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OBSERVE: A multimedia course on the observational analysis of behavior

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OBSERVE is a preliminary release of a multimedia course for teaching undergraduate and graduate students how and why to study behavior by direct observation. The instructional text and commentary and the self-test and examination materials are built around a series of exercises in which the student observes and categorizes film clips of the behavior of several different species in several different ways. Incorporation of elements from The Observer software for computer recording and video analysis implements fully computerized continuous recording. At present, the text, together with check sheets that the program generates, enables a comparison between one–zero, instantaneous, and continuous sampling of the same behavioral excerpts. Matrices are printed out for an exercise in calculating interobserver reliability. Another section supports carrying out and writing up a small observational project on human behavior in the field. Plans for the future development of OBSERVE are briefly described.

OBSERVE was created as Socrates Project 25230-CP-2-97-1-GB-ODL-ODL of the European Commission, which gave financial support to the development of the multimedia course as a vehicle for open and distance learning. The authors thank Arthur Wammes (multimedia programmer), all our participating colleagues at Noldus Information Technology, the staff of the Television Service at the University of Liverpool, especially Susan Wilson-Mackell (graphic artist), Kevin Jones and Steve Bellis (camera), and Rebecca Woodnutt (video editor), and the staff and, particularly, the students at the universities of Liverpool, Barcelona, and Iceland, for giving us feedback on how to improve the course. The video film material was shot on multiple cameras by the team in the Television Service of the University of Liverpool under the direction of C.M.N., recorded on Betacam S.P. analogue tape, and edited in digital format on an Avid machine. On-location filming was done, for kittiwake gulls, on Lundy, a small island in the Bristol Channel, U.K.; for macaque monkeys and chimpanzees, at Chester Zoo; for nursery school children, at two day nurseries in Liverpool; and for people arriving at an airport, in the International Arrivals terminal at Manchester airport. An examination copy of the preliminary version of OBSERVE on CD can be obtained from Noldus Information Technology b.v., Costerweg 5, P. O. Box 268, 6700 AG Wageningen, The Netherlands (e-mail: marketing@noldus.nl), who will be happy to answer any technical questions. Address scientific/ educational information or comments concerning this article to D. W. Dickens, Department of Psychology, Eleanor Rathbone Bldg., Bedford Street South, University of Liverpool, Liverpool L69 7ZA, England (e-mail: dickins@liverpool.ac.uk).

Psychology and behavioral biology are rightly valued for their capacity to predict, control, and analyze the organization of behavior in the experimental laboratory. Explanations of behavior are of little value, however, unless we know what behavior there is that we need to explain.

Students may need to be reminded that the phenomena of behavior, the raw data to which these sciences are addressed, are the complex actions of organisms living in their own physical and social habitats—the context in which their entire repertoire of behavior and the way it has developed and is organized has evolved.

To obtain valid, representative data in the field requires both skill and patience. At least some of the requisite skills can be brought into the laboratory by displaying and analyzing film material on a computer. This also provides an ideal opportunity to foster the development of good observational practices.

ESSENCE OF THE PROGRAM

OBSERVE[1] is designed to provide a course module in learning why and how to conduct systematic objective ob-

servations of the behavior of animals and humans in their own habitats that is suitable for undergraduate and graduate students of psychology and the biology of behavior. The earlier sections are also suitable for advanced high school students. It may also be useful to others who have a professional interest in recording people's behavior in the environment.

The program combines advanced software for the computer recording and analysis of behavior, including the facility for video analysis, with film examples of human and animal behavior. The multimedia course is divided into a logical sequence of sections, with many text screens that explain the science and methodology of behavioral observation, and it provides exercises, both on and off screen, to develop the user's understanding and skill.

The format is intended to encourage serious study and to convey something of the patience that is required adequately to sample (and savor) the behavior of organisms. It is hoped that this will whet the appetite of the student for objective and methodical observation, both in a professional context and in ordinary daily life.

HOW THE PROGRAM DEVELOPED

Earlier cooperation between the Dutch and English contributors had resulted in the publication of the four volume, *Video Course in Behavior Observation* (Dickins, 1994, 1996; Dickins & Clark, 1993, 1994). This provides instructional and illustrative exercise material on videotape, together with facilities for both pencil-and-paper and computer recording and analysis of behavior.

These partners were joined by the contributors from Spain and Iceland in a successful bid to obtain support from the European Commission to develop a substantial multimedia extension of this approach in relation, primarily, to open and distance learning.

Thus, OBSERVE is designed principally to be used by students working individually at their own computers, and this can be done at home or in a remote location. If used on campus, aspects of the present program can be used with a group, although it is ideally suited to a computer laboratory. Working in pairs is often to be preferred, not only for economy of computer access, but for good educational reasons of cooperative exploration as well. The whole nature of categorization, for example, comes into focus when two students address together the issue of interobserver agreement. With this program as a platform, the skills of an enthusiastic tutor, with or without personal experience of observational research, can be employed to optimal effect.

AIMS AND OBJECTIVES

Blasko and her colleagues (Blasko, Kazmerski, Corty, & Kallgren, 1998) give a good account of some principal reasons why the naturalistic observation of behavior is important and of several effective ways in which multimedia technology can facilitate learning how to do this.

The Orienting Attitude of the Present Program is Ethological and Evolutionary

The program starts with the view that behavior is the flux of activity of a living organism as it occurs in the field (the habitat in which that organism lives). Manipulation of stimulus conditions or constraints on behavioral outputs, as in laboratory or in field experiments, is best applied only when the rich variety of unrestrained behavior has become familiar to the investigator. This applies as well to humans in today's artificial environment as it does to other species in the natural world. We must bear in mind that the environment of evolutionary adaptedness of our species may have spanned mostly Pleistocene, rather than Holocene or postliterate, times; just as often now, we may be observing other species in atypical conditions, because of more recent human influences. In any case, behavior constitutes the primary data of psychology, as well as of ethology, and observation is the initial means of measuring it. This natural science orientation can be applied to the actions of humans in the cultural and technological settings of today without ruling out complementary accounts of them in terms of cultural history and social functions.

Problems of Behavioral Description

Initially, measurement is largely by qualitative description, and therefore, it principally yields nominal data.

The student needs to be aware that we all possess, through our natural language, a set of descriptive categories, many of which have developed specifically to refer to the actions, motivations, and probable future actions of other organisms, especially other people. Inherent, therefore, in human language is a *folk psychology* (Stich, 1983), which can be both elegant and cumbersome, insightful and misleading, in construing categories of description. The thrust of the present program is the importance of developing objective, impersonal, and impartial descriptions of behavior in sufficiently explicit detail, rather than using interpretive ratings, often unsystematically based on ill-formulated or tendentious hypotheses.

In What Different Ways Can the Program be Used?

The program aims to demonstrate the value of the direct measurement of behavior by observation and to show how to analyze, interpret, and report the results obtained.

The more advanced analytical components will be more suitable for advanced undergraduate and graduate students, who most likely will be doing their own observational research. Scientists and other persons working in the community, such as police, marketing strategists, human factors engineers, ergonomists, and sports coaches, may also benefit from the whole course, even if their principal interest is to explore the more sophisticated observational analyses introduced in later sections of the program.

RUNNING THE CD-ROM

The present multimedia program is contained within a single CD-ROM, which will run from the CD-drive of any fast PC with Windows 95, 98, or NT and with suitable software for playing MPEG-1 video clips. With a unique user name, output from all sessions will be accumulated on the user's floppy diskette.

The program has parallel French and English versions, which the user can select between at the start.

FINDING YOUR WAY AROUND THE PROGRAM

Figure 1 shows the *wheel*, or *eye*, which serves both as home page and the highest level map of the program.

Sections are entered by clicking with the mouse on one of the 14 spheres (Figure 1). The Opening Video is at the top, followed by Sections 0–13 in clockwise order (see Table 1). This is the most logical order in which to follow the course, but the user is free to explore, and certain meaningful cross-links are specifically implemented by a *jump* facility.

For more detailed navigation, a map we used in an earlier prototype was replaced with a hierarchical system in each section. It appears adequately intuitive: The track records (see below) indicate that it quickly becomes clear to users.

ASSESSMENT OF THE PROGRAM

The effectiveness of the program can be gauged by the designers, by instructors, and by students themselves from (1) the quality of the students' performance on the exercises, including tests of interobserver reliability or of how ratings compare with a master file; (2) the write-up of a small field project guided by material in the CD-ROM; (3) working through test yourself questions incorporated in the text; (4) before-and-after scores on the incorporated multiple choice inventory; (5) a built-in users' assessment questionnaire; and (6) by the inherent application of The Observer's technology, to keep a track record of the sequence and duration of visits by the student to all the parts of the instructional program.

OTHER PROGRAMS AND ALTERNATIVE METHODS OF TEACHING BEHAVIORAL OBSERVATION

The multimedia combination of text and video clips with established computer programs for collecting and analyzing observational data is ideally suited to teach the preliminaries of how and why to study behavior by direct observation. Time-honored methods of showing students how to do this by using film material in the laboratory or by supervising individual observational projects in streets, zoos, or wilderness field trip settings, familiar to the first

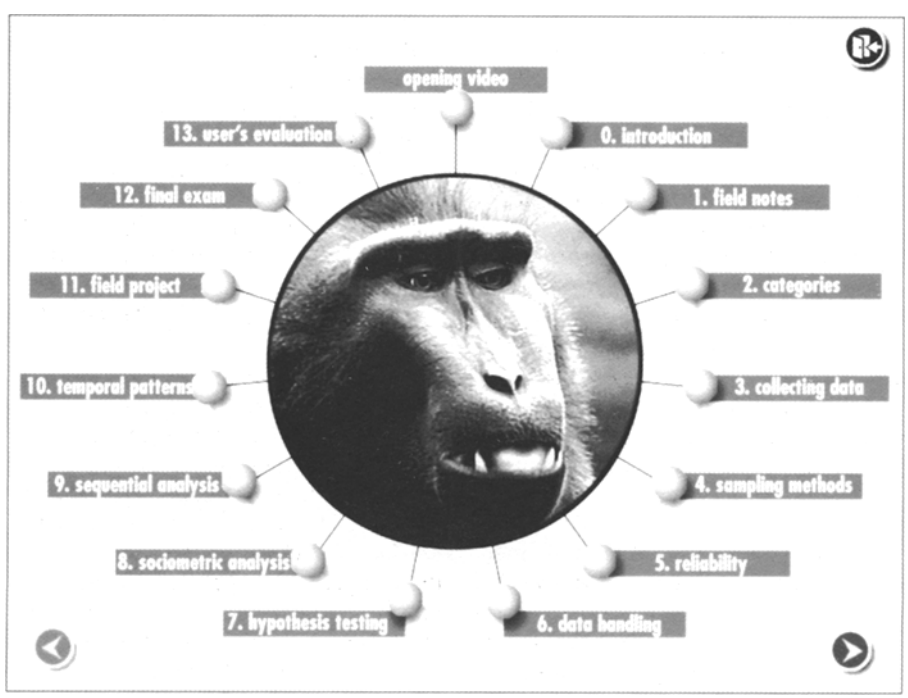

Figure 1. Home page *Wheel*, or *eye*, of OBSERVE. Each button selects a different section (see Table 1).

Figure 2. User's first view of The Observer Video-Pro data recording screen. Clockwise from top right: video monitor view of child in nursery; video controls (e.g., play, pause, rewind); behavior codes menu; event log (event, time, behavior code); timers; box indicating behavioral class and current code.

author, are very costly in tutor time; concentrated use of these can be directed to more experienced and enthusiastic students, selected after they have worked hard at this extensive multimedia program.

To the authors' knowledge, two other groups—Blasko and her colleagues (Blasko et al., 1998) and Oates and his colleagues (Gove, Oates, & Littleton, 1998; Hall & Oates, 1997)—are working on multimedia instructional packages on behavioral observation.

Blasko et al.'s (1998) package contains exercises for class and individual follow-up work. Coding methods include recording the frequency of events, measuring the duration of states, and making a binary classification. Chi square and Cohen's kappa are explained. This shell provides space into which the individual instructor may insert explanatory material. Glossary items may be edited, and the small library of films may be supplemented by the user's own film materials.

Oates's program, fOCUS (currently in a publishers' draft, but contact may be made with <J.M.Oates@open.ac.uk>), has several of the research features of The Observer package, including some of its video analysis facilities. An HTML instructional text is to be incorporated. It is a shell to which academics working in various areas involving observation can add their own film and instructional material. Oates's own specific module, Child Development Observation Resource (CDOR), understandably concentrates on the human species.

A package already published, in Dutch, is the second edition of a book by J. P. van de Sande (1999), together with a workbook (Christophe & van de Sande, 1999). The former contains insightful little exercises on observing people in quotidian situations and very much encourages reflection, as OBSERVE sets out to do, on the nature of observation. The workbook presents a series of exercises and is accompanied by a CD-ROM of short films of human behavior, which simple applications of The Observer enable students to code.

PLANS FOR FUTURE DEVELOPMENT

In the more advanced sections (8–10) of the course, much of the explanatory text is in place, ready for the projected incorporation of active versions of the following three programs in the fully developed version of Eye on Behavior: (1) "Matman" (based on the original publication by De Vries, 1993), for the analysis of hierarchies; (2) The GSEQ software (Bakeman & Quera, 1995), for the analysis of sequential dependencies; when the new version is incorporated, it will be able to work directly with the ODF data from The Observer (Bakeman & Quera, 2000); (3) "Theme" (Magnusson 1996, 2000), for the analysis of temporal patterns in both consecutive and temporally separated events.

Slots also exist in several parts of the OBSERVE program for the insertion of upcoming revised versions of

Table 1
Main Contents of the Sections Around the Home Page Wheel, or Eye

Section	Brief Description
Opening video	Flings user into busy human scene, but shows how other scenes and species (human adults and children, apes, monkeys, birds) will also be included.
0. Introduction	Explains navigation, value to user, work requirements, general contents, and credits.
1. Field notes	The problems of ordinary language description are shown by dissection of the user's notes on a sample behavior sequence. The user is invited to type in personal descriptions of behavior in his or her own words, selecting samples of kittiwake gulls, chimpanzees, or people at an airport.
2. Categories	Addresses fundamental question, "what is a good category?" Two types of exercises are given, both using computer recording: (1) inventing one's own categories by demarcating transitions (adult human or chimp example), and (2) learning to apply categories provided from the literature (with choice of the Kittiwake gull (*Rissa tridactyla*), Black macaque monkeys (*Macaca nigra*), or nursery school children). This exploits the incorporated video analysis function of The Observer software (Noldus 1991; Noldus, Trienes, Hendriksen, Jansen, & Jansen, 2000), which lies at the heart of this CD-ROM (see Figure 2).
3. Collecting data	Introduces hypothesis construction, followed by a review of alternative practical ways of recording in the field.
4. Sampling methods	Compares in a practical exercise (using print-out record sheets for manual recording in the preliminary version) different recording methods (continuous recording, instantaneous or point sampling, and one–zero recording; Lehner, 1996; Martin & Bateson, 1993) applied to the same film excerpt.
5. Reliability	Users learn this concept by transcribing their data files to print-out matrices from which percentage of inter- or intraobserver agreement can be calculated.
6. Data handling	Illustrates how The Observer data files may generate time–event plots and tables of elementary statistics.
7. Hypothesis testing	Cross-relates to life history of a project in Section 11 and then extends the exercise on monkeys in Section 2, using The Observer, to test a specific hypothesis.
8. Sociometric analysis	Explanatory shell on matrix analysis showing how to derive dominance hierarchies from a table of dyadic relations.
9. Sequential analysis	An example from the kittiwake literature (Daniels, Heath, & Rawson, 1984) is used to show how The Observer sequential analysis works. An explanatory shell explains the functioning of the GSEQ program (Bakeman & Quera, 1995).
10. Temporal patterns	Describes the workings of the Theme algorithm for the discovery of temporal patterns (Magnusson, 2000).
11. Field project	Complete instructions for planning, carrying out, analyzing the results, and writing the report on a simple human observational study users may carry out for themselves in the field, a replication of Wirtz and Waurra (1986).
12. Final exam	A multiple choice inventory to test knowledge gained on the multimedia course. It is automatically marked and can be used as a before and after test to measure academic gain.
13. User's evaluation	Questionnaire testing many aspects of users' reactions, which can assist future development of the program.

Table 2
Other Features of the OBSERVE Program

Other Features	Brief Details
Test yourself questions	After each section of course. Some simple, to promote reflection; some multiple choice, with guidance toward the correct answer.
Glossary	Accessible at all times from icon at foot of screen, and also hot-linked to technical terms on introduction.
Bibliography	All learned references in the text screens, although not yet hot-linked, can be looked up simply by clicking on the Bibliography icon and locating them alphabetically.
Hypertext branches	More technical (even esoteric?) screens attached to hot-spots for more advanced users to explore concepts in greater depth, and some background literature on examples used for exercises.
Track record	A complete Observer data file of every screen visited, every exercise performed, and every term or reference looked up and of the time spent doing this, to see how the program has been used.
Videos	Clips from broadcast quality films made by the Liverpool TV unit on four species and seven scenes, digitized into MPEG files for the exercises. Reserve of material exists for amplification.
Commentary	In places, a vocal explanation is given to supplement guidance information on the text screens.

The Observer and associated software from Noldus Information Technology. For example, when the reliability components of The Observer are fully grafted in, Cohen's kappa will be provided, and the problem of how much temporal disparity to allow between reports of the same category by two observers will be addressed.

The course will provide extensive experience with slightly restricted student versions of all these programs.

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NOTE

1. The provisional name OBSERVE is an acronym for "observation in the behavioral sciences: a European research and valuation exercise." On completion, the program will be renamed Eye on Behavior (L'Oeuil sur Comportement).

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