

## ***Behaviorology Curricula in Higher Education***

**Stephen F. Ledoux**

*The* By-laws of the professional organization of behaviorologists, *The International Behaviorology Association* (TIBA), state that one of several purposes of TIBA is “to promote a scientific ‘Behavior Literacy’ graduation requirement of appropriate content and depth at all levels of educational institutions from kindergarten through university” (TIBA, 1989, p. 3). To carry out this and other TIBA purposes, large numbers of fully trained behaviorologists are needed.

### **Some General Behaviorology Training Concerns**

Since comprehensive professional training historically occurs at colleges and universities, behaviorologists’ initial efforts regarding training programs should address curricula at that level. Therefore, this paper focuses on behaviorology curricula in higher education, including curricula at the Associate (A.A.), Baccalaureate (B.A.), and Master of Arts (M.A.) / Master of Science (M.S.) degree levels.

#### ***Consensus***

The success of curriculum development efforts depends in part on consensus regarding the repertoires of behaviorologists and the curricula to generate those repertoires. So, one purpose of this paper is to contribute to the development of that consensus.

Achieving consensus on repertoires and curricula can facilitate the development of additional academic homes and programs of behaviorology in which to implement such curricula. Descriptions of the repertoires of behaviorologists provide standards against which professional organizations evaluate curricular programs for certification or accreditation. Consensus statements about the desired repertoires—in the form of a variety of general and specific program descriptions as presented here, or in other forms—could assist behaviorologists as they prepare proposals to establish or expand programs in their own academic units. Behaviorologists could point to the consensus as an appropriate indication of disciplinary maturity, organization, and solidarity, and these are important characteristics that would likely be taken into account by those to whom behaviorologists present program proposals.

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Consensus can, and perhaps must, vary across academic levels. Given the foundational nature of the A.A. and B.A. levels, consensus at these levels is especially important and might be easier to obtain. Other natural science disciplines have reached a workable consensus on curricula at those levels. Given the increasing specialization for which graduate trainees prepare, programs at M.A. and doctoral levels are more variable, making standardization more difficult. Consensus for these higher levels usually involves more general guidelines with respect to the repertoire components that denote a specialization within a behaviorological repertoire.

### ***Curricular Design Alternatives***

The behaviorological literature already contains expressions of concern (e.g., Michael, 1980) about the contents of training programs for professionals in the science of behavior founded by B.F. Skinner. Most such articles, however, were written while behaviorological science shared a history (Ledoux, 1997a) with another discipline. They focused on training problems that arose *from* that residence, such as the requirement that some training time be devoted to courses with cognitive/mentalist contents (see Fraley & Ledoux, 1997, for a full discussion). These articles addressed the question of what should be done with our *share* of the training time (which often shrank even as the scientific content to be covered expanded). This paper explicitly addresses the chief alternative by posing the question of what we want to do with behaviorology training time when we behaviorologists are responsible for *all* of it. How should behaviorologists be trained?

One approach to designing curricula starts by describing an ideal finished product: the repertoires whose refinement and manifestation denote a behaviorologist. In this approach, a curricula organizer might specify a comprehensive list of behavioral objectives relevant to the topics in the subject matter of behaviorology and design curricula around that list.

At the first TIBA convention, Michael (1988) presented a tentative list of important topics in behaviorology. His list included both respondent and operant conditioning, and virtually all known subtopics. Behaviorologists might add to this list the appropriate philosophical, analytical, technological, and other relevant topics to create a master list. That master list could be organized under conceptual headings that could become parts of course titles, including "Conceptual Foundations" (philosophical, analytical, interpretative, and historical), "Experimental Foundations" (basic and applied measurement, methodology, and research), and "Technological Foundations" (effective applications in general and in specific areas). This might be the approach of choice, especially when designing curricula in a situation free of those current administrative contingencies in higher education that constrain effective educational practices.

The approach of this paper differs. For convenience, it uses the firmly established and administratively sanctioned degree structure of higher education in the United States of America (i.e., A.A., B.A., M.A./M.S., and Ph.D.) as a familiar foundation, while acknowledging other equally viable systems. More specifically, the curricular designs presented here take into account various (and sometimes constraining) academic and administrative contingencies. An example of a constraining contingency would be the requirement that all students conform their speed of progress on a set of course materials to a particular amount of time (for instance, three contact-hours per week for a 15-week semester). At the same time, the curricular designs presented here seek to pro-

vide, through as much practice of behaviorologically sound educational methods as possible, some of the evidence upon which to base improvements to administrative contingencies, improvements that bring those contingencies and improved educational methods into conformity.

This design option then proceeds by bringing together aspects of the programs and courses through which behaviorologists currently teach approximations of the complete behaviorological repertoire in various educational settings. These programs and courses appear here as a series of curricular structures. While specifically *not* designed for any particular institution, the description of these curricular structures may ease the task for others who are designing programs by providing a set of patterns and components that they can adapt to their own situation. To the extent that the curricular structures and components described herein derive from the current teaching activities of behaviorologists, some consensus is automatically inherent.

### ***Facets of Program Design***

Program design involves at least three facets: (a) *curricular* concerns which center on course descriptions, course sequences, and component courses of degree programs, (b) *resource* concerns which center on staff, facilities, and materials, and (c) *instructional* concerns which center on staff skills and instructional design and programming for each course. The design option presented here emphasizes the curricular concerns, and acknowledges that resource concerns are specific to the educational institution in which a program designer operates.

With respect to the instructional concerns, this design option reiterates the demonstrated value of implementing the educational methods derived from behaviorological science (see Johnson & Layng, 1992; J. Vargas, 1988). This design option also supports the improvements to administrative contingencies implicit in that science. For instance, on the basis of the type and the extent of the repertoire that is conducive to effective educational design, Vargas and Fraley (1976; also see Vargas, 1996) proposed dividing the content and process functions of teachers between subject-matter experts (persons with an extensive repertoire in a particular subject matter) and educational design experts (persons with an extensive repertoire in educational behaviorology). Such a division would provide an important foundation for further improvements to administrative contingencies that could enhance the effectiveness of education throughout an institution's programs. For instance, while design and content experts make equally vital contributions to the success of a course, one design expert can pair up with several content experts to achieve those results with many courses.

## **Curriculum Related Issues**

The four programs described in detail here (of which three award certificates and one is the B.A. diploma) are not the first programs with behaviorological *content*. Most such programs, however, are embedded within the curricula of other disciplines or fields. For example, in the early 1970s, Joseph Morrow started offering an undergraduate, behaviorological science "Certificate in Behavior Modification" within the psychology department at California State University, Sacramento (see Ledoux, 1997a). Other examples are (a) the graduate training offered by Lawrence Fraley (see Fraley, 1996), Ernest Vargas,

and Julie Vargas in education at West Virginia University, Morgantown, and (b) the graduate training offered by Jerome Ulman in special education at Ball State University, Muncie, IN. These are more appropriate because a number of basic *disciplines*, behaviorology among them, can inform an applied behavioral *field* such as education or special education, and some disciplines can do so more effectively than others.

Some programs are administered independently of other disciplines and fields. One example is the M.S. program with behaviorological content at North Texas State University (Denton) that Sigrid Glenn directs within a university unit separate from the departments of other disciplines or fields. In terms of resources, credibility, and stability, the establishment of programs *within academic departments of behaviorology* is preferred, perhaps with behaviorology departments being administered within larger academic units also responsible for other *life sciences* such as biology and culturology (i.e., natural science anthropology; see Fraley & Ledoux, 1997, Ch. 6).

### ***Overview of the Certificate and B.A. Programs***

*The programs will be described here as if they already existed so as to avoid excessive use of the subjunctive.*

These programs provide one of various ways to organize comprehensive behaviorology training according to differing student needs. Students might include (a) those who want to fulfill a Behavior Literacy graduation requirement, (b) those who are majoring in behaviorology at the A.A. or B.A. (or M.A./M.S.) level so as to investigate or enter a career as a behaviorologist, and (c) those who are working or studying in another human–service or human–development field for which they want behaviorological input.

***Behavior Literacy.*** The first program leads to a *Behavior Literacy Certificate* (BLC, or simply “Literacy Certificate”). The BLC requires nine semester hours (three courses) including six hours (a two–term sequence) of Introduction to Behaviorology. The third course, The Behaviorology of Child–Rearing Practices, is important, for it ties behaviorology in detail to a vital component of the daily life of virtually every person, behaviorologist or not. The third course thereby demonstrates in a practical way the value of Behavior Literacy. If this third course is unavailable, then (a) its topic should be incorporated into the remaining required courses (even though this would mean covering less detail in this and all other topics), and (b) a special certificate would not be warranted. The criterion of completing an especially demanding, three course, higher education Behavior Literacy graduation requirement justifies granting a certificate. (Other literacy graduation requirements, such as Computer Literacy requirements, rarely demand more than a two course sequence and may never earn a certificate.)

***The ABC.*** The second program leads to a certificate called the *Affiliate of Behaviorology Certificate* (ABC, or simply “Affiliate Certificate”). This certificate requires three courses beyond the BLC, for a total of six courses. The ABC is an intermediate step, at the undergraduate level, between the minimum behavior literacy repertoire, represented by the BLC, and the two more advanced programs, one for majors and one for professionals, both of which incorporate this 18 semester–hour program. In essence, the ABC is similar to an undergraduate minor. With relevant changes in course numbers and levels (as indicated in the requirements for the ABC), this program could constitute a reasonable lower division or two–year college major at the A.A. level.

***The PSBC.*** The third program leads to a certificate called the *Professional Studies in Behaviorology Certificate* (PSBC, or simply “Professional Certificate”). This is a 30 se-

mester-hour program with four courses beyond the ABC. The PSBC provides basic training for non-behaviorological professionals. This specifically includes persons working or studying in another human-service or human-development field. The PSBC is designed to add a solid foundation in behaviorological science to their professional repertoires so that they may take into account implications of behaviorological science for their work. Whether they hold a graduate degree, an undergraduate degree, or as yet no degree, such professionals may seek this certificate because it is similar to a minimal major in behaviorology (like a second, or double, undergraduate major); meaningful benefits accrue without needing further graduate studies outside their original areas of professional interest. Alternatively, they could seek a graduate behaviorology degree. (However, while the repertoire acquired through the PSBC is appropriate for bringing behaviorology to bear on work in various applied behavioral fields, the more extensive repertoire acquired through the B.A. program is the preferred background for further study in behaviorology.)

**The B.A.** The fourth program adds nine courses to the ABC requirements and represents a strong, 45 credit-hour undergraduate major culminating in a baccalaureate degree. This program is designed to lay a thorough foundation both for entry-level employment in fields where behaviorology is the appropriate foundation science and for further graduate level studies in behaviorology.

### ***Program Parameters***

Program requirements reflect the familiar arrangements of courses each having three contact credit-hours attached, with three laboratory hours replacing one contact hour, in a 15-week semester. (These parameters, while not the best known arrangements, are used because they are the kinds of parameters program designers will likely face when they begin a program proposal. Improvements can be a part of a proposal or can follow at a later time.) Also, the course numbers used here reflect lower division credit (100/200 level), upper division credit (300 level), shared upper division/graduate credit (400 level), and graduate credit (500/600 level). To fulfill the requirements for elective courses, a variety of additional behaviorology courses that could serve as electives are included in the list of course descriptions.

As is typical of natural science training curricula, and to make these program descriptions more useful to program designers, the courses in the programs of this natural science follow systematic sequences. Repertoires gained in early courses form systematic foundations for the contents of later courses. So the courses are listed in a preferred enrollment sequence, with prerequisites noted explicitly. Instances where concurrent enrollment (corequisite) could be allowed to replace a prerequisite are listed as well. (The preferred enrollment sequences could not consistently reflect the arithmetic sequence of the course numbers because the actual numbers were arbitrarily selected to keep, if possible, thematically related courses numerically close.)

### ***Specific Program Requirements***

**Behavior Literacy Certificate.** The following fulfill a comprehensive higher education Behavior Literacy graduation requirement:

- I. Behaviorology 101:** Introduction to Behaviorology I. (Includes Lab on basic principles and methods.)

2. **Behaviorology 102:** Introduction to Behaviorology II. (Includes Lab in simple applied research and methods. Prerequisite [Pre]: Beh. 101.)
3. **Behaviorology 201:** The Behaviorology of Child–Rearing Practices. (Pre or co-requisite [Co]: Beh. 102.)

**Affiliate Certificate.** The first three requirements are equivalent to those for the Behavior Literacy Certificate. Additional requirements follow those three:

- 1–3. (As in the BLC.)
4. **Behaviorology 320:** History and Philosophy of Behaviorology. (Pre/Co: Beh. 102.) [In an A.A. program, the course number would indicate the lower division level, e.g., 220.]
5. **Behaviorology 325:** Behaviorology and Culture. (Pre: Beh. 102.) [In an A.A. program, the course number would indicate the lower division level, e.g., 225.]
6. **Behaviorology 335:** Survey of Behaviorology Applications. (Includes Lab/fieldwork in measurement and applied methods and research. Pre: Beh. 201.) [In an A.A. program, the course number would indicate the lower division level, e.g., 235.]

**Professional Certificate.** The first six requirements are equivalent to those for the Affiliate Certificate. Additional requirements follow those six:

- 1–6. (As in the ABC.)
7. **Behaviorology 355:** Verbal Behavior I. (Pre: ABC.)
- 8–9. Electives: two behaviorology courses relevant to the student's professional area (see course descriptions).
10. **Behaviorology 496:** Professional Paper. (Pre: Beh. 355 and one of the electives; also, Pre/Co: the other elective.)

**B.A. Program.** The first six requirements are equivalent to those for the Affiliate Certificate. Additional requirements follow those six:

- 1–6. (As in the ABC.)
7. **Behaviorology 365:** Advanced Behaviorology I. (Pre: ABC.)
- 8–9. Electives: two Behaviorology courses (see course descriptions).
10. **Behaviorology 340:** Behaviorology in Education. (Includes a Lab on course and educational materials design. Pre: ABC.)
11. **Behaviorology 395:** Teaching Practicum in Behaviorology. (Pre: Beh. 340 plus the course in which the student is to assist.)
12. **Behaviorology 345:** Experimental Behaviorology: A Survey. (Includes Lab in course–related experimental research. Pre: ABC.)
13. **Behaviorology 355:** Verbal Behavior I. (Includes a Lab on verbal behavior [VB] research. Pre: ABC.)
14. **Behaviorology 385:** Behavior Technology: A Survey. (Includes Lab/fieldwork in course–related applied research. Pre: Beh. 345.)
15. **Behaviorology 495:** Personal Project or Paper, *or* **Behaviorology 496:** Professional Paper. (Pre: Beh. 355 and one other behaviorology course; also Pre/Co: another behaviorology course.)

### ***General Program Requirements and Conventions***

In these programs a course counts toward requirements by meeting an appropriate level of behaviorologically based educational evaluation criteria. These criteria combine percentage, frequency, and other applicable measures, in overlapping parts of an instructional sequence. For example, percentage measures would apply more during the

acquisition of new behaviors to meet the original specification (mastery) of any particular educational objective of a course, and would then overlap with frequency measures that apply more to the performance improvement and maintenance specification (fluency) of those educational objectives. Such measures would be involved with each objective as a student progresses through the series of objectives for a course.

Differences in usage, however, require a clarification about the term *mastery*. In some circles, mastery means setting a criterion, perhaps at a high level, for students to meet for a particular grade, as an alternative to grading students on a statistical curve. But in the context of behaviorology training, and in the more general context of behaviorology-derived practices in education, mastery implies much more than just meeting a set standard. In these contexts mastery requires at least (a) that material has been prepared for presentation in numerous small steps providing for, and demanding, a high density of successful and properly consequated student responses, (b) that students are not allowed to move on to another component until they are competent on previous components, and further (c) that the material has been approached systematically so that acquiring a repertoire in later components *relies* upon having already acquired a competent repertoire in earlier components. (Through this last requirement, mastery automatically contributes to fluency.)

Based on their understanding of mastery and fluency, behaviorology program operators will specify both the mastery-generating instructional design as well as the criteria by which a student's passing a course will fulfill a program requirement. However, these programs operate within some administrative structure, and so will be required to state their design and criteria in terms amenable with the practices of that structure. (Discussion about improving those practices extends beyond the scope of this paper.)

Since administrative practices differ among institutions, an approximation of the relation between passing a course and fulfilling a program requirement provides an adequate starting point for program designers: For a course to count towards requirements, a student must pass it at the "A" level, representing a 90% mastery criterion combined with an appropriate fluency criterion. If a "B" or "C" is earned (80% and 70% respectively), the course might count for general academic credit but not toward these certificates or degrees until remediation to the "A" level has been completed. For a grade less than "C," the student must repeat the full course, completing it at the "A" level (by remediation if necessary) before it can count towards fulfilling requirements.

Assuming that the methods of educational design used to teach these courses invoke the principles of behavior being taught, these standards should pose no unreasonable barriers for the typical student in higher education. Ideally, students should complete a course at their own pace, based on established yet evolving mastery/fluency criteria, and then move right along to the next course, regardless of calendar terms. This pacing may differ from the classic self-pacing of PSI (Personalized System of Instruction; see Keller & Sherman, 1982). Some research (see Buskist, Cush, & DeGrandpre, 1991) indicates that the classic self-pacing of PSI may not be absolutely required for educational success.

### ***Program Validation***

TIBA, through its Academic Affairs Committee, is undertaking to provide some form of certification or accreditation for behaviorology programs. TIBA might then review those programs every few years. For a program to be called a behaviorology pro-

gram, it would meet the criteria set by TIBA. As more actual programs come on line, numerous minor variations from recommended programs will occur. This type of variation is normal, usually reflecting continuing advances in the discipline as a whole, and should disturb no one. For instance, the courses and requirements for a physics degree at Stanford differ from those at Yale, but no one has claimed one or the other to be inadequate on that basis. With respect to behaviorology, the programs described here are merely part of a larger number of programs that could fall within a range of acceptable criteria.

A *range* of criteria is appropriate for a discipline based on selection. The programs delineated in this paper would change over time also, within a range of acceptable criteria. These programs would change both as behaviorologists become more effective with respect to behavior–environment relations, and as solutions to curricular problems arise in the practice of designing and operating actual programs.

### **Graduate Level Programs**

**Master's Program.** With the PSBC or, preferably, the B.A. program as a prerequisite, a masters–level program might require 30 additional credits over nine or ten courses such as these (see the course descriptions for details on examples):

**Beh. 475: Verbal Behavior II.** (The course description includes a laboratory component on VB research. Pre: Beh. 355.)

**Beh. xxx.** An M.A. program includes at least one course, or preferably a two course sequence, on **research methods and measurement** that covers a measurement–based analysis of behavior at the level of the specific properties of behavior, and that uses more up–to–date sources to cover the behaviorological material contained in works like Sidman's (1988) *Tactics of Scientific Research* and Johnston and Pennypacker's (1980) *Strategies and Tactics of Human Behavioral Research*.

**Beh. xxx.** An M.A. program includes at least one **experimental research** course involving laboratory responsibilities (e.g., Beh. 450).

**Beh. xxx.** An M.A. program includes at least one **applied research and fieldwork** course involving research and/or technological responsibilities (e.g., Beh. 490).

**Beh. xxx.** An M.A. program includes at least one **seminar** course (e.g., Beh. 430, 440, or 465).

**Beh. xxx.** An M.A. program includes three to five elective courses (9–15 credits, depending on the credit value of the thesis, to bring the total number of credits to at least 30) determined in consultation with the student's advisor and considering the need for both generality and specialization at this level.

**Beh. 600: Master's Thesis/Practicum.** With 1–6 credits, as determined by the student's thesis committee in advance, and based on the scope of the work, this course should be taken in the final term prior to completion of all degree requirements.

A student may seek an M.A./M.S. degree in behaviorology without any previous behaviorology training. One starting point to plan graduate studies under this circumstance is to rely on the sequence of courses inherent in the system of prerequisites for required masters–level courses.

**Ph.D. Program.** Doctoral programs should require a third course, with a laboratory component, on advances in the analysis of verbal behavior. But beyond that, the more specialized nature of doctoral programs takes discussion of their contents beyond the scope of this paper.

## Behaviorology Courses

### *Descriptions of Principle Courses in these Programs*

Various behaviorology courses are described. These include a range of potential elective courses since electives are among the proposed requirements. Logical prerequisites are also listed. With the exception that either Beh. 495 or Beh. 496 fills the same explicit requirement, course numbers with an asterisk (\*) indicate courses explicitly specified for the B.A. program.

**Beh. 101\*:** *Introduction to Behaviorology I.* *Introduction to Behaviorology* is a two-course sequence, for both majors and non-majors, on the science of the variables controlling the behavior of humans and other animals. This first course of that sequence introduces the student to the range of components that comprise the discipline of behaviorology including (a) its philosophy of science and selection paradigm, and (b) its experimental methods, theory, and technology. The philosophy and paradigm include the criteria for natural science, the fallacy of inner causes, the significance of control and selection, the status of private events, and the behavior of the scientist. Methods include basic single-subject designs and measurement. Theory includes the fundamental natural laws describing the antecedent and postcedent relations between behavior and its controlling variables; these include such basic principles as added and subtracted reinforcement and punishment, extinction, simple schedules, stimulus control, and establishing operations. Technology includes the basic practices used to apply behaviorological principles to change accessible variables so as to change and especially to expand behavior repertoires through behavioral engineering. Basic techniques include differential reinforcement, shaping, fading, chaining, modeling and imitation, and time out. Other topics include superstitious behavior, emotion, escape and avoidance, and deprivation and satiation. The course includes a laboratory component on the basic principles and methods.

**Beh. 102\*:** *Introduction to Behaviorology II.* *Introduction to Behaviorology* is a two-course sequence for both majors and non-majors. This second course of that sequence begins by introducing the student to the basic application of behaviorological principles and techniques to the prevention and solution of mild to moderate (non-incapacitating) behavior problems in the most common settings (e.g., child rearing, education, business and industry and organization management). The course includes a laboratory component on applied behaviorology research and methods, starting with the student changing his or her own behavior. The course also introduces analyses of complex behaviors and the variables of which they are a function, such as event-shaped and verbally-mediated behaviors, social behavior, verbal behavior, stimulus equivalence relations, multi-term contingencies, personal control, group control, cultural design, and various controlling agencies (such as in economics, education, government, law, religion). The course also includes analyses of (a) the preference for design rather than accident or chance in the control of both individual behavior and, especially, cultural practices, and (b) the relevance of science to ethics and morality. (Pre: Beh. 101.)

**Beh. 201\*:** *The Behaviorology of Child-Rearing Practices.* This course covers, in two parts, the science and technology of behaviorology applied to the child-care repertoires of parents. The first part covers some methods applicable throughout pre-adult

years which encourage the *prevention* of the common behavior problems of these years. Some common problems that can be avoided are associated with bedtime, eating, dressing, shopping, and automobile travel. Some methods to prevent these problems include “catch ‘em being good,” let kids help, monitor kids, orderly routines, time out, and other forms of discipline. The second part covers some methods applicable to helping distraught parents change problem behaviors that have occurred (i.e., “cure” techniques, rather than prevention techniques). Other topics include toilet training, language, intelligence, creativity, achievement, reading, Aircribs, and morality. (Pre or Co: Beh. 102.)

**Beh. 320\*:** *History and Philosophy of Behaviorology.* This course is an in-depth treatment both of the history of the emergence of behaviorology as a discipline and of the philosophy of science of this discipline, tracing the development of the philosophy since the early twentieth century, comparing and contrasting it with other philosophies of the times, examining its role in the emergence of the behaviorology discipline, and considering its implications for experimental and applied work at the individual and cultural levels. (Pre or co: Beh. 102.)

**Beh. 325\*:** *Behaviorology and Culture.* This course is a probe of the relevance of behaviorology to cultures and their survival and improvement (a) by examining such previously progressive concepts as freedom and dignity and the current effect of these on the development of more effective cultural practices, and (b) by examining a range of scientifically based and improved cultural practices working in concert and producing a better world as represented in the behavioral “utopian” literature. The course includes coverage of the implications, relevant to the present and future of behavior science and its professionals, the culture, and the world at large, that are inherent in the later writings of B.F. Skinner (i.e., *Reflections on Behaviorism and Society* [1978] and later works). (Pre: Beh. 102.)

**Beh. 335\*:** *Survey of Behaviorology Applications.* This course surveys the application of behaviorological principles and techniques to therapy and clinical behaviorology with respect to the common and uncommon solutions for moderate to severe (incapacitating) abnormal behavior problems in common and uncommon settings. The course includes the measurement and classification of the behaviors it surveys. The course also includes lab/fieldwork in measurement and applied methods and research. (Pre: Beh. 201.)

**Beh. 340\*:** *Behaviorology in Education.* This course is an examination of the interaction between instructional design and human behavior in educational settings from two vantage points: (a) the theoretical, historical, and philosophical aspects of the facts of teaching and learning, including the reasons for effective and non-effective methods, the role of technology in teaching, and the teaching of thinking, motivation, creativity, and discipline, and (b) the practical aspects of the teaching effort, including teaching as the management of the learning environment, the measurement and evaluation of behavior change, the educational techniques of behavior change, and the expansion of the learner’s behavior repertoire as a function of teaching. The course includes a laboratory component in which the student prepares and tests teaching materials, designs a course, and addresses the issues of systematic mastery, fluency, and cybernetics in instructional design. (Pre: ABC.)

**Beh. 345\*:** *Experimental Behaviorology: A Survey.* This course surveys complex behavior–environment relationships including stimulus equivalence classes and com-

plex schedules of reinforcement, as well as other complex antecedent and postcedent factors of which behavior is a function. The course includes a laboratory component on the complex relationships surveyed. (Pre: ABC.)

**Beh. 350/450: Behaviorology Research Lab: General.** In this course the student will assist in the ongoing work of two to four current research experiments, in two or more different laboratories or under two or more different project researchers in the same laboratory. For each of the two or more projects, the student will become familiar with the background experiments and issues of the project, the current work of the project, and some of the potential directions of the project. (Pre: Beh. 345.)

**Beh. 355\*: Verbal Behavior I.** This course is an introduction to B.F. Skinner's scientific approach to considering language as verbal behavior (VB), including coverage of multiple control and the elementary relationships between the controlling environment and verbal behavior, plus investigation of the development and applications of this approach from its appearance, through evaluative and technological research reported in the literature, to the present. The course includes not only an introduction to the book *Verbal Behavior* (Skinner, 1957) but also reviews of the book (the book itself being more thoroughly covered in a more advanced course). The course includes a laboratory component on VB research. (Pre: ABC.)

**Beh. 360/460: Non-Humans and Verbal Behavior.** This course covers the research, controversy, and further developments in the non-human language field, emphasizing the work with sign language and primates as well as the implications of this research to understanding human verbal behavior. (Pre: Beh. 355.)

**Beh. 365\*: Advanced Behaviorology I.** This course is a theoretical analysis of phylogenic and ontogenic contingencies. Topics related to this analysis include the design of cultures and the environments that produce the designs, the question of purpose in light of the experimental analysis of behavior, the concern with problem solving behavior and the related issues of event-shaped and verbally mediated behavior, the critique of theories alternative to this analysis, the question of whether or not "theories" of learning are necessary, and the problem of freedom and control as it relates to the control of human beings. (Pre: ABC.)

**Beh. 370/470: Advanced Behaviorology II.** In this course the student will learn to evaluate criticisms of behaviorological science. The course includes review of critical commentary, and response to that commentary, such as is available in the "Canonical Papers of B.F. Skinner" issue of *The Behavioral and Brain Sciences* (7, 4, 1984) and/or other similar sources. (Pre: Beh. 365.)

**Beh. 375/475: Verbal Behavior II.** This course provides comprehensive coverage of all aspects of verbal behavior (VB) as presented in the original work on this topic (i.e., the book, *Verbal Behavior*, by B.F. Skinner, 1957) and in more recent literature updates. The course includes a laboratory component on VB research. (Pre: Beh. 355.)

**Beh. 380/480: Human Development.** This course is an analysis of the phylogenic and ontogenic contingencies operating in the subject matter of the field of human development. (Pre: Beh. 355.)

**Beh. 385\*: Behavior Technology: A Survey.** This course provides training in two major repertoires that are needed for effectiveness in the work of behavioral engineering: (a) training *about* the techniques stemming from the laws of behavior that are used to generate, maintain, increase, and decrease behavior in applied settings, and (b) training *in the actual use*, or application, of these techniques as reported in the re-

search literature. The course includes a lab/fieldwork component in course-related applied research. (Pre: Beh. 345.)

**Beh. 390/490: Behavior Technology Fieldwork: General Experience.** In this course the student will assist in ongoing behaviorological engineering work at two to four different field settings such as clinics, schools, and other institutions. Data gathering and paper presentation will be included. (Pre: Beh. 385.)

**Beh. 395\*: Teaching Practicum in Behaviorology.** This course introduces the student to the application of scientific teaching methods (e.g., self-paced, systematic mastery and fluency designs, precision teaching, and instructional designs that are cybernetic) while the student practices these methods by assisting comprehensively in the teaching of another behaviorology course (such as Beh. 101 and Beh. 102). May be repeated for credit. (Pre: Beh. 340 plus the course in which the student is to assist.)

**Beh. 440: Seminar: A Survey of the Contributions of Behaviorology.** This course is a seminar on selected materials from relevant sources elaborating on the actual and potential contributions of behaviorology to a wide variety of applied behavioral fields and other disciplines. (Pre: ABC.)

**Beh. 465: Seminar: Current Issues in Behaviorology.** This course considers the major current issues in behaviorology as represented in current and recent issues of the discipline's journals, and in recent books in the discipline. (Pre: ABC.)

**Beh. 485: Directed Reading in Behaviorology.** This course provides directed reading on discipline-related topics or sources not comprehensively covered in other courses. (Pre: ABC.)

**Beh. 495\*: Personal Project or Paper.** This course is a project (with a report), or a paper (with the goal of publication), relating behaviorology to (and/or improving, with a behaviorological perspective) the popular cultural view of a topic selected by the student and the faculty member in consultation. (Pre: Beh. 355 plus others that are program specific.)

**Beh. 496\*: Professional Paper.** This course is a library and/or field research paper, with the goal of publication, relating behaviorology to the student's preferred applied behavioral field, including the importance, relevance, and contributions of behaviorology to the selected area. (Pre: Beh. 355 plus others that are program specific.)

### ***A Selection of Additional Courses***

Several additional behaviorology courses are probably more valuable to the advanced student, according to his or her specific career focus. So these courses are more likely to be found in graduate programs. Here, however, course numbers reflect both undergraduate and graduate status in order to show the relation of such courses to the courses already described. The amount of course credit earned will range from one to three, depending on variables inherent in the subjects actually covered. Here is a sample of such courses (an appendix in Ledoux, 1997b, describes the experimental and applied course sequences):

**Beh. 346/446, 347/447, 348/448, 349/449: The Experimental Analysis of [a Selected Topic].** This course is an examination of the background experiments and issues of [the topic], the current work on [the topic], and some of the potential directions of research on [the topic]. (Pre: Beh. 345.)

**Beh. 351/451, 352/452, 353/453, 354/454: Behaviorology Research Lab on [a Selected Topic].** In this course the student will assist in ongoing experimental research on

[the topic], including the preparation of reports for publication. (Pre: Beh. 350/450 and the course on The Experimental Analysis of [the same Topic].)

**Beh. 386/486, 387/487, 388/488, 389/489: Behavior Technology in [a Selected Setting].** This course is an examination of the concerns and issues relevant to technological applications in [the selected setting] and of the prevalent techniques (and their supporting research) that are used in [the selected setting]. (Pre: Beh. 385.)

**Beh. 391/491, 392/492, 393/493, 394/494: Behavior Technology Fieldwork in [a Selected Setting].** In this course the student will assist in ongoing behaviorological engineering work in [the selected setting]. Data gathering and paper presentation will be included. (Pre: Beh. 390/490 and the course on Behavior Technology in [the same Setting].)

**Beh. 430, 431, 432, ..., 439: Seminar on Behaviorology and [a Selected Topic].** This course provides a seminar on [the selected topic] in behaviorology. (Pre: ABC.) [These would be topics not covered in depth in another course. Examples of potential topics include ethics or epistemology.]

**Beh. 441, 442, ..., 445: Seminar: The Contributions of Behaviorology in [a Selected Area].** This course provides a seminar on the contributions, both actual and potential, of behaviorology to [the selected area]. (Pre: Beh. 440.) [The selected area would be one that is not already covered in depth in another offered course. Such areas could involve the impact of behaviorology specifically in a particular human service, human development, or other applied behavioral field.]

## Practical Curricular Development

The interaction of the local circumstances of a particular educational unit with program preferences, such as those inherent in the programs described here, will likely result in curricula well suited for that particular educational institution. Those curricula need not, even should not, mimic the details of the programs described here. These programs were devised without reference to the kinds of conditions that affect curricular design at the local level and which differ from one institution to the next.

Behaviorologists, through TIBA (or TIBI [...Institute]; see the Addendum in Ledoux, 1997b/2002), their professional organization, will build and act on consensus concerning the curricula that produce more and better behaviorologists. Since TIBA will have arranged to certify or accredit training programs, behaviorologists involved in program design and development will presumably consult TIBA for guidance during the process.☺

## Endnotes

In an effort to build further consensus, this paper was submitted to *Behaviorology* for full peer review (even though as a presidential address it was to be automatically accepted). On the basis of the full peer review, the paper was accepted by *Behaviorology*. Later, with incomplete explanation, the paper was transferred to *The International Behaviorologist* (TIB). As of the publication of *Origins and Components of Behaviorology*, the 1997 book of readings that included this paper with minor revisions, the first issue of TIB, in which this article was scheduled to appear, had not yet been published. (The bibliography in this book includes items that may be usable in some of the courses de-

scribed in this paper. The paper had earlier received minor revisions for inclusion, by permission of *Behaviorology*, in the 1992 edition of this book of readings.)

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