Operants

A Newsletter from the B. F. Skinner Foundation

Second Quarter 2013

Editorial Staff

Features & Articles

Skinner's Corner

E. A. Vargas, Ph.D. (Vice President, B. F. Skinner Foundation)

The second part of Skinner's doctoral thesis (1930) presented his experimental operations on what he then called the "reflex" relation. He submitted a good many records of rats' eating rates. In the first part of his thesis, well over half of it, he reviewed the history of the concept of the reflex. What he drives home in this history, whose manner is adopted he says from Mach, Poincaire, and Bridgeman, is how "the conflict between observed necessity and preconceptions of freedom" (p. 9) produced the tension in interpreting the observed results of surgical preparations of decorticate animals. In all animal life, the soul was held to be responsible for movement. As Skinner (1930) states, "the movement of an organism had generally been taken as coexistent with its life and as necessarily correlated with the action of some such entity as soul. The necessary relationship between the action of soul and the contraction of a muscle . . . was explicit. As a consequence, it was disturbing to find, experimentally, that a muscle could be made to contract after it had been severed from a living organism or even after death" (p. 10).

"Movement, far from being the objective manifestation of the activity of soul, had become an organic process subject to experimental investigation" (p.12). Unpredictable variability still occurred, and when it did, a "non-physical concept" such as mind or volition was asserted as its cause. Additional experimental work with "spinal frogs," for example, dispensed with the variability and thus with causes outside of those of immediate mechanical or chemical applications. The physiological examination of basic muscle motion eventually replaced, with the concept of "stimulus," the cause for movement that formerly had been given to "causes" such as the earlier one of "soul" and the later one of "mind." The further step was taken by Pavlov. "Pavlov was engaged in the investigation of the activity of the digestive glands. For much of this activity it was possible to identify the necessary antecedent events (the mechanical or chemical changes acting directly or reflexly upon the glands). The greater part of the normal secretion . . . was . . . not under the control of the experimenter. . . . [T]his was called "psychic" secretion. Pavlov undertook the investigation of this activity" (Skinner, *Thesis*, 1930, p. 20).

"The work of Pavlov may be taken as historically fundamental. . . . The principle of conditioning supplied the extended range of stimulation needed to account for the complex behavior of the total organism" (Skinner, *Thesis*, 1930, p. 21). Pavlov's findings became a cornerstone of behaviorological science, but these discoveries are not the focus here. What is of import is the further exclusion of a non-material cause.

Skinner drives home the point (in all his writings) that the description of behavior (and its explanation when description is extended) rests on two relationships: the correlations between actions and stimuli; and based on those primary correlations, the secondary correlations with a class of events he calls "third variables"—events such as "emotion." But critically, the primary functional relations between actions and stimulus variables do not derive from antecedent events. Stimulus events prior to an action cannot account for all of the variability between stimulus variables and response variables. The typical solution has been to construe an agency (such as a "mind") or agency-like structure (such as a grammatical "mechanism") between the antecedent stimulus events and the response outcomes that adjust for

the discrepancy in the paired values of the observed sets of values. Almost all of behavioral science operates within this stimulus-agency-response formulation. Skinner stepped outside this stimulus-response formula. Skinner's position is radically contrary to other behavioristic positions, including that of John B. Watson, and especially those who adopt an organism/structuralism approach. Skinner investigated the selective effects of an immediate milieu upon those actions that impact it. It made unnecessary any agency. The selection effects of particular properties of internal or external milieus combine with the appropriate effects of third variable events and produce changes in classes of action. By accounting for non-predicted variability, such postcedent effects dispense with the necessity of an agency.

Skinner's thematic interpretation not only applied to the events the organism's behavior directly encounters. It was also applied to those actions mediated by others, for example language. Skinner (in *Verbal Behavior*, p. 311) summed his position as follows:

> Whenever we demonstrate that a variable exerts functional control over a response, we reduce the supposed contribution of any inner agent. For example, if we can show that the occurrence of a response is due to the presence of a stimulus of specified properties, then it is not necessary to say that a speaker uses the response to describe the stimulus. If we can show that a response is stronger when we deprive the individual of food, then we do not need to say that a speaker uses the response to describe or disclose his need. If metaphorical extension can be shown to take place because a particular stimulus property has acquired control of a response, we do not need to say that a speaker has invented a figure of speech to express a perceived similarity between two stimuli. If an audience can be shown to strengthen a particular subdivision of a verbal repertoire, we do not need to say that a speaker chooses words appropriate to his audience.

In this analysis of verbal and lingual behavior the agent disappears.

This exclusion of agency puts forward the most radical thema in the Skinnerian frames of reference by which actions are interpreted. It is not an issue of whether there is an "inner life" or not. For Skinner, undoubtedly there was. The issue was how we talked about behavioral events wherever situated. What were the descriptive concepts and explanatory principles by which that talk occurred? As an explanatory principle, his theory excludes "mind." It excludes as well any agency or feature within the organism that "intends" or "decides" or "chooses" or any of the other vast array of words that center an analysis upon an organism and its presumed inner doppelgänger. Skinner's analysis moves to the contingencies between actions and events, wherever and however those contingent relations are located. It finalizes the dethronement of humankind's dominion over nature, which earlier featured Copernicus's and Darwin's analyses. The implications have not been lost to those who object to such a dethronement. And it is this kind of thema, as Gerald Holtan, physicist and historian of science (in *Thematic Origins of Scientific Thought*, 1973, p. 192) points out, that so upsets those with an opposite one—"the widespread feeling of paradox and outrage when a new thema is proposed in opposition to the prevalent ones—as was, of course, the case with relativity theory, so much so that Poincaire, to the end of his life in 1912, never once referred to Einstein's theory of relativity in print (and to Einstein, as far as I could discover, only once on the subject of the photon, and in a derogatory way)." Eventually, physicists got over their hissy. It will take longer in the behavioral sciences, for so many of society's

institutions operate on the presumption of an agency with free will who sins, buys, and votes. These social institutions directly (e.g. grants that fund projects to explore agency action) and indirectly (e.g. socialization that builds beliefs in agencies) shape the presumptions of behavioral scientists.

Snippets:

Dog taught to identify infections through operant conditioning

Erin Bremer, Care Manager, RN at Fusion Health, GA

In two Dutch hospitals, a beagle was taught using operant conditioning techniques to identify Clostridium difficile, an increasingly common infection that spreads easily in healthcare settings. Testing for C difficile can be expensive and time consuming and the infection can complicate patients' health.

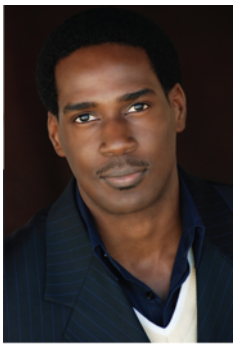
Using reinforcers and shaping, the dog was first taught to search out the smell of C difficile, then the stimulus smell presented was fainter. After that, the environment was generalized by presenting the stimulus in variable locations on various surfaces. After completing training, the dog was taught to walk down a hospital hallway and sit down next to patients that were infected, which it did with a high degree of accuracy. Using the dog's natural strong sense of smell combined with this type of training, the levels of infection could be lowered on a large scale. This novel approach to the problem could also spark similar solutions.

To read about this study and watch a video, see this website: www.bmj.com/content/345/bmj.e7396

Current Directions:

The Self, Perfected?

Edafe Okurume



David Freedman's May 2012 article in The Atlantic, "The Perfected Self," explores how B.F. Skinner's once maligned theory of behavior modification is making a comeback in the most unlikely way, via technology. Smartphone apps using Skinnerian behavior modification techniques are apparently transforming people into "thinner, richer and all-around-better-versions of themselves." Really? At what cost? Free will, of course.

Freedman writes of his brother Dan, once morbidly obese, who has slimmed down to 165 pounds the old fashioned way: diet and exercise, but also supported by new fashioned behavior modification technology. While it is great to lose weight, keeping it off is the prize. Dan has achieved long-term weight loss (defined by the National Weight-Control Registry as keeping off a minimum of 30 pounds for at least a year).

While a year doesn't seem very long, it is important to note that 98 percent of Americans can't achieve even that goal. What's more puzzling is that sure-fire diet and exercise protocols for long-term weight loss are well known. So what's the problem? Could it be that what works, such as the weight loss clinic, is expensive and inconvenient? Well, Dan has been able to meet his long-term weight loss goals from home and work, and while eating out, with minimal effort.

How?

Electronic weight loss tools may be the key to solving the pandemic of obesity in America. These tools allow people to

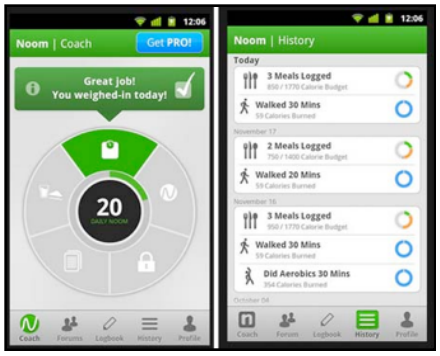
create their own regimen using smart phones and computers to monitor and augment their consumption environment up to the minute. Across the healthcare spectrum, these tools may forever change the administration of healthcare and save billions of dollars. The effect is not limited to healthcare; behavioral technology can be applied to all sorts of human behavior from managing finances to energy conservation to awareness of "unconscious" bias (implicit.harvard.edu). Tech-driven, gradual, permanent change? Imagine that.

With regard to obesity, the specifics, according to Freedman, are quite familiar: "Set modest goals (to encourage sustainable progress and frequent reinforcement), rigorously track food intake and weight (precise measurement is key to changing behavior, especially when it comes to eating, since a few bites can make the difference between weight loss and weight gain); obtain counseling or coaching (to diagnose what environmental factors are prompting or rewarding certain behaviors); turn to fellow participants for support (little is more reinforcing than encouragement from peers, who can also help with problem solving); transition to less-calorie-dense foods (to avoid the powerful, immediate reinforcement provided by rich foods); and move your body more often, any way you like (to burn calories in a non-punishing way). What is different now is that technology, employing smart apps and social media, is the glue, the mission control, in this scenario.

In practice, Freedman writes of Michael Cameron, who found himself on his hands and knees in his doctor's office barely able to do a push up; he was 105 pounds overweight. Collapsed on the floor, he wondered what was wrong with him as his doctor recommended antidepressants. Cameron realized that he did know how to solve his problem; problem solving is what he does, as he is an experimental behavioral psychologist. He asked himself quite simply, "What would Skinner do?"

Cameron looked for prompts in his environment that were enabling his overeating. He rarely ate at the office. Finding himself famished on the way home, driving past fast food restaurants he would stop to eat and then snack late into the night as he continued working. So he made little changes: He ate a sensible breakfast and lunch, and chose another route home. He started packing a gym bag and leaving it by the front door at night and asked family and friends to support him. He used web-based programs to track his food intake and video conferenced coaching and group support meetings.

Cameron quickly realized his entire weight loss program could be done on screen, remotely. In fact, it was Cameron who Freedman called to get his brother Dan started on a weight loss program.



Noom is one of several mobile weight loss apps currently available.

According to Freedman, "the first thing Dan did every morning" was to check his weight on a scale that transmitted that weight to his computer, which was linked to the social media platform, Twitter, to automatically report any loss or gain to other participants in Cameron's program. "Every time I saw him he'd pull out his phone to read an encouraging tweet from one of them, or fire off one of his own, or plug in the components of the meal he was eating, or check how many minutes of walking he'd logged that day. Sometimes he'd excuse himself for 10 minutes to take part in a group meeting on his laptop."

Freedman writes of a free app, a Skinnerian-based behavior modification program in which users set a goal weight and timeline for

reaching it. The app formulates a daily calorie count and can track eating and physical activity by the user holding their phone to food package barcodes or tapping the screen before and after exercise to measure calories burned.

In essence, this article expresses the dictum: Environment is the prime influencer and we can purposefully change our lives by using what we can control to affect the things we cannot.

Events:
CalABA conference

Ellie Kazami, Ph.D., BCBA-D

This year, the 31st annual CalABA conference was held in Garden Grove, California. The conference attracted over 1,400 participants who represented a wide spectrum of professionals and consumers from all over the U.S. and internationally. Despite its growth, the conference felt cozy and remained true to CalABA's mission to promote the science and theory of behavior analysis through the support of research, education, and practice. The conference was intellectually stimulating and inspiring, as well as a lot of fun. The three-day event was packed with excellent workshops and talks from Organizational Behavior Management (OBM) Network, public policy, and invited speakers such as Peter Gerhardt, Cathleen Piazza, Carol Pilgrim, Jonathan C. Baker, Timothy Hackenberg, Shahla Alai-Rosales, Anna I. Petursdottir, Jose Martinez-Diaz, William Ahearn, and James E. Carr.

A vital focus at this year's conference was the dissemination of information regarding public policy, working with health plans, and a call to action for behavior analysts to consider the future of behavior analysis. Dr. Gina Green, the Executive Director of the Association of Professional Behavior Analysts (APBA), was named CalABA's 2013 Outstanding Contributor to Behavior Analysis. In her presentation, she argued that Applied Behavior Analysis (ABA) is a distinct discipline and that ABA practitioners should be treated as professionals in their own right. In line with a call to action for behavior analysts to consider the impact of the profession of behavior analysis, Dr. Mary Jane Weiss, in her Glenda Vittimberga Memorial Lecture, addressed the importance of social significance in educating individuals with autism.

It was an excellent idea for CalABA to co-conference with the OBM Network because many of the CalABA talks were circumscribed around supervision and training, best practices which stem from the OBM literature. The other prominent theme at CalABA this year was Skinner's vision that behavior analysts would address a wide variety of societal challenges. For example, Dr. Van Houten, in his keynote presentation, focused on areas beyond autism treatment, where behavior analysis could make a difference and become more acceptable as a treatment approach. Dr. Julie Vargas, during her keynote address, discussed how we could use eLearning programs more effectively.

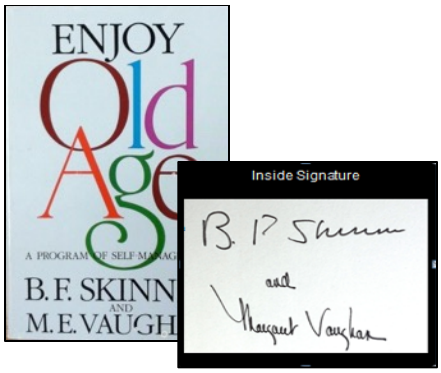
I asked my students at California State University, Northridge (CSUN) to share their impressions of Dr. Vargas's talk with me and every one of them mentioned their admiration for her poise and conversational style. The students said that one of their favorite aspects of Dr. Vargas's talk was how she connected history to modern day by comparing Skinner's teaching machines to today's learning programs.

In addition to the exceptional sessions, CalABA hosted some fun events such as the "Fight for Your Right to Practice" dance party and the luncheon. At the luncheon, Dr. Eric Larsson was honored as the recipient of CalABA's Gerald. L. Shook Leadership in Advocacy Award. Dr. Larsson was recognized for exhibiting exceptional leadership

and advocacy skills in promoting behavior analysis by affecting policy and legislation through his many years of service and contributions in intensive early intervention for children with severe behavior disorders and autism.

It was also entertaining to watch enthusiasts bid on B.F. Skinner's personal memorabilia during the Skinner Foundation Auction. Robert Ross won a pair of classic champagne glasses used by the Skinners (below).

Denisse Tristancho, a student from CSUN, obtained a personalized, signed copy of an article Julie Vargas wrote about her father, titled "A Daughter's Retrospective of B.F. Skinner" for *The Spanish Journal of Psychology*. Bryan Hebert won the auction for a manuscript page with handwritten edits and notes, and Josh Prichard obtained the first edition of *Enjoy Old Age*, signed by B. F. Skinner and Margaret Vaughan (below). Proceeds from the auction are split between CalABA and B.F. Skinner Foundation.



Recognition goes to the members of the 2013 Conference Committee, Conference Chair, Joyce Tu, and Conference Chair-Elect, Linda LeBlanc, for contributing countless hours to develop a strong and impressive line-up of speakers and presenters. Jackyn Shandy-Pinto, as PR/Marketing Chair, developed lively events and inserted super geeky fun (e.g., ribbons with quotes such as "Behavior Analysts Do It Consistently") into a very professional conference. Special thanks go to the Volunteer Coordinator, the large army of student volunteers, and CalABA's Administrative Director, Bob Schwartz, for their tireless efforts to put forth a well-organized event. Overall, thanks to the contributions of many devoted individuals in behavior analysis, CalABA seems to get bigger and better every year and we are looking forward to next year's CalABA at Burlingame, California.

Student Research Awards

The 2013 recipient of the B.F. Skinner CalABA Award was **Marnie Shapiro** (above) from California State University, Northridge. Ms. Shapiro received the award for her thesis study, titled "Maximizing Supervisors' Efficiency: The Use of Enhanced Written Instructions to Teach Undergraduates to Implement a Stimulus Preference Assessment."

Tracy Larson (above, pictured with Dr. Julie S. Vargas), of the University of the Pacific, was the recipient of the 2013 Julie Vargas Award for her study, titled "Treatment Implications of a

Functional Analysis of Moderate-T-Vigorous Physical Activity in Young Children."

International:
An Interview with Dr. Iver Iversen

Monica Vandbakk, Ph. D. (Assistant Professor, Oslo and Akershus University, Norway)

Dr. Iver Iversen received his Ph.D. in Experimental Psychology from University of Copenhagen, Denmark (1978). He has been a professor of experimental psychology at University of North Florida, Jacksonville, since 1986. His research focuses on basic mechanisms of operant behavior, primarily in non-human subjects. Examples are detailed analyses of effects of individual reinforcements in rats, intermittent reinforcement of stimulus control in rats, and visual guidance of drawing in chimpanzees. His research also involved operant conditioning of brainwaves in humans to enable communication in completely paralyzed ALS patients. He has served on the board of *Journal of the Experimental Analysis of Behavior* for five three-year terms and currently serves on the boards of *European Journal of Behavior Analysis*, *Mexican Journal of Behavior Analysis*, and *The Behavior Analyst*.

Dr. Iversen believes that strong methodology is necessary to advance the science of behavior, and he has developed several automated methods to shape and control behavior, as well as methods to analyze complex data from behavioral experiments. Dr. Iversen edited a two-volume text on methodology in experimental analysis of behavior (1991) with Dr. K. A. Lattal (West Virginia University). In addition, he has published several papers that document development of behavior control techniques and methods of data analysis.

Dr. Iversen frequently visits Norway as a guest professor at Oslo and Akershus University College, and he collaborates with Professors Per Holth and Erik Arntzen.

Dr. Iversen was recently in Norway as an invited guest on a panel discussion for the 40th anniversary of the Norwegian Association for Applied Behavior Analysis. The topic of the panel discussion was "Reflections, Historical and Future Aspects of Behavior Analysis." I used the opportunity conduct a brief interview with him.

I have great respect for Iversen's work, and it is a privilege to have the opportunity to work with him whenever he visits Norway, and of course to hear his thoughts about the future of behavior analysis. I would like to thank him for taking the time to answer these questions on behalf of the *Operants* readers.

Question 1: Describe your work and your recent interests.
My research centers on establishing basic knowledge of operant behavior based on sound methodology with a high degree of replicability. Of particular interest, I have found that individual reinforcers can control behavior quite vividly during early acquisition of operant behavior. One can even design an experiment around giving just a single reinforcer to rats and examine how various behaviors change over time before and after the single reinforcer. Currently, I do research on stimulus control of operant behavior in rats where a novel response is introduced in a familiar discriminative stimulus, and I find that rats have to learn the discrimination all over each time I introduce a novel response. It means that the rats do not really learn a general S-dee S-delta difference; that difference is specific to the response that is reinforced in S-dee. In the laboratory, we also examine basic chaining procedures, and currently I work on intermittent reinforcement of stimulus control in behavior

chains. Apparently, intermittent reinforcement of stimulus control units is an understudied area. We are able to maintain over a thousand stimulus control trials in one session with just 50 reinforcers. All the research themes I work on have a core of interest in methodology, and I suppose I had that interest since I started as a psychology student in Copenhagen where I would build boxes and special levers all the time.

Question 2: What would you rank as Skinner's top three most important contributions to behavior analysis?

First, Skinner's most important contribution is the early demonstration that voluntary behavior can be brought under experimental control, including stimulus control. The second most important contribution is probably that behavior can be maintained with intermittent reinforcement. The third contribution is probably that he developed a fairly consistent vocabulary for use in behavior analysis, a vocabulary that sought to eliminate references to causes of behavior that have no means of scientific verification.

Question 3: Which is your favorite book by Skinner?

Science and Human Behavior. This is the first book where Skinner really articulates all the societal implications of an experimental analysis of behavior.

Question 4: Which other authors do you think are of great importance in the development of our field?

Professors Keller and Schoenfeld had a tremendous influence on the field through their textbook, *Principles of Psychology*, and through mentoring a high number of graduate students. Most of the top people in the field, both past and present, were in fact students of Keller and Schoenfeld. These many students include Professor Murray Sidman, whose *Tactics of Scientific Research* should be read by all students of behavior analysis. It was one of the first books on behavior analysis that I read as a graduate student, and I never forget the excitement and respect for methodology that I developed as I read it (several times in fact).

Question 5: What do you see as the biggest challenge for behavior analysis in the future?

Probably the survival of the field as a science. I mean that application is mainly technology of behavior and does not always generate novel information about behavior. Only basic research can generate novel information and novel methodology. Many behavior analysts worry about the future of behavior analysis and as a solution want to extend behavior analysis to other areas of psychology and incorporate standard methods from such other areas into behavior analysis. This may wash away the uniqueness of behavior analysis, which is rooted in single-subject designs, analysis of causes of variability of behavior, and exploratory research.

Question 6: Do you have any thoughts on historical events or cases in the past that may have been detrimental to the field? Events you would like to erase if you could?

Personally, I believe that the heavy emphasis on mathematical modeling may have been detrimental to the field because it may have stifled exploratory research among young researchers and placed an undue emphasis on "averaging behavior" as opposed to examining behavior at the level where it actually occurs. In addition, I believe that the emphasis on "constraints on learning" in the 1970s may have tarnished the reputation of behavior analysis because the idea that behavior

analysis is fairly limited in use became dominant in introduction to psychology textbooks for decades thereafter.

Question 7: Do you have any thoughts on events, cases, people, or writings you think are underestimated, and that you would like to bring to light if you could?
In general, I believe that research on stimulus control is not emphasized enough in the area of behavior analysis. There are hundreds of "gold nuggets" of already published articles on important stimulus control research that never get cited, and this research will most likely be forgotten. I have often thought of writing a textbook on stimulus control research, but it will be a major undertaking.

Question 8: What is your point of view considering neuroscience and its relevance to the practice of behavior analysis?
I believe that neuroscience will keep using the techniques of behavior analysis to examine how the brain works and that some important findings about the brain can be obtained that way. However, my experience has also taught me that neuroscientists, in general, often do not fully grasp the core idea in behavior analysis that voluntary behavior is controlled by environmental variables and that behavior of the individual subject can be controlled fairly accurately at the level of seconds, if not milliseconds. I believe that collaboration between behavior analysts and neuroscientists can benefit both areas. In fact, such collaborations already exist and have been very fruitful.

Question 9: Any final thoughts you would like to share with Operants readers?
I would like to recommend to behavior analysts that they always read articles about basic research even if they do not have an opportunity to conduct basic research.

President's Column

Dr. Julie S. Vargas, Ph.D. (President, B. F. Skinner Foundation)

The Foundation has been fortunate in having many volunteers who help with Foundation activities. This newsletter is a result of their work. Not only do they extend the reach of the central office in locating information, they help in dissemination of what they find and write about.

One of the new Foundation projects came about because of a volunteer. Social media has become a good way to communicate widely with people of similar interests. One of these social utilities is Facebook. The Foundation created a Facebook page for B. F. Skinner in 2012, but didn't have a page for the Foundation itself. That was solved in a visit to the Foundation office by Amanda Kelly (aka "BehaviorBabe"). Amanda set up the Facebook page, facebook.com/BFSkinnerFoundation, and a Twitter account as well.

Amanda Kelly pictured with Drs. E.A. Vargas and Julie S. Vargas

When Maureen Murphy left the Foundation (for a job that was an hour closer in commuting time), the Foundation looked for a replacement who would be familiar with Facebook and other social media. Amy Kucharik fit the bill. She joined as an administrative assistant in March, 2013, and has been handling the Facebook page with good results. A second part-time administrative assistant, Marya Weissberg-Walker, also joined the office staff. Marya has been working on obtaining permissions the B. F. Skinner Foundation needs to post downloadable copies of Skinner's articles on the Foundation website. She is also tracking progress on various indications of progress on Foundation activities including out-

reach through the website and social media, and financial indices including contributions.

Keeping up with technology never ends. For some time, students and professionals have been asking about whether the Foundation planned to produce e- books. In 2013 the Foundation began a serious effort into finding out what is involved in converting all the books the Foundation publishes into e-book formats. Different e-book devices require different formats and there are dozens of companies that offer conversion services. To talk with reputable companies, the Foundation called personal contacts at Hackett Publishing Company for recommendations. Three companies were named, and communications with all three have produced a lot of information as well as rough estimates of costs. A grant was submitted for the conversion of *Verbal Behavior* and two other print books into e-books for iPad and other tablets, iPhone and other cell phones, Kindle, and the Nook. As is customary for e-book versus print formats, the Foundation will price the electronic versions at $12.50 to $15.00 (50 to 60%) of the paperback price. The Foundation should have word about support by the next newsletter.

As always, the editors welcome your feedback, suggestions and news items are very welcome. Feel free to contact any of us by emailing info@bfskinner.org.

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