The Future of Behavior Analysis: Foxes and Hedgehogs Revisited

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Abstract Some twenty-five years ago *The Behavior Analyst* published a paper by David Rider (*The Behavior Analyst*, 14, 171–181, 1991) titled “The speciation of behavior analysis.” Rider’s thesis was that basic and applied behavior analysis, for a variety of reasons, are destined to become independent species. In a commentary on this paper I pointed out, for example, that scientists and engineers are interdependent, especially at the frontiers of application. I was sanguine about a continuing analogous relationship between basic and applied behavior analysis. However, especially in the last decade, indications are that basic and applied behavior analysis may indeed be emerging as distinct species. I discuss several themes in a review of the “literature of survival” addressing the evolving complex relations between basic and applied behavior analysis, including constraints on training leading to narrow foci of application, our often self-imposed isolation from those with whom we could productively collaborate, and the difficulties of obtaining sufficient support for our science. All these challenges reflect a briar-patch of interlocking contingencies; each one depends crucially on the others and we cannot effectively address any in isolation. Thus solutions will not be easy, but our long-term survival as a coherent discipline absolutely depends on finding some.

Keywords Prediction · Selection · Translation · Training · Isolation · Research support · Basic versus applied behavior analysis

“Prediction is very difficult, especially about the future.”—Niels Bohr

Not only is prediction of the future difficult, as this perhaps apocryphal quote asserts, but as numerous attempts in virtually all significant domains of human endeavor have

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shown, nothing fails like prediction—either failures to predict, or predictions that fail. These failures seem particularly true in science where one might naively expect them to be especially successful. As a child I was fascinated by predictions of a future world, that is, my adulthood, when all diseases would be conquered, there were cities on the moon and colonies on Mars, we flew about in our own atomic-powered airplanes and traveled around the world in seconds, among many other wonders. Even relatively short-term predictions are elusive—there is more computing power in your iPad 2 than in the most powerful (and huge) supercomputers in the 1980s, and who would have predicted the end of the Cold War would be followed by a seemingly endless war with much more elusive enemies.

Putting aside these clichéd examples and focusing on our field of behavior analysis, any predictions we might make about its future will likely follow a similar fate; but just as surely, there have been numerous attempts. As I shall detail, the imminent demise of behavior analysis has been predicted for at least 35 years; yet, somehow, we are still here. Such persistence is, of course, no guarantee whatever of our continued existence—at least in any currently recognized guise.

In preparation for this essay, I reviewed a number of sources going back to the 1980's right through to fairly recent numbers of *The Behavior Analyst (TBA)* devoted to concerns relevant to the future of behavior analysis—basic and applied. I have also been part of this effort in at least three published papers and more than one such symposium at the Association for Behavior Analysis- International (ABA-I) meetings. One could say that a cottage industry has developed to analyze the fate of behavior analysis. For expository purposes, I'm going to give this industry a name—the *literature of survival*. Its goal is to evaluate the field—its current status, its possible future, and, by far most of all, what it *should* be doing—deriving “what ought” from “what is”—if it is to have a future. Given the now extensive literature of survival (one could almost do a conceptual meta-analysis), a number of motifs are evident that define, shape, and direct the discussions. I'll not venture to review the entire literature here, but rather to outline some of major themes with a bit of commentary. Here is the first of my themes driving the literature of survival.

Basic versus Applied Behavior Analysis

This is probably the most venerable of all issues and in significant ways, can be said to underlie *all* the other relevant concerns. The relative roles and positions of these two wings of the edifice of behavior analysis have been continuing sources of controversy for at least the last third of a century or so, most recently manifested with a huge donnybrook in 2011 over the role and representation of practice and certification in ABAI and putative conflicts with the stated mission of the organization as promoting the *science* of behavior analysis. Thankfully, with cooler heads prevailing, some of the heat of that battle appears to have dissipated, but calls for a parting of the ways of the basic science of behavior analysis and what I like to think of most positively as the engineering of behavior analysis are still afoot.

Such a parting was suggested as the future of the field over 25 years ago by David Rider in a 1991 article in *The Behavior Analyst*; but, as Rider pointed out, there were precedents going back a decade before that. Titled “The Speciation of Behavior Analysis,” Rider's

paper was a very clever and detailed application of the natural selection analogy to characterize what he deemed a growing schism between basic and applied behavior analysis. Essentially, this distinct speciation was driven by (1) isolation of some members of the population from others to form two separate groups; (2) differential contingencies of survival for these two groups; and (3) divergence in the adaptive characteristics by the two groups. According to Rider, ultimately, the two will not interact, i.e., interbreed to produce new offspring, and the two distinct species would emerge to go their separate ways—in sum, “divergence of character,” to use Darwin’s phrase. To quote Rider: “Perhaps someday [applied behavior analysts] and [basic behavior analysts] will have to be reminded that they were once related and, even when reminded, they still will not care” (p. 176). He was not the first (nor the last) to make this prediction; at least part of his own argument was based on a literature he cited that went back almost a decade before with papers by eminent behavior analysts—Don Baer, Steve Hayes, and Jack Michael to name a few. Particular focus was placed on just what one needed to know to be an effective applied versus basic behavior analyst.

In this same issue of *The Behavior Analyst*, I replied to Rider’s essay with a commentary subtitled, “The Unnatural Selection of Foxes and Hedgehogs” based on this focus (Marr, 1991). For example, Don Baer in 1981 had argued that much of applied behavior analysis could be reduced to the principle of reinforcement in some guise or other plus experience with applied situations gained primarily through trial and error. In the front lines of application anything that will help is of value and there is little time, training, or inclination to engage in a behavioral analysis beyond the minimum necessary to do the job. My response to this was it’s the “old country doctor” approach—simple remedies at hand are, by and large, the best. To the extent that the principle of reinforcement constitutes the primary remedy, applied workers should remind one of the words of the Greek poet Archilochus:

“The fox knows many things, but the hedgehog knows one big thing.”

Baer’s characterization clearly places applied behavior analysts with the hedgehogs. It would be as if all electrical engineering practice were based solely on Ohm’s Law!

But considering the last 25 years is this true? My answer is yes and no. I begin with the good news—‘no’. The first thing one should note is that a whole generation of behavior analysts has emerged since the dire predictions argued and cited by Rider and nothing like a complete separation of basic and applied behavior analysis has occurred. My second point is that the literature in research and practice in the applied domain compellingly reflects far more that the hedgehog characterization of knowing one big thing. In their introduction to the (2010) special issue of the *Journal of the Experimental Analysis of Behavior* (*JEAB*) devoted to translational research, Mace and Critchfield explicitly address this issue in assessing the shift in emphasis in papers published in the *Journal of Applied Behavior Analysis* (*JABA*) over the years from largely “interventional outcomes” to the analysis of contingencies controlling behavior, mostly embodied in functional analysis methodologies. But, while careful contingency analyses certainly require fox-like strategies, in my view these efforts, as reflected in too many *JABA* papers, have taken on the same routine character as those earlier intervention studies—a new breed of hedgehog perhaps.

That aside, of major import to the basic versus applied issue are the rapidly expanding efforts in *translational research*. There have now appeared several issues of *JABA* and *JEAB* and, more recently *TBA* devoted extensively, if not exclusively to translational research. In fact, *JEAB* now has a special editor for papers focused on translational studies.

In general, translational efforts are fundamental to advances in both science and engineering and are manifested in complex dynamic *interactions* between fields and sources of expertise. So it is with the best of basic and applied behavior analysis. The important term is interaction—translation is a *bi-directional process* involving both field and laboratory studies conducted by both basic and applied workers. It is not simply, as some would have it, seeing how, or if, some laboratory finding has application in the field, but also attempting to derive and test models in the laboratory of findings in the field.

Applications derived from basic research as evinced, for example, by even a cursory look at *JABA* just in the last couple of years are numerous—behavioral momentum, choice and matching, equivalence, relational frames and other examples of complex stimulus control, verbal behavior, problem solving, schedules and reinforcement history, motivational operations, temporal discounting and self-control, signal detection theory, to name but a few—all of which were initially the outcome of basic laboratory research. On the other side, going from the field to the laboratory, laboratory models of drug dependency, gambling, anxiety, depression, cooperation and competition, and many “everyday” as well as “pathological” phenomena have been and continue to be developed and tested. Notice that both these directions of translational research are *interdependent*—putative generalizations of laboratory findings to the field must be tested to establish their credibility as should models of phenomena and processes derived from field studies. Thus, we *all* must be foxes—but knowing many *big* things!

This recent history shows, in my view, that we behavior analysts still have a certain unity based on common principles and methods—a unique coherence having emerged and continuing to emerge from both the basic and applied arenas. Certainly, no other domain in the whole history of psychology can make any such claim. But such a continued unity crucially depends upon proper training, the next motif I shall discuss shortly.

Before that, however, some bad news—the ‘yes’ to my earlier question about the predicted inevitable separation of basic and applied behavior analysis. First, there are those who say that these two domains *should* part company—if they had not already done so—perhaps through some selectionist processes as suggested by Rider. There are several different perspectives on this putative parting of the ways, but all contradicting the good news I just presented. David Pierce in a 2012 *TBA* paper concluded, “My own assessment is that the separation between basic and applied behavior analysis [since 1980]...has become even wider today” (p. 276). In part, he blamed the lack of significant *analysis* in applied behavior analysis along with the development of the Behavior Analysis Certification Board (BACB) requirements and organizations such as the Association for Professional Behavior Analysts (APBA).

Far more trenchant critiques have come from two eminent figures in behavior analysis, Alan Poling (2010) and a very well-known person I’ll not name here to protect the guilty. While both place considerable blame on the experimental analysis of behavior (EAB), the latter in a paper presented at the 2012 ABAI in Seattle and subsequently elsewhere has asserted unequivocally that *EAB had neither discovered*

nor can offer anything of value whatsoever to understanding behavior outside the limitations of a laboratory operant chamber. Despite much evidence to the contrary (some of which I've already mentioned), he steadfastly holds to this stance—in my view an outrageous, irresponsible, indeed, dangerous fit of hyperbole.

A much more considered position is taken by Alan Poling who has been one of the most creative and productive contributors to *both* basic and applied behavior analysis, thus his views must be taken seriously. He thinks the initials EAB should really stand for “esoteric analysis of behavior,” and particularly focuses on what he sees as much useless attention given to studies of schedules of reinforcement by the experimental community. He provides some examples from his own work in behavioral pharmacology.

In general, he asserts, “...many [JEAB] basic research studies are not obviously relevant to significant actions of people and other animals in their natural environments. In fact, many established areas of basic research involve little or nothing more than a progression of well-controlled studies that clearly demonstrate the influence of unimportant independent variables on trifling outcome measures. I know because I've done more than my share of such work” (p. 9).

In rebuttal, there are a number of technical details to consider here, including how a basic science is conducted, but I would simply point out that most, if not all, the phenomena shown to be effective in research translated from the laboratory were the outcome of systematic contingency analysis, including schedules.

But Poling also took applied behavior analysis to task, most pointedly in asserting what we all know: “Applied behavior analysis is becoming synonymous with treatments for [autism spectrum disorders]” (p. 8). Because outside our community the expression “applied behavior analysis,” if known at all, is synonymous with *all* of behavior analysis, Poling's assertion functionally applies to the entire field—basic as well as applied.

A quarter-century ago few, if any, could foresee the explosion of behaviorally-based practice largely driven by autism treatment—another failure to predict. But certainly within a decade, as evidenced, for example, by attendance and programs at ABAI, and many other venues around the world, an avalanche became obvious. In recent years ABAI has in various ways, not always successfully, attempted to confront this challenge to its mission:

“The mission of the Association for Behavior Analysis International is to contribute to the well-being of society by developing, enhancing, and supporting the growth and vitality of the *science of behavior analysis* through research, education, and practice.” [My italics]

This mission thus defines ABAI as essentially a scientific organization; *however I cannot over emphasize the concern here is not about the value of effective practice in all of its domains, which is unassailable and provides an essential credibility to the entire field of behavior analysis—basic and applied.* Indeed, every effort should be devoted to expanding our autism treatment availability and services world-wide, and, in fact, ABAI is playing a major role in that endeavor. Moreover, one could argue that, for example, the overwhelming evidence for the effective treatment of autism spectrum disorders could bring the value of the science and practice of behavior analysis into a more positive light for those outside the behavior-analytic community.

But to see some of the difficulties let's return to Rider's evolutionary biology analogy: The field is being overwhelmed by a rapidly reproducing new species (bachelor and master's-level practitioners) supported by what many assess as constrained contingencies of survival and filling a special niche (e.g., powerful and pervasive needs for autism treatment). The principal question is: How is this rapid evolution affecting the reproductive success of scientists and science-based practitioners—and thus ultimately the field itself? The survival, indeed, the flourishing of the various sub-cultures of behavior analysis should not be a zero-sum game, but how can we discourage this? Possibly one way to address this is to develop new models of training.

Training in Behavior Analysis

As most members know, accreditation has become an important function of ABAI and it is granted to programs demonstrating proper and rigorous training in both basic and applied behavior analysis. As of today, ABA-I has accredited some 20 Master's-level programs and nearly a dozen Ph.D. programs in the USA and elsewhere (e.g., Norway) and one hopes for many more—not only in the States, but around the world. But herein lies a deep and challenging problem, as many in the literature of survival have pointed out: Essentially, what does “proper and rigorous training” mean?

Clearly, the focus should be on training and accreditation based not solely on a current but demographically limited demand; and, without question, not simply on expediency and profit—but on what the field actually encompasses—experimental, applied, and conceptual—and, most significantly, oriented toward a broader future directed outward, and not inward.

Certainly there should be more required graduate-level courses in basic and applied science areas beyond what is minimal, say, for BACB certification—though to their credit the BACB has recently increased its requirements. As I've already emphasized, an effective engineering, as is the best of applied behavior analysis, is founded on a firm science and conceptual base; to do otherwise is to compromise the best future our field can and should offer. Moreover, much of this entire enterprise would collapse, for example, if better treatments were discovered for autism, not to say a cure, however remote these possibilities might be. I'm reminded of koala bears in Australia, a species that lives by eating only eucalyptus leaves; if these trees were to die off, so would the koalas. At the least, there is a kind of hyperbolic discounting effect here where a significant subculture of applied behavior analysis is controlled by more immediate consequences to the potential detriment of its long-term survival.

But, as they say on TV, there's more. What about education (and I'm not talking about *special* education)? Virtually *everyone* goes through school and we know behaviorally-based instructional designs and methods can be astonishingly effective at all levels—K through graduate school—I know; I worked in this domain at the university level for many years. Furthermore, all of us will age or have already aged—a demographic rapidly accelerating in population with immense opportunities and needs for behaviorally-based interventions. Many, many children at some point need and should have behavioral interventions for a host of every-day problems plaguing them and their parents, as Pat Friman has eloquently advocated and creatively demonstrated. Happily, many papers presented at ABAI meetings and elsewhere do reflect such

broader issues; but, in my view, we can and should do more to bring behavior analysis into many domains of universal concern. Examples of such application can be enumerated virtually without limit (see, e.g., Norman & Kohn, 2013 for other possibilities), but where are the training, the accrediting, and the certifying for the skills needed to address those behavioral issues affecting *everyone*? In my long experience teaching behavior analysis at Georgia Tech, many of my very able students want to address these sorts of problems; and they don't want to be shoe-horned into graduate programs narrowly focused primarily on developmentally disabled people.

But, accreditation and certification based upon proper standards of knowledge and skills is by no means the whole story. As I remarked in my Rider commentary long ago, "...the divergence of basic and applied behavior analysis is not only about scientific and technological turf, but about 'professional' status and how to deal effectively with a public who pays the bills for treatment" (p. 186). These roles reflect *professional practice issues*—licensing, certification, ethics, lobbying, insurance coverage, and other essential practice concerns and responsibilities.

By whom and how should these be addressed? As every reader of *TBA* knows, the majority of ABA-I's members are applied behavior analysts, but a scientific association like ABA-I, while having major and essential interests in such matters and thus directly addressing some, cannot fulfill *all* these practice functions. At least some of these need to be handled by *independent organizations* established for such purposes, yet these entities must be deeply responsive and representative of the science and science-based practices they reflect to the public who needs and demands their services. While such entities may be necessarily independent in effectively addressing certain professional practice issues, they can *never* be independent of the science that justifies their role as advocates for effective practice.

A more general description of the graduate training dilemma applies to both the basic and applied camps. Depending on which camp you're in: There's insufficient basic training for the applied students on the one hand, and insufficient applied training for the basic students on the other—yet we all agree, you can't learn everything. In my view, the problem is deeper than this and applies to both the basic and applied fields. Despite the assertion that behavior analysis is a member of the natural sciences, most future behavior analysts come out of psychology or education undergraduate programs, or the like, thus they are often appallingly ignorant of other natural sciences and, especially mathematics. I see no practical solution to this problem, but such ignorance has already and will certainly severely limit the kinds of roles possible, and maybe essential, in the future for those said to be trained in the basic and applied science of behavior. For example, without mastery of a modicum of mathematics, most of science is a closed book written in an unknown tongue. Stuart Vyse (2013) in a *TBA* paper mentioned the important role of mathematical training in the development and dissemination of behavior-analytic contributions to choice, delay discounting, and other aspects of behavioral economics. I would add to his list: neurobiology, genetics, robotics, pharmacology, toxicology, system dynamics, artificial intelligence, STEM instructional design, human-computer interaction, and complex skill acquisition. These are just a few areas to which behavior analysts might contribute and would certainly benefit from knowing, but one doesn't just "pick up" these at leisure over a weekend. Typically, they demand rigorous prior foundations acquired as an undergraduate.

And there's even more: Even assuming current needs for training in behavior analysis will continue for the near future, I have to wonder just *who* is going to do the training? Early on, some predicted that the rapid development of training programs aimed at addressing the needs for behaviorally-based treatment for autism would spur the parallel development of quality behavior analysis programs in general, but, alas, this is another failure of prediction. Quality Ph.D. programs to train academicians—basic or applied—have dwindled to a precious few—at least in the States. Retiring faculty, especially in the basic science, are too often not being replaced (I'm but one example of many). But even Master's level programs require training in the basic science of behavior analysis by experts who are familiar with the latest developments in that science, who can provide a scholarly and critical focus on so-called fundamental concepts and principles, and who can inspire innovative applications, perhaps in new domains. Fortunately, there are exceptions to the trends I've discussed, but the trends continue apace.

All these challenging considerations of training lead to another motif discussed by many in the literature of survival—isolation.

Isolation

Over the years in the literature of survival many have expressed deep and, I think justifiable concerns about our largely self-imposed isolation from others whose interests and concerns we might better have diplomatically and collaboratively cultivated. Let's face it—often we have not worked and played well with others. Perhaps the complex social dynamics of science and application made such efforts difficult; without question, however, we have burned many bridges. Finding new friends is thus difficult, but we surely need them. Our tribalism has deeply and perhaps fatally affected our opportunities to apply our science in the wider sphere of human concerns.

There are many dimensions to our isolation that have been extensively discussed such as an “off-putting” terminology, along with narrowly confined methodologies and dependent measures. By themselves, these elements may have also contributed to another aspect of our isolation—an apparent lack of interest in many problems considered significant to other scientists—basic and applied. Again, Stuart Vyse (2013) has correctly pointed out that in our conceptual and methodological alienation from mainstream experimental psychology, we have ignored (or worse, dismissed) some significant findings that we might well have taken into account and even contributed to their further exploration. For just one example, I and my Brazilian colleague, Diego Zilio (2013) have discussed how modern memory research conducted by cognitive psychologists and others has revealed distinctive repertoires that behavior analysts would have never have discovered on their own, yet such repertoires have enormous significance for addressing complex behaviors in humans. For example, the development of effective behavioral treatments for aged populations require understanding of the spectrum of cognitive deficits in that growing demographic.

Even within our field, as I have already noted, some behavior analysts argue over the putatively irrelevant and “esoteric” nature of much of the research conducted in the experimental analysis of behavior. In my view there's a good bit of muddle and confusion in these squabbles; and, moreover, there's probably not much that can be

done about any of it—but it’s fun to talk about anyway. I’ll confine my comments to just two issues.

First, one compelling feature of behavior analysis is that wherever it is applied, it *works*, and certainly there is now sufficient translational research documentation to demonstrate the viability and value of many EAB findings in the world outside the laboratory. If there is a problem here—and there certainly is— even if enthusiastically adopted, such achievements and their origins are grossly un-disseminated and thus under-appreciated by those outside the behavior-analytic community. This is an example of isolation begetting more isolation; we find it far more reinforcing to talk and work with ourselves than to meet the challenges of talking and working with others. There are no obvious solutions to this situation, but I sincerely believe our long-term survival absolutely depends on finding some.

Second, to use a couple of Marc Branch’s (2011) examples presented in his *TBA* commentary on translational research, sciences like paleontology and astronomy are not typically charged with solving human problems, even though to the outsider, much of their research involves concerns many would consider “esoteric.” Indeed, as one who has spent more than a half-century in the experimental analysis of behavior and related areas, and like every reader of this essay, I’m interested in what interests me—who knows why—but exploring what interests me is what makes doing science fun. But I’ve also had exactly the same kind of fun doing instructional design work in physics—a strictly applied activity (e.g., Marr, Thomas, Benne, Thomas, & Hume, 1999). In neither case did I have some exalted sense of addressing the human condition. The dilemma here is that a science of behavior is unlike paleontology or astronomy, as its subject matter is of direct human concern; and, as we all know, virtually all of the problems of human kind are behavioral in origin. Thus a field like behavior analysis has what might be called a *burden of interest*—we cannot divorce ourselves from addressing the human condition. Our powerful methods for controlling human behavior necessarily confer special responsibilities and, especially, ethical sensitivities. This leads me to a final motif—how or even will our interests, whatever they are, be sufficiently supported?

Support

The core concept of behavior analysis is contingency, and contingencies affecting our survival are embodied in such elements as job demands and opportunities, proper training, criteria for academic success, productive collaboration, and research support, among others. In the literature of survival many words have been written on these requirements. Without question, the primary driving force that will shape the future of the field is research support from appropriate granting agencies. Of course, this is true of all other sciences and their related applications. Not only are we not immune, but given all the proper concerns expressed in the literature of survival regarding the enormous difficulties faced by even our most creative researchers in obtaining sufficient support, the long-term outlook frankly looks grim—especially in the light of recent political events. Again, there are major exceptions and anyone seeking grant support would do well to emulate the strategies of those who have been successful. As I and others have already emphasized, success in this essential effort begins with proper training.

A major thrust of the literature of survival is that we should not and, indeed, *cannot* depend upon for our long-term survival in some narrow applied area like autism treatment, however essential and effective our efforts. At a minimum, as I've already alluded, supportable applications of behavior analysis must also be directed toward issues affecting most, if not all of us—education at all levels, decision making, contingencies of persuasion, social dynamics, effective business and labor practices, systems analysis, technology development and dissemination, employment training, public policy, defense strategies, medical interventions, physical rehabilitation, aging, child care, crime, substance abuse, poverty, and many, many others—all, I believe requiring our close collaboration with other, outside, experts. To be sure, behavior analysis has already contributed to a few of these efforts and issues, but in many of these kinds of examples others have already taken the roles we might have had and it will be tough for us to audition, never mind to get on stage.

Conclusion

In discussing and commenting on the extensive literature of survival, I have briefly addressed several challenges: the evolving complex relations between basic and applied behavior analysis, the constraints on training, our often self-imposed isolation from those with whom we could have productively collaborated, and, finally, obtaining sufficient support for our long-term survival. All these challenges reflect a briar-patch of interlocking contingencies; each one depends crucially on the others and we can't effectively address any in isolation. Whether we, as behavior analysts, can perform a proper functional analysis to help lead us out of our thorny predicament remains very much an open question. But why should we be concerned? As Skinner argued in *Beyond Freedom and Dignity* (1971, p. 137), "There is no good reason why you should be concerned, but if your culture has not convinced you that there is, so much the worse for your culture."

What is also not new is the truism that nothing lasts forever. We are thus assured that what we now call behavior analysis will ultimately be different from what we know today. How and through what forces, we can only guess and our guesses will be right or wrong in ways we cannot guess.

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Compliance with Ethical Standards

Conflicts of Interest The author has no conflict of interest.

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