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ABA from A to Z: Behavior Science Applied to 350 Domains of Socially Significant Behavior

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Abstract

Applied behavior analysis (ABA), the practical wing of behavior science, is defined by its focus on socially significant behavior and characterized by an assumed relevance to every domain of it. Although advocates claim ABA has world-changing potential, disagreements exist about how well the science has met its potential for far-ranging social significance. To advance this discussion, we present an extensive list of socially significant behavior domains to which ABA has given empirical attention. The list demonstrates the broad applicability of behavior analysis and suggests some themes future researchers could emphasize to help ABA achieve world-changing impact.

Keywords Applied behavior analysis · Individual well-being · Social significance · Species survival

In the early days of applied behavior analysis (ABA), its founding generation could have gathered at a single corner bar (e.g., see Rutherford, 2009). Today ABA subsumes numerous scholarly journals and professional organizations, many graduate training programs, and more than 54,000 certified practitioners worldwide at the master's level and above (Behavior Analyst Certification Board, 2022). This swelling of the ranks raises a crucial question that we pose, especially on behalf of those who are joining the field and those who teach them: Is ABA's reach into the various corners of the human experience expanding as well?

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Just a few professional generations have passed since Skinner (e.g., 1948, 1953) began trumpeting the potential of behavior analysis to change the world for the better. At that time, no consensus existed about what an applied science of behavior might look like or achieve (Rutherford, 2009). In the late 1950s and 1960s, a few pioneers explored some possible applications (e.g., Allyon & Michael, 1959; Baer, 1962; Birnbrauer et al., 1965; Bijou, 1957), and ABA was born (Morris et al., 1990; Morris et al., 2005; Morris et al., 2013). Skinner's original conception was that the scientific exploration and application of fundamental principles of behavior should address the whole of the human condition, and it is our impression that this vision has never seriously been questioned. For instance, when ABA achieved early successes with severe problem behavior of people residing in institutions, we doubt any pioneering applied behavior analyst thought, "This is plenty." When Baer et al. (1968) put forward the first formal definition of ABA, they constrained the field only in this way: "The label applied is . . . determined by the . . . interest which society shows in the problem being studied" (p. 92). Consistent with this seminal perspective, we have no sense that contemporary behavior analysts regard ABA as intended for just a few kinds of behavior or a few kinds of people (e.g., see Friman, 2006, 2014; Normand & Kohn, 2013; Poling, 2010).

Before ABA, there were no systematic applications of behavior principles. During ABA's earliest years, research and practice focused on only a few types of socially important behavior. Today, can we imagine some enlightened future in which ABA has grown to match Skinner's all-encompassing vision? One hopes for evidence of progress, but how might such progress be evaluated?

Some who have reflected on this question have offered qualitative commentary on how well ABA is doing at expanding its reach (e.g., Friman, 2006, 2014; Normand & Kohn, 2013; Poling, 2010), For example, Friman (2006) opined that ABA was becoming too focused on problems of developmental disorders and placing too little emphasis on matters of concern to society in general. This is a thought-provoking argument, but one framed in terms of diagnostic membership and demographics rather than of socially significant classes of behavior. Other observers have attempted to quantify ABA's citation impact on various areas of research and practice. For instance, Kazdin (1975) showed how often ABA research had been cited by journals in each of several areas of professional specialization (e.g., psychiatry, clinical psychology, corrections). Kazdin's analysis suggested that the ABA of 1975 had expanded its reach beyond that of, say, the ABA of 1965, but no specific socially important behaviors were mentioned—something that has been true in general of such assessments (e.g., Critchfield, 2002; Critchfield & Reed, 2004; Laties & Mace, 1993)

In the end, both qualitative commentaries and citation analyses are too coarse-grained to inform us about specific domains of socially significant behavior upon which applied behavior analysts are shedding light. We therefore took a different approach by compiling an extensive list of socially significant behaviors that have been the focus of empirical attention in behavior analysis research (for a model of this approach, see Heward & Critchfield, 2020).
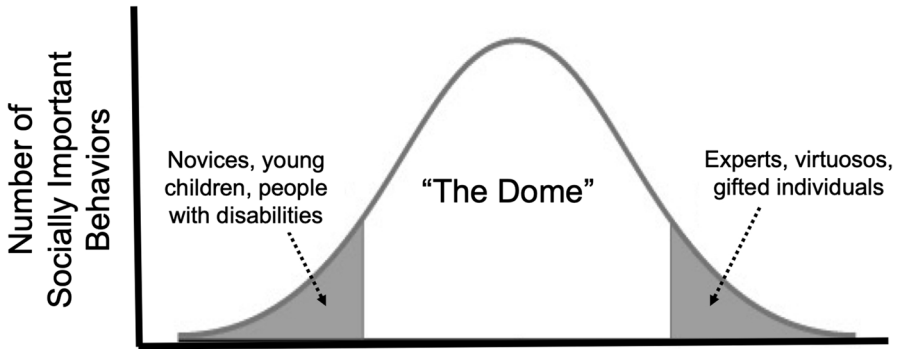
Fig. 1 A distribution of socially significant behaviors. *Note.* Based on Friman (2006)

Four preliminary comments are in order about our effort. First and foremost, this is not a systematic literature review. We did not try to identify every single domain of socially significant behavior that has received attention in ABA. We were simply curious whether we could identify enough domains to persuade ourselves, and a skeptical reader, that ABA is broader and more richly nuanced than in its formative days. Second, we made no effort to summarize the research in any particular domain. Instead, we cited one or two illustrative empirical articles as evidence that the domain has been addressed in the peer-reviewed research literature in some data-based way. Third, we labeled domains with everyday language for behaviors the general public might view as socially significant. We make no claim that other observers would describe the domains in the same way.[1]

Finally, two broad classes of socially significant behavior are evident in the list. The first class might be called *individual well-being behaviors*, by which we mean behaviors that affect one person's quality of life. It has become popular to think about such behaviors as falling into a distribution based on their prevalence in and relevance to the population at large (see Fig. 1, based on Friman, 2006). Some socially significant behaviors are rare because they pertain to relatively uncommon disorders (e.g., pica or trichotillomania) or to exceptional talent (e.g., Ericsson et al., 2005). Also included are transitional behaviors of young children that, in typically developing individuals, are replaced by more sophisticated behaviors. At the other end of the life span are behavior changes that enhance the quality of life for senior citizens (Skinner & Vaughan, 1997). The most common behaviors, those comprising the largest portion of the distribution (or its "dome"), reflect the experiences of most individuals for most of their lives; the various classes of behavior that contribute to physical health is an example

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[1] As an example of the many ambiguities inherent in identifying domains, consider: Is the acquisition of communicative abilities one domain, or many? Should speech training with persons with disabilities be considered in combination with, or apart from, acquisition of speech by typically developing individuals? Put another way, should our list include 100 domains or 500? Perceiving no clear answers to such questions, we decided it was better to create this resource in some fashion than to ruminate interminably over taxonomic decisions. Note that, given the latitude we claimed for ourselves, a driblet of whimsy may have leaked into one or two domains, although we stand behind the list as a serious inventory of ABA's reach.

(e.g., Jarmolowicz et al., 2016; Marsch et al., 2014; Rehfeldt & Tindall, 2021). One valid perspective is that for ABA to be a truly general-purpose science and continue to thrive, it must promote positive change across the full range of individual well-being behaviors.

A second class of socially significant behaviors might be called *species-survival behaviors*, which are distinguished by their impact on humanity. For example: "Threats abound, including atomic warfare, global warming, overpopulation, pandemic diseases, natural resource depletion, and corporate abuse. Each of these has the potential to destroy our way of life, if not life itself" (Neuringer, 2011, p. 28). Many (most?) existential threats are direct products of, or can be affected by, human behavior, so, "To survive, we must learn how to change behaviors" that create threats (p. 28). For purposes of the present article, we assume ABA must attend to both individual well-being behaviors and species-survival behaviors.

Whereas many behavior analysts (present authors included) are enthusiastic about the discipline's ability to improve both the quality of people's lives and the settings in which they live them, a clear-eyed view shows that a great deal of work remains on both fronts. Regarding individual well-being behaviors, skeptics say ABA has focused too much on autism and developmental disabilities, the challenges of which are essential to address but unrelated to the daily concerns of most people (e.g., Friman, 2006, 2014; Normand & Kohn, 2013; Poling, 2010). As for species-survival behaviors, skeptics argue that ABA has not addressed most of humanity's major threats, and has achieved few, if any, effects with population-wide impact (e.g., Chance, 2007; Dixon et al., 2018; Marcattilio & Nevin, 1986; Mattaini & Aspholm, 2016).

Contrasting views of the extent and impact of ABA exist because most assessments, whether optimistic or skeptical, have been subjective and/or employed disparate conceptual frameworks. We seek to offer something more objective and, to our knowledge, more extensive than what currently exists in the ABA literature, namely, an inventory of a range of socially significant behaviors—meaningful at the levels of both individual well-being and species-survival—that behavior analysts have addressed empirically[2] (cf. Kazdin, 1975). Heward and Critchfield (2020) presented a preliminary model for counting the proverbial horse's teeth when they cited published sources for 164 socially significant behavior domains. We build upon that effort here.

Making the World a Better Place, One Socially Significant Behavior at a Time

In compiling our list, we were not overly concerned with whether a given application incorporated each of Baer et al.'s (1968) classic dimensions of ABA. Consistent with the notion that useful ABA studies feature various combinations of desirable

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[2] There is a long tradition in behavior analysis of analyzing socially significant behavior via narrative-style "conceptual" writings (e.g., Skinner, 1953, 1957). This approach explores the plausibility of a behavioral account but cannot rule out competing interpretations (for more on this distinction, see Baron et al., 1991). In the present article, we focus on empirical (if not strictly experimental) evidence as the bedrock of a cumulative science.

characteristics (e.g., Axelrod, 2017; Cooper et al., 2020, ch. 10; Critchfield & Reed, 2017; Hyten, 2017; Kunkel, 1987; St. Peter, 2017), we included any peer-reviewed report that was empirical and focused on a specific class of socially significant behavior.[3] The Appendix describes how we compiled our list and acknowledges some of the limitations of that process.

Table 1 displays the results: 350 domains of socially significant behavior with illustrative citations. The articles cited in Table 1 date from 1954 to the present and represent the contributions of more than 1,000 investigators. Domains of application range from the mundane (e.g., walking, jokes and humor, video games) to the critically consequential (e.g., hostage negotiations, violence prevention, urban search and rescue), and include a great deal in between. Through its heft and breadth, Table 1 offers a concrete frame of reference for discussing how well Skinner's vision of a generally applicable applied behavior science has been realized. Consistent with the assumption that behavior analysis has a substantial role to play in enhancing the human experience, Table 1 demonstrates that behavior principles have proven effective in changing a vast spectrum of behaviors. One wonders how many other applied areas in psychology and related fields have addressed such a variety of socially significant behaviors.

Table 1 may serve a valuable educational function for those who are new to behavior analysis. This compendium of applied research documents the enormous life-improving potential ABA's advocates have long proclaimed. It is one thing to assert that "ABA can help make the world a better place." It is quite another to provide a basis for multiple-exemplar training that features hundreds of ways in which the application of behavioral principles and technology can be fruitful (Dardig, 1985). We submit that the greater the range of examples of meaningful behavior change encountered by novices to ABA, the richer their understanding of ABA's potential will be.

We do not mean to suggest that research reports, by themselves, are an effective recruiting tool (e.g., Detrich, 2018). Instructive examples must be shared in a way that captures the excitement of discovery and satisfaction of addressing socially significant problems (for some practical tips, see Dardig, 1985). Murray Sidman's (2007) joyful description of observing the emergence of stimulus equivalence relations by a boy with severe intellectual disabilities is a powerful example.

> Then came the magic moment. With Kent now matching dictated words both to pictures and to printed words, we repeated the reading comprehension tests in which he had to match the printed words with their corresponding pictures, tests that Kent had been completely unable to do before. As the tests progressed, we could not believe what we were seeing. Trial after trial,

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[3] Although people may disagree on the definition of "socially significant" behavior (e.g., Furman & Lepper, 2018), we took the view that most observers can tell the difference between a behavior that matters in everyday life and a behavior selected strictly for measurement convenience or theoretical fit, as in basic research. We did not attempt to distinguish relative degrees of social importance on the grounds that this determination is, to a large extent, subjective. For instance, the survival of the human species doesn't depend on the self-management of one person's diabetes or on another person learning an effective tennis serve, but those behaviors can mean a great deal to specific individuals.

Kent correctly matched the car, the cap, the cat, the box, the cow—each of the 20 pictures—to its printed name, and each of the 20 printed names to its corresponding picture. The technician, sitting behind Kent in the experimental room, could hardly contain himself. At the end, he leaped up, grabbed the boy in a bear hug, and shouted, "Dammit, Kent, you can read!" Outside the room, where the rest of us were watching through a one-way window, I was dancing the twist; my son, who happened to be in the lab at that moment, said to me later, "Dad, I've never seen you like that before!" (p. 315)

Building on a Great Start: Watchwords for the Work Ahead

Table 1 tallies an impressive array of accomplishments, but there is always work to be done; prospects for the long-term influence and even survival of ABA—and, not hyperbolically, of our species—will be improved by leaving no domain of socially

Table 1 ABA from A to Z: Applications of Behavior Science to 350 Socially Significant Domains

A   active shooter drills (Dickson & Vargo, 2017)
      aggression (Hood et al., 2019; Roscoe et al., 2010)
      attention deficit hyperactivity disorder (ADHD) (Bicard & Neef, 2002; Neef et al., 2001)
      AIDS prevention and treatment (DeVries et al., 1991; Rosen et al., 2007)
      altruism (Goldstein et al., 1978; Rushton & Teachman, 1978)
      Alzheimer's disease (Bourgeois, 1990; LeBlanc et al., 2006)
      anesthesia (MacLaren & Kain, 2008; Stephens & Ludwig, 2005)
      animal training and care
        • problem behavior management (Feuerbacher & Muir, 2020; Salmeron et al., 2021)
        • shelter worker skills (Howard & DiGenarro Reed, 2014, 2015)
        • training (Pryor & Ramirez, 2014)
      anorexia nervosa (Solanto et al., 1994)
      anxiety (Flood & Wilder, 2004; Rounds et al.,2007)
      asking "why" (Patil et al., 2021; Pyles et al., 2021)
      assertiveness (Borstein et al., 1977; McGee et al., 1984)
      astronauts
        • space flight (Kelly et al., 2005)
        • training (Findley et al., 1963; Roma et al., 2011)
      attendance & punctuality (Bicard et al.,2012)
      attitudes (Foxall & Yani-de-Soriano, 2005; Parling et al., 2012)
      autism spectrum disorders (DiGennaro Reed & Reed, 2015).
      aviation safety (Rantz et al., 2009; Rantz & Van Houten, 2011)

B   baseball (Heward, 1978; Osborne et al., 1990)
      basketball (Kladopoulos & McComas, 2001; Lambert et al., 2016)
      beer (Geller et al., 1986; Morrell et al., 2021)
      behavior analysis instruction
        • design and analysis (Blair et al., 2019; Lovett et al., 2011)
        • fundamental concepts (Albright et al., 2016; O'Neill et al., 2015)
        • interventions (Jarmolowicz et al., 2008; Sarakoff & Sturmey, 2004)
      bicycle
        • riding (Cameron et al., 2005; Hanley et al., 1999)
        • safety (Van Houten et al., 2007)
      bilingualism (Clay et al., 2020; Zhou et al., 2019)
      binge eating (Lee & Miltenberger, 1997; Kjelsås et al., 2004)
      bipolar disorder (Bradshaw & Szabadi, 1978; Whitton et al., 2015)
      brain injury, traumatic (Tasky et al., 2008; Wehman et al., 1989)
      breastfeeding (Washio et al., 2017; 2020)
      bullying (Bradshaw, 2013; Ross et al., 2009)
      bulimia (Cooper et al., 1989)
      bruxism (toothgrinding) (Barnoy et al., 2013; Lang et al., 2013)
      burn care (Sil et al., 2013; Tarnowski et al., 1989)

Table 1 (continued)

C   caffeine
   • effects on children (Baer, 1987)
   • reducing intake (Foxx & Rubinoff, 1979; James et al., 1985)
   cancer
   • detection (Finney et al., 1995; Saunders et al., 1986)
   • prevention (Lombard et al., 1991; Pagoto et al., 2003)
   • problems associated with chemotherapy (Redd, 2019)
   cerebral palsy (Johnson et al., 1981; Martin & Epstein, 1976)
   charitable giving (Farrimond & Leland, 2006; Silverman et al., 1984).
   child
   • abuse and neglect (Lutzker & Rice, 1987; Wesch & Lutzker, 1991)
   • accidents (Cataldo et al., 1992; Finney et al., 1993)
   cigarette smoking cessation (Dallery et al., 2008; Reynolds et al., 2008)
   classroom
   • management (Joslyn et al., 2019; Pfiffner et al., 1985)
   • teacher training (Moore et al., 2002; Witt et al., 1997)
   coma (Boyle & Greer, 1983; Lancioni et al., 2006)
   computer skills
   • elementary (Jerome et al., 2007; Sump et al., 2019)
   • vocational (Lehardy et al., in press; Wong et al., 2003)
   constipation (Wassom & Christopherson, 2014)
   consumer behavior (Foxall, 2017; Hantula & Wells, 2014)
   conversation skills (Kornacki et al., 2013; Sherer et al., 2013)
   cooperation (Azrin & Lindsley, 1956; Jones et al., 2000)
   COVID
   • mask wearing (Frank-Crawford et al., 2021; Sivaraman et al., 2021)
   • modifying services during pandemic mitigation (Crockett et al., 2020; Pollard et al., 2021)
   creativity (Holman et al., 1977; Winston & Baker, 1985) update Dec '21 Psych Record?
   criminal justice
   • correctional institutions (Hall, 1979; Schnelle & Lee, 1974)
   • crime deterrence and interdiction (Van Houten & Nau, 1981; Schnelle et al., 1978)
   • training of law enforcement personnel (Hinkle & Lerman, 2021; O'Neill et al., 2019)
   crying (Bowman et al., 2013; Etzel & Gewirtz, 1967)
   culturally sensitive therapies and programs (Aguilar et al., 2017; Lo et al., 2015)
   customer service (Johnson & Fawcett, 1994; Rice et al., 2009)
   cystic fibrosis (Hagopian & Thompson, 1999; Stark et al., 1993)

D   dance (Quinn et al., 2015)
   deafness (Heward & Eachus, 1979)
   death and dying (Maccallum & Bonanno, 2016; Papa et al., 2013)
   delusions (Travis & Sturmey, 2010)
   dental
   • community access (Reiss & Bailey, 1982; Reiss et al., 1976)
   • fear and avoidance (Allen & Wallace, 2013; Conyers et al., 2004)
   • self-care (Dahlquist et al., 1985; Poche et al., 1982)
   deception (McHugh et al., 2007; Reineke et al., 1997)
   depression (Cuijpers et al., 2007; Polenick & Flora, 2013)
   diabetes (Epstein et al., 1981; Raiff et al., 2016)
   driving
   • and drinking (Teeters et al., 2015; Teeters et al., 2014)
   • safety-belt use (Geller, Casali et al., 1980; Van Houten et al., 2005)
   • speeding (Reagan et al., 2013; Van Houten et al., 1985)
   domestic and partner violence (Martinez & Wong, 2009)
   Down syndrome (Neil et al., 2021)
   dressing, self
   • clothing (Day & Horner, 1986; Sisson et al., 1988)
   • shoe tying (Rayner, 2011)
   dropout prevention (Freeman et al., 2015; Mayer et al., 1993)
   dyslexia (Deno & Chiang, 1979; Denton & Meindle, 2016)

significant behavior unstudied. Table 1, therefore, may also function to help interested researchers identify promising or under-investigated topics. Finally, Table 1 sets the occasion for discussing how ABA might press forward to help make the world a more humane place. In this section, we identify some themes that, based on our experience of compiling Table 1, we believe are important elements of such a discussion.

Table 1 (continued)

E echolalia (Goren et al., 1977; McMorrow & Foxx, 1986)
elopement (wandering away) (Kodak et al., 2004; Tarbox et al., 2003)
emotion (Daou et al., 2016; Guercio et al., 2004)
empathy (Schrandt et al., 2009; Sivaraman, 2017)
employee
  • performance (Goomas, 2010; Hybza et al., 2013)
  • tardiness and attendance (Komacki et al., 1977; Merritt et al., 2019)
  • turnover and retention (Strouse et al., 2004)
enuresis, nocturnal [bedwetting] (Friman & Jones, 2005; Henriksen & Peterson, 2013)
environmental conservation, sustainability, and climate change
  • air pollution (Berry, Friedel et al., 2017; Berry, Nickerson et al., 2017)
  • recycling (Bolanos et al., 2020; O'Conner et al., 2010)
  • reducing driving (Foxx & Schaeffer, 1981; Jadro, 2017)
  • reducing energy use (Bekker et al., 2010; Winett et al., 1982)
  • solid waste management (Hayashi et al., 2019)
  • water conservation (Agras et al., 1980)
ethics (Borba et al., 2014; Brodhead & Higbee, 2012)
exercise
  • promotion (Washington et al., 2014; Wysocki et al., 1979)
  • program attendance (Estabrooks et al., 1996; Epstein et al., 1980)
expectorating, inappropriate (Carter & Wheeler, 2007; Hartz et al., 2020)
eyewitness testimony (Doepke et al., 2003)

F fake news (Tsipursky et al., 2018)
families (Koegel et al., 1996; Lucyshyn et al., 2002)
fear
  • of exercise settings (Rapp et al., 2005; Schmidt et al., 2013)
  • of flying (Rus-Calafell et al., 2013; Tortella-Feliu et al., 2011)
  • specific phobia (Shabani & Fisher, 2006; Tyner et al., 2016)
figure skating (Hume et al., 1985)
fire safety (Garcia et al., 2016; Houvouras & Harvey, 2014)
first aid (Marchand-Martella et al., 1992)
fluorescent lighting, adverse effects of (O'Leary et al., 1978; Pence et al., 2019)
food
  • choices (Hausman et al., 2014; Morrill et al., 2016)
  • preparation (Graves et al., 2005; Trask-Tyler et al., 1994)
  • refusal and feeding disorders (Piazza, 2008; Volkert & Piazza, 2012)
  • safety (Geller, Eason et al., 1980; Yu et al., 2018)
football, American (Stokes et al., 2010; Ward & Carnes, 2002)
foreign language instruction (Petursdottir & Hafliðadóttir, 2009; Rosales et al., 2011)
foster care (Van Camp et al., 2008; Whitehouse et al., 2014)
Fragile X Syndrome (Hall et al., 2020; Kurtz et al., 2015)
friendliness
  • social (Kale et al., 1968; Kohler & Fowler, 1985)
  • workplace (Brown & Sulzer-Azaroff, 1994; Wilson et al., 1997)

G gambling (Dickerson, 1979; Dixon et al., 2015)
games (Schleien et al., 1981; Speelman et al., 2015)
gerontology
  • memory loss (Bourgeois, 1993; Hill et al., 1990)
  • promoting activity and engagement (Gallagher & Keenan, 2000; Quattrochi-Tubin & Jason, 1980)
goats (Hendendez & Rosales-Ruiz (2021)
golf (Fogel et al., 2010; Simek et al., 1994)
government
  • legislation (Critchfield et al., 2015; Weisberg & Waldrop, 1972)
  • public policy (Agras et al., 1980; Hursh & Roma, 2013)
gun safety (Himle et al., 2004; Miltenberger et al., 2005)
gymnastics (Allison & Allyon, 1980; Boyer et al., 2009)

Flexibility

Empirical evidence has always been the cornerstone of applied behavior analysis. Expanding ABA's influence will require devising research to suit a wide variety of settings and problems. It is instructive, we believe, that Table 1 reflects no single methodological canon. The cited research incorporates experimental and descriptive

Table 1 (continued)

H   happiness (Green et al., 1997: Moore et al., 2007)
        Happy Hour (Babor et al., 1978; Kaplan & Reed, 2018)
        harassment, sexual (Hertzog et al., 2008)
        hearing aid use (Richling et al., 2011; Tucker & Berry, 1980)
        higher education
           • college student survival skills (Austin et al., 2002; Robin et al., 1977)
           • student performance management (Ryan & Hemmes, 2005; Semb, 1974)
        hoarding (Donaldson et al., 2014)
        hockey (Seniuk et al., 2015)
        homework (Alber et al., 2002; Ferneza et al., 2012)
        hopelessness (Rezende et al., 2021)
        horse
           • loading into trailers (Ferguson & Rosalez-Ruiz, 2001)
           • riding skills (Kelley & Miltenberger, 2016)
        hostage negotiations (Hughes, 2009)
        hygiene
           • hand washing (Bördlein, 2020; Fournier & Berry, 2012)
           • related to menstruation (Richman et al., 1984; Veazey et al., 2016)
           • other (Rose & Ludwig, 2009; Stokes et al., 2004)

I   impulsivity
           • making risky decisions (Lawyer & Mahoney, 2018; Witts et al., 2011)
           • paying attention (Sherman & Anderson, 1980; Walker & Buckley, 1968)
           • resisting temptation [delayed consequence sensitivity] (Dixon et al., 1998; Schweitzer & Sulzer-Azaroff, 1988)
        incontinence (Adkins & Mathews, 1997; Hagopian et al., 1993)
        independent living skills (Matson et al., 2012)
        infant care
           • at home (Dachman et al., 1986; Matthews et al., 1987)
           • facilities (Kunz et al., 1982; Tate et al., 2005)
        infection prevention (Babcock et al., 1992; Luke & Alavosius, 2011)
        intelligence [IQ] (Cassidy et al., 2016; Dixon et al., 2021)
        instruction, academic
           • systems (Kulik et al., 1979; Twyman, in press)
           • tactics (Brodsky & Fienup, 2018; Gist & Bulla, 2020; Querol et al., 2015)

J   job seeking (Kelly et al., 1980; Toegel et al., 2020)
        jokes and humor (Dymond & Ferguson, 2007; Jackson et al., 2021)
        joint attention (Isaksen & Holth, 2009)
        juvenile delinquency (Kirigin et al., 1982; Phillips et al., 1971)

K   keyboarding skills (DeFulio, 2011; McCuin & Cooper, 1994)
        kidnapping prevention (Beck & Miltenberger, 2009; Gunby et al., 2010)
        kindergarten readiness (Russo & Koegel, 1977)
        kleptomania [shoplifting, stealing, theft] (Maglieri et al., 2000; Rohn et al., 2003)

L   lacrosse (DePaolo et al., 2019)
        landmine detection (Mahoney, Durgin et al., 2015; Poling et al., 2010)
        language acquisition (Guess et al., 1968; Miguel, 2018)
        laundry skills (Horn et al., 2008; McDonnell & McFarland, 1988)
        Lesch-Nyhan Syndrome (Buzas et al., 1981; Olson & Houlihan, 2000)
        library behavior (Fishbein & Wasik, 1981; Meyers et al., 1977)
        legal decision-making (Weatherly, & Kehn, 2013; Weatherly et al., 2012)
        logic (Gallant et al., 2021; Ong et al., 2018)
        lying
           • promoting honesty (Cortez et al., 2014; Sauter et al., 2020)
           • teaching socially-useful "white lies" (Bergstrom et al., 2016)

strategies of investigation, single-subject and group-comparison designs, a wide variety of measurement methods, and visual analysis and quantitative methods. Methodological flexibility has enabled ABA to flourish. Tackling a broad range of socially significant behaviors requires methods compatible with the problems of interest, rather than selecting a problem that fits neatly with preferred research designs (e.g., Birnbrauer, 1979; Critchfield & Reed, 2017; Fawcett, 1991; Kunkel, 1987). This conclusion echoes Baer et al.'s (1987) admonition that progress is impeded when, "applied researchers . . . transform questions to fit the known designs and their rules, rather than constructing

Table 1 (continued)

M marriage (Azrin et al., 1973; Markman, 1979)
martial arts and boxing (Deochand et al., 2020; Harding et al., 2004)
mathematics instruction
  • counting (Bracey et al., 1975; Murphy et al., 1984)
  • basic operations (Lynch & Cuvo, 1995; Wood et al., 1998)
  • advanced operations (Ninness et al., 2006; Ninness et al., 2009)
medicine
  • patient regimen adherence (Dapcich-Miura & Hovell, 1979; Epstein & Masek, 1978)
  • pill swallowing (Anderson et al., 2000; Ghuman et al., 2004)
  • physician regimen adherence (Granvina et al., in press)
  • preparing patients for difficult procedures (Slifer et al., 1994; Slifer et al., 2002)
  • surgical skill training (Levy, Fornani et al., 2016; Levy, Pryor et al., 2016)
  • teaching lay persons to administer medical procedures (Slifer et al., 2009; Whiting et al., 2014)
migraine headaches (Arvans & LeBlanc, 2009; Allen & McKeen, 1991)
money skills (Fienup et al., 2013; Stoddard et al., 1989)
motor tics (Miltenberger et al., 1985; Woods et al., 1996)
multiple sclerosis (Bruce et al., 2018; Motl et al., 2018)
music (Greer et al., 1971; Hill et al., 2020)
mutism, selective (Lang et al., 2011; O'Reilly et al., 2008)

N nail biting (Heffernan & Lyons, 2016; Nunn & Azrin, 1976)
neuroscience instruction (Fienup et al., 2016; Pytte & Fienup, 2012)
noncompliance (Mace et al., 1988; Wahler, 1975)

O obesity (Carr & Epstein, 2020; Hustyi et al., 2011)
obscene speech (Lahey et al., 1973; Pace et al., 1994)
observational learning
  • learning by imitating (Pelaez et al., 2011; Taylor & DeQuinzio, 2012)
  • learning how to imitate (DeQuinzio & Taylor, 2015; Pereira-Delgado & Greer, 2009)
on-task behavior (Fefer et al., 2020; Mattson & Pinkelman, 2020)
otitis media [ear infections] (Finney et al., 1985; O'Reilly, 1997)

P paralysis (Taub, 2012)
parent training (Fettig & Barton, 2014; Matson et al., 2009)
pain management (Henschke et al., 2010. Kelley et al., 1984)
pedestrian safety (Van Houten & Malenfant, 2004; Yeaton & Bailey, 1978)
peer support
  • socialization (Greer & Polirstok, 1982; McGee et al., 1992)
  • tutoring (Kamps, 1994; Morgan et al., 2020)
perspective-taking (Belisle et al., 2016; LeBlanc et al., 2003)
physical education (McKenzie et al., 1991; Sallis et al., 1997)
physical therapy and rehabilitation (Dowrick & Dove, 1980; Dixon & Falcomata, 2004)
photography skills (Edrisinha et al., 2011; Giangreco, 1983)
pica [ingesting inedibles] (Fisher et al., 1994; Piazza et al., 2002)
pinball machine skills (Hill et al., 1981)
play (Hyusti et al., 2012; Machalicek et al., 2009)
poisoning prevention (Dancho et al., 2008; King & Miltenberger, 2008)
pole vaulting (Brock et al., 1972; Scott et al., 1997)
politics
  • policy speeches (Chan et al., 2021)
  • political action (Schroeder et al., 2004)
pornography (Negash et al., 2020; Schaeffer & Colgan, 1977)
posture (Dib & Sturmey, 2007; Noda & Tanaka-Matsumi, 2009)
Prader-Willi Syndrome (Joseph et al., 1997; Page et al., 1983)
praise, getting teachers to use (Craft et al., 1998; Reinke et al., 2007)
prejudice and social discrimination
  • age (Cullen et al., 2009)
  • ethnicity (Dixon & Lemke, 2007)
  • gender (Cartwright et al., 2017; Farrell & McHugh, 2017)
  • religion (McGlinchey & Keenan, 1997)
problem-solving
  • by children (Kisamore et al., 2011; Sautter et al., 2011)
  • by professionals (Gorrell & Downing, 1989; Watson & Kramer, 1995)
procrastination (Johnson et al., 2016; Perrin et al., 2011)
psychogenic [psychosomatic] conditions (Grosz & Zimmerman, 1965; Watson & Sterling, 1998)
psychopharmacology instruction (Zinn et al., 2015)
public speaking (Fawcett & Miller, 1975; Pawlik & Perrin, 2020)

Q quality control (Verhave, 1966)
quantitative analysis instruction (Fields et al., 2009; Fienup & Critchfield, 2010)
quarreling (Prinz et al., 1979; Taylor, 1966)
question asking/answering (Ingvarsson et al., 2007; Taylor & Harris, 1995)
quietness (Sigurdsson et al., 2011; Winett & Roach, 1973)

Table 1 (continued)

R reading instruction
  - comprehension (Brooks Newsome et al., 2014; Stevens et al., 1991)
  - decoding and phonics (Daly et al., 1996; Ryder et al., 2006)
  - vocabulary (Cuvo et al., 1995; Lahey & Drabman, 1974)
  reasoning
  - analogical (Belisle et al., in press)
  - metaphorical (Persicke et al., 2012)
  relapse after treatment (Pritchard et al., 2014; Wathen & Podlesnik, 2018)
  relationship-building skills (Callahan et al., 2019; Canon & Gould, 2021)
  remembering [memory]
  - prospective memory (Peisley et al., 2020)
  - working memory (Baltruschat et al., 2011a, 2011b)
  robbery prevention (Schnelle et al., 1979)
  rollerblading (Bord et al., 2017)
  rugby (Lee & Ward, 2009; Mellalieu et al., 2006)
  running (May & Treadwell, 2020; Wack et al., 2014)

S sales (Milligan & Hantula, 2006; Sigurdsson et al., 2010)
  schedule following (Miguel et al., 2009)
  schizophrenia (Salzinger & Pisoni, 1958; Wilder et al., 2001)
  school attendance
  - absences and truancy (Barber & Kagey, 1977; Freeman et al., 2015)
  - avoidance and phobia (Ayllon et al., 1970; Welch & Carpenter, 1970)
  - tardiness (Caldarella et al., 2011; Tyre et al., 2011)
  school bus, student conduct on (King et al., 2019; Putnam et al., 2003)
  self-advocacy/determination (Arndt et al., 2006; Sievert et al., 1988)
  self-concept (Montoya-Rodriguez et al., 2017)
  self-control [see also impulsivity]
  - say-do correspondence [follow-through on promises] (Baer et al., 1988; Rosenberg et al., 2015)
  - self-management (Briesch & Chafouleas, 2009; Carr et al., 2014)
  self-injury, nonsuicidal (Kahng et al., 2002)
  sex
  - arousal (Roche & Barnes, 1997)
  - masturbation (Cicero, 2019; Cividini-Motta et al., 2020)
  - partner selection (Dolan et al., 2020; Jarmolowicz et al., 2015)
  - pregnancy and disease prevention (Bulow & Meller, 1998; Strickland et al., 2020)
  sex abuse prevention (Kopp & Miltenberger, 2009; Miltenberger et al., 1999)
  sharing things (Barton & Ascione, 1979; Marzullo-Kerth et al., 2011)
  sign language (Carr & Kologinsky, 1981; Valentino & Shillingsburg, 2011)
  sleep
  - delayed onset and bedtime resistance (Freeman, 2006; Sanberg et al., 2018)
  - deprivation effects (Kennedy & Meyer, 1996)
  - disorders (Durand & Mindell, 1999; France & Hudson, 1990)
  - sleepwalking (Frank et al., 1997; Meyer, 1975)
  - snoring (Josephson & Rosen, 1983; Voulgarakis et al., 2017)
  smelling (Dass et al., 2018; Hanney et al., 2019)
  smiling (Hopkins, 1968; Krstovska-Guerrero & Jones, 2013)
  soccer (Brobst & Ward, 2002; Quintero et al., 2020)
  social skills (Schreiber, 2011; Weiss & Harris, 2001)
  spelling (McNeish et al., 1992; Morton et al., 1998)
  staff, human services
  - supervision (Burg et al., 1979; Dixon et al., 2016)
  - training (Hine, 2014; Page et al., 1982)
  stereotypy [repetitive behavior] (Rapp & Vollmer, 2005)
  stuttering (de Kinkelder & Beolens, 1998; Wagaman et al., 1995)
  stress (Koegel et al., 1992; Osborne et al., 2008)
  swimming
  - coaching and instructional skills (Jull & Mirenda, 2016; Rushall & Smith, 1979)
  - skill acquisition (Koop & Martin, 1983; McKenzie & Rushall, 1974)
  substance abuse
  - access to effective treatment (Greenfield et al., 1996; Roll et al., 2009)
  - help-seeking (George & Tucker, 1996)
  - prevention (Embry, 2002)
  - relapse (Vuchinich & Tucker, 1996)
  - treatment (Higgins et al., 2007)
  suicide (Bryan & Bryan, 2021; Dombrovski et al., 2011)
  supported employment (McDonnell et al., 1989; Storey & Horner, 1991)

Table 1 (continued)

T   table manners (Barton et al., 1970; van den Pol et al., 1981)
          tanning, indoor (Reed et al., 2014)
          tantrums (Vollmer et al., 1996; Wilder et al., 2006)
          telehealth (Higgins et al., 2017; Fisher et al., 2020)
          telephone skills (Praderas & MacDonald, 1986; Slowiak, 2014)
          telling other people about your day (Shillingsburg et al., 2019)
          tennis (Galvan & Ward, 1998; Ziegler, 1987)
          terrorism
              • detecting explosives (Porritt et al., 2015; Sargisson & McLean, 2010)
              • government response to (Nevin, 2003)
              • identifying and reporting suspicious packages (May et al., 2018)
              • reducing prejudice caused by (Dixon et al., 2006)
          texting (Hayashi et al., 2019)
          thumb sucking (Long et al., 2000; Rapp et al., 1999)
          toxicity substances, understanding behavioral effects (Newland & Bailey, 2017)
          toilet training (Azrin & Foxx, 1971)
          Tourette syndrome (Azrin & Peterson, 1988; Wiskow & Klatt, 2013)
          trichotillomania [hairpulling] (Azrin et al., 1980; Rapp et al., 1998)
          tuberculosis detection (Mahoney, Weetjins et al., 2012; Poling et al., 2017)

U   urban search and rescue (Edwards et al., 2016; La Londe et al., 2015)
          underachievement, academic (Pigott et al., 1986; Wolfe et al., 1986)
          urinary reflexes in cattle (to reduce methane) (Dirksen et al., 2021)
          urination, males, better aim (Siegel, 1977)

V   vaccination and immunization (Jarmolowicz et al., 2018; Yokley & Glenwick, 1984)
          vandalism (Mayer et al., 1983; Watson, 1996)
          veterinary practice (Grandin et al., 1995; Laule et al., 2003)
          video games (Blum-Dimaya et al., 2010; Schenck & Reed, 2020)
          violence prevention (Anderson & Kincaid, 2005)
          vitamins, taking of (Pace & Toyer, 2000)
          vision
              • blindness (Correa et al., 1984; Toussaint & Tiger, 2010)
              • improving acuity (Collins et al., 1981; Leung, 1988)
              • wearing corrective lenses (DeLeon et al., 2008)
          vocational training for persons with intellectual disabilities (Bennett & Dukes, 2013)
          vocal tics (Mancuso & Miltenberger, 2016; Woods & Twohig, 2002)
          voice disorders (Lanovaz et al., 2011; Warnes & Allen, 2005)
          volleyball (Rotta & Poling, 2021)
          vomiting [rumination] (Kleibert & Tiger, 2011; Lockwood et al., 1997)

W   walking (Kurti & Dallery, 2013; Stylianou et al., 2016)
          war (Nevin, 1996)
          weather-related behavior (Gelino & Reed, 2020; Ardila Sánchez et al., 2019)
          weightlifting (Moore & Quintero, 2019; Mulqueen et al., 2021)
          Williams Syndrome (O'Reilly et al., 2000)
          workplace safety
              • industrial accident prevention (Myers et al., 2010; Sulzer-Azaroff et al., 1990)
              • proper physical technique (Alavosius & Sulzer-Azaroff, 1986; Sigurdsson & Austin, 2008)
              • use of personal protective equipment (Abellon & Wilder, 2014)
          writing
              • composition (Hansen & Wills, 2014; Heward et al., 1991)
              • handwriting (Kubina et al., 1998; Trap et al., 1978)
              • creativity enhancement (Glover & Gary, 1976; Maloney & Hopkins, 1973)
              • writer's block (Upper, 1974; Didden et al., 2007)

X   xeroxing [photocopying] (Wacker & Berg, 1984)
          x-ray shielding (Greene & Neistat, 1983)

Y   yelling (Lancioni & Markus, 1997; Lancioni et al., 1999)
          yoga (Downs et al., 2015; Ennett et al., 2020)

Z   zoo and aquarium management (Alligood et al., 2017; Fernandez & Martin, 2021)

Complete list of references for sources cited in this table is available as supplementary material in the online version or directly at https://doi.org/10.1007/s40614-022-00336-z.

a design that answers the original question" (p. 319). Or, as Sidman (1960) put more strongly, there is always a danger that a discussion of desirable methods will be . . .

Accepted as constituting a set of rules that must be followed in the design of experiments. I cannot emphasize too strongly that this would be disastrous. I could make the trite statement that every rule has its exception, but this is not strong enough. Nor is the more relaxed statement that the rules of experimental design are flexible, to be employed only where appropriate. The fact is that there are no rules of experimental design. (p. 214)

We trust that behavior analysts distinguish between valuable information and hierarchical standards of evidence. Table 1 would be shorter, less interesting, and less reflective of the human experience if our search had excluded studies that employed descriptive methods, group-comparison designs, or self-report measures. To build on Sidman's point, we assert that behavior analysts, in the pursuit of understanding and influencing behavior, should and will employ any research methods that advance that endeavor.[4]

Thoroughness

The domains with the most impact in Table 1—those where the findings of ABA are widely used and benefitting large numbers of individuals—tend to be those with the most extensive evidence bases (e.g., autism, special education, workplace safety). Our literature search suggested that many other domains have been lightly investigated. For some domains, we found only a single exploratory study or a smattering of loosely related articles. Other domains appear to be explored by a single research team, with their work neither replicated nor extended by other investigators. Such breadth without depth is concerning because, contrary to the popular notion that science advances through "Eureka!" moments of discovery, progress usually depends on cumulative evidence built up incrementally across many investigations (Rogers, 2010; Root-Bernstein, 1988; Sidman, 1960; Skinner, 1956). Turning most of the domains in Table 1 into large-scale success stories will require considerable additional research.

Scaling

To achieve societal impact in a given domain, ABA must develop effective, user-friendly interventions that are disseminated to all who can benefit from them. In compiling Table 1, we found many translational studies or proof-of-concept demonstrations that fell short of implementing interventions in the field at a scale that might yield societal-level benefits (e.g., see Horner & Kittelman, 2021). Each domain that is in Table 1—or that could be—requires the kind of careful attention that has been devoted to areas like autism, developmental disabilities, and workplace

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[4] Pragmatism is one the philosophical pillars of behavior analysis (Moore, 2008; Skinner, 1984). The word is not used here in the trivial and often resigned or compromising sense of utilitarian practicality, as in "done is better than good." It means that the circumstantial value of a proposition or method is a matter of whether its use brings the user closer to achieving a particular goal—in this case, extending ABA's capacity to remain a vibrant field that contributes to the betterment of the human condition.

safety. To appropriate a line from management guru Peter Drucker (e.g., 2020), without the hard work of building a systematic program of investigation, the goal of making the world more humane is merely a good intention.

A further prerequisite for impact is devising programs and interventions suited to large numbers of individuals—recall the "dome" of Fig. 1's distribution of socially significant behaviors. In compiling Table 1, we found a good deal of what might be called "dome adjacency." That is, behavior analysts have studied numerous behaviors of relevance to the general human population—concerns like sleep difficulties, perspective-taking, impulsivity, and adherence to medical regimens—but have done so primarily with children and persons with disabilities, and much less so in typically developing adults. There is no guarantee that insights derived in the left tail of Fig. 1 will generalize meaningfully under the "dome"[5]: Promising interventions often fail when transplanted into new settings or populations (Detrich, 2013a, 2013b; Fixsen et al., 2019). This lesson, however, suggests the potential for cross-fertilization between ABA and other disciplines that have studied "under the dome" problems to the exclusion of the tails of the dome, which brings us to the next section.

Connections and Partnerships

Scientists in many disciplines want to address society's pressing problems, and they have productively engaged in that enterprise. The work of those researchers might benefit from contacting behavior analysis research, and vice versa. Both directions of influence and collaboration deserve comment.

Regarding the sharing of behavior analysis research, scientists in other fields can benefit only from what they know about. Behavior analysis journals have relatively small subscriber counts and garner a large proportion of their citations from articles published in other behavior analysis journals (e.g., Critchfield & Reed, 2004). Almost 60% of the articles cited in Table 1 are from a dozen journals read primarily by behavior analysts[6] and more than 40% come from one outlet, the *Journal of Applied Behavior Analysis*.

Behavior analysis journals might not provide the best platform for widespread dissemination of behavior analytic principles, methods, and technology to society. Journals and professional magazines that do not specialize in behavior analysis attract many more readers, and these may be the *right* readers—that is, people who control the modal practices in particular domains of application. Reaching those

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[5] Generality to the right tail of Fig. 1 seems even less certain. Behavior analysis research focusing on the specific needs of gifted and talented learners and exceptional performers appears to be rare (e.g., in Table 1, see entries related to the training of astronauts and surgeons and the performance of skilled athletes).

[6] Behavior Analysis in Practice, Behavior and Social Issues, Behavior Modification, Behavioral Interventions, Education and Treatment of Children (and its precursor, School Applications of Learning Theory), European Journal of Behavior Analysis, Journal of Applied Behavior Analysis, Journal of Behavioral Education, Journal of the Experimental Analysis of Behavior, Journal of Organizational Behavior Management, Perspectives on Behavior Science (and its precursor, The Behavior Analyst), and The Psychological Record.

readers may be an important early step in setting behavioral solutions into motion (Friman, 2014).

With new audiences come new opportunities for connections and partnerships. Decades ago, behavior analysts began placing their studies in mainstream journals devoted to autism and special education, a practice that certainly contributed to the acceptance and growth of ABA in those areas. Friman (2021) has described how behavioral pediatrics research gained traction with physicians when one investigator, Edward Christopherson, employed strategic messaging in articles published outside of behavior analysis journals:

> He did not bemoan the relative absence of behavioral applications in pediatric practices. He criticized neither the pediatricians for referring patients to non-behavioral providers nor those providers for using treatments that were demonstrably inferior to behavioral methods. Instead, he conducted research showing various ways behavior analysis could benefit pediatrics and published them in pediatric medical journals. . . . That he was successful is beyond dispute. There are behavioral pediatric clinics across the United States . . . [and] behavior analysts have edited three issues of the prestigious *Pediatric Clinics of North America* that focused on behavioral pediatric themes. . . . The general message is that behavioral pediatrics is marketed as a benefit to pediatrics, not a corrective. It is an enhancement of success, not the satisfaction of a deficiency. (p. 311)

We have heard behavior analysts remark that their work is not welcome in non-behavioral journals, that outsiders don't understand behavior analysis or are biased against it.[7] Yet Table 1 shows that a great deal of behavior analysis research has been published in nonbehavioral journals (Table 2 lists 103 of these journals). It is clear that more than a few behavior analysts have reached mainstream readers, and we presume that their successes depended in part on tailoring the message to the needs and values of a specific audience (cf. Friman, 2014, 2021).

Every domain in Table 1 represents an opportunity to cite and collaborate with investigators from other disciplines. Tapping the expertise of other fields may help behavior analysts avoid reinventing the wheel in some domains. For instance, measurement systems can be coopted, ways of gaining access to settings and populations can be identified, and effects well-established by other disciplines can be replicated and refined. Case studies of the process of science show that discoveries often result from synthesizing seemingly unrelated knowledge. Insulin therapy for diabetes, for instance, arose at the conjunction of Oskar Minkowski's training with medical diagnostics, research on the digestive functions of the pancreas, and personal knowledge of the potty habits of one suddenly incontinent dog (Root-Bernstein, 1988). Therapeutic massage as a treatment for preterm infants arose at the conjunction of Tiffany Field's knowledge of traditional practices in neonatal intensive care and a chance encounter with a researcher who studied why rat mothers lick their pups (Field, 1993).

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[7] This view holds some historical validity because the first behavior analysis journals and societies were founded in part because existing scholarly communities did not accept or value behavior analytic research methods (Laties, 2008; Peterson, 1978; Rutherford, 2019).

Behavior analysts seeking to contribute to a more humane world should harness useful ideas wherever they may be found; those who focus solely on behavior analysis research and commune only with other behavior analysts may insulate themselves from both "unrelated" knowledge that could spur the next important discovery (Critchfield & Farmer-Dougan, 2014) and the selective forces that could promote its dissemination. The Matrix Project initiated by ABAI's special interest group, Behaviorists for Social Responsibility (Mattaini & Luke, 2014), is one notable effort to identify supports or barriers for behavior analysts addressing issues of social importance, and to facilitate systems-level change by connecting various actors and entities within and outside behavior analysis (see Seniuk et al. [2019], in particular for a description of how the Matrix Project is being used with respect to sustainability). Nevin (2010) shares a story of the way an island community in Denmark united to use wind power and other innovative practices to become energy independent (they now produce more energy than they consume); this project became the model for a similar one on Martha's Vineyard, in which Nevin himself was involved.

Diversity

A general-purpose applied science must be responsive to the needs of all people. Recent surveys of the literature show that ABA has been slow to confront the implications of individual differences (Jones et al., 2020; Pritchett et al., 2021). In compiling Table 1, however, we saw limited descriptions of participants' demographic characteristics. More complete identification of the characteristics of research participants is central to delineating the effectiveness and social validity of applied work (Jones et al., 2020; Li et al., 2017). We are heartened by recent articles that demonstrate increasing awareness that ABA must develop inclusive and culturally competent interventions (Beaulieu et al., 2019; Fong et al., 2017; Zarcone et al., 2019).

Effectiveness

There are no one-size-fits-all interventions, and behavior analysts imperil effectiveness if they overlook diversity (e.g., Bumstead & Boyce, 2005). Imagine, for instance, trying to teach young nonverbal children with autism using a behavior skills training program developed for factory workers and using the Picture Exchange Communication System (Bondy & Frost, 1994) to train those same factory workers. Interventions encounter replication challenges when transported into contexts different from those in which they were developed (Detrich, 2020; Fixsen et al., 2019).

A critical component of intervention effectiveness is implementation integrity, which can vary across contexts and groups (e.g., Fixsen & Blase, 2019). To cite one troubling example, punitive school discipline procedures tend to be employed with greater intensity and in disproportionate numbers with members of

underrepresented groups (e.g., Butler et al., 2012; Simmons-Reed & Cartledge, 2014). Greflund et al. (2014) reported that this form of bias was avoided when one schoolwide positive behavioral interventions and supports program paid explicit attention to participant characteristics.

Social Validity

People have different ideas about what counts as socially significant; cultural groups vary in what they value as the common good (Holland, 1974, 1978; Winett & Winkler, 1972). To a large degree, social significance is in the eye of the beholder, a point that Strain et al. (2012) highlighted in describing their work designing interventions for children with developmental disabilities:

> Our preconceived notion was that families would be most interested in their children displaying specific developmental skills associated with routines, such as independently dressing self, feeding, and tooth brushing. Relatedly, we also expected that families would be focused on communication skills such as expressing one's needs, wants, and discomforts. Contrary to our a priori judgments, families were most interested in completing routines in a timely fashion. (p. 184)

Social validity assessments help to reveal what different people regard as important (Detrich, 2018; Strain et al., 2012), but they can accomplish this purpose only if the right people are asked (e.g., Fawcett, 1991; Holland, 1978; Pritchett et al., 2021). Some issues may be more important to members of underrepresented groups than to majority-culture individuals—think of microaggressions, racial identity concerns, and the quest for healthy eating in an urban food desert. Some behaviors the majority culture regards as valuable may be objectionable to minority groups—think of how contraception use intersects with the beliefs of certain religious sects. A particularly dark example involves attempts by early behavioral researchers to force binary gender roles on nonbinary individuals (e.g., Rekers et al., 1974). Many of the world's problems involve members of specific groups being subjected to unkindness, economic disparity, and restricted civil liberties; attention to group-specific characteristics, needs, and practices is required, therefore, to do justice to social justice issues (e.g., Pritchett et al., 2021).[8]

Prevention

In compiling Table 1, we found numerous studies focusing on changing individual behavior, but limited empirical work aimed at understanding and changing contingencies that provide the context for behavior. For example, applied behavior analysts have conducted research on substance use by individuals (undergirded by a robust

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[8] Pritchett et al. (2021) describe two connotations of the term "social justice," one involving those problems of group-specific unkindness, economic disparity, and curtailment of civil liberties; the other involving making various groups partners in the evolution of ABA as a way of solving such problems. Both are important, but in the present discussion we refer to the former.

Table 2 104 Mainstream Scholarly Journals that Have Published Behavior Analysis Research

Acta Astronautica

Advances in Neurodevelopmental Disorders

AIDS Patient Care and STDS

Alcoholism: Clinical and Experimental Research

Analysis and Intervention in Developmental Disabilities

American Journal of Diseases of Children

American Journal of Public Health

American Journal of Public Health and the Nation's Health

Animals

Applied Animal Behaviour Science

Applied Research in Mental Retardation

Archives of General Psychiatry

Archives of Sexual Behavior

Australian Journal of Mental Retardation

Behaviour Research and Therapy

Biological Psychiatry

BMJ Open

Brain Injury

Bulletin of the Council for Research in Music Education

Canadian Journal of Addiction

Cancer

Clinical Child and Family Psychology Review

Children's Health Care

Clinical Orthopaedics and Related Research

Clinical Practice in Pediatric Psychology

Clinical Psychological Science

Clinical Psychology Review

Cochrane Database of Systematic Reviews

Cognitive and Behavioral Practice

Cognitive Behaviour Therapy

Cornell Hospitality Quarterly

Current Biology

Current Opinion in Psychiatry

Death Studies

Developmental Disabilities Research Reviews

Developmental Neurorehabilitation

Drug and Alcohol Dependence

Eating and Weight Disorders

Eating Disorders

Education and Training in Autism and Developmental Disabilities

Exceptional Children

Table 2 (continued)

Experimental and Clinical Psychopharmacology

Headache: The Journal of Head and Face Pain

Health Psychology

Human Factors

International Electronic Journal of Elementary Education

International Journal of Eating Disorders

International Journal of Environmental Research and Public Health

Intervention in School and Clinic

Journal of Abnormal and Social Psychology

Journal of Abnormal Child Psychology

Journal of Alzheimer's Disease and Other Dementias

Journal of Anxiety Disorders

Journal of Applied Animal Welfare Science

Journal of Applied Psychology

Journal of Behavioral Health and Medicine

Journal of Consulting and Clinical Psychology

Journal of Conventional Weapons Destruction

Journal of Educational Computing Research

Journal of Educational Psychology

Journal of Educational Research

Journal of Environmental Psychology

Journal of Experimental Child Psychology

Journal of Experimental Psychology: Applied

Journal of Family Violence

Journal of Gerontology

Journal of Mind and Behavior

Journal of Neurodevelopmental Disorders

Journal of Peace Research

Journal of Pediatric Oncology Nursing

Journal of Pediatric Psychology

Journal of Sport Psychology

Journal of Studies on Alcohol

Journal of the Academy of Nutrition and Dietetics

Journal of Undergraduate Neuroscience Education

Journal of Zoological and Botanical Gardens

Learning and Individual Differences

Montefiore Journal of Musculoskeletal Medicine & Surgery

Multiple Sclerosis Journal–Experimental, Translational, and Clinical

Organizational Behavior and Human Performance

Pavlovian Journal of Biological Science

Pediatrics

Table 2 (continued)

Perceptual and Motor Skills

Personality and Social Psychology Bulletin

Physical Education & Sport Pedagogy

Policy Insights from the Behavioral and Brain Sciences

Preventing School Failure: Alternative Education for Children and Youth

Preventive Medicine Reports

Psychology in the Schools

Psychopharmacology

Research in Developmental Disabilities

Research on Social Work Practice

Scholarship of Teaching and Learning in Psychology

School Psychology Quarterly

Sexuality and Disability

Sleep

The British Journal of Criminology

The High School Journal

The Journal of Educational Research

The Journal of Sex Research

The Sport Psychologist

Theory into Practice

Tuberculosis Research and Treatment

Zoo Biology

body of basic research, e.g., Craig et al., 2016; Madden et al., 1997), but ABA has not learned how to influence systems that select drug-seeking over the non-drug-related behaviors of many individuals.

Social systems require a different level of analysis, and changing them is a complex task (e.g., Malott & Glenn, 2006), but one that is necessary to maximize the benefits that an analysis of behavior can deliver. Biglan and Ogden (2008) describe one effort to change the national policies and practices in community mental health in Norway, the achievement of which required building community alliances and influencing policy makers. This project involved components well beyond the interventions common to most behavior analysts.

Prevention-oriented programs may test the flexibility of behavior analysts because (1) they focus on reengineering environments on a broad scale so that problems do not arise in the first place (Bradshaw, 2013; Hovell et al., 1986; Kazdin, 2018; Malott & Glenn, 2006; Winett et al., 1991), and (2) they measure effectiveness at a community or population level (Hovell et al., 1986; Fawcett, 1991). Consider the following example. When young children consume bits of flaking paint in older houses, they may ingest lead that adversely affects both behavior (e.g., attention, aggression) and general intelligence (Needleman, 2004). This risk is probabilistic: Not every child who eats paint chips is affected to the same degree, and some children who do not eat paint chips develop the same problems. Although it is clear that lead mitigation efforts in the United

States during the 1970s through 1990s (which includes banning lead as a gasoline additive) greatly reduced the general prevalence of lead poisoning and associated behavior problems (Needleman, 2004; Reyes, 2007), it is impossible to verify that a given child who did not develop behavior problems benefitted personally from these efforts.

Applied behavior analysts value big and rapid changes in behavior (Baer, 1977; Baer et al., 1968). Prevention science, in contrast, is interested in effects that can be small at the individual level and temporally diffuse; at the community or population level, however, small changes over time add up to big benefits (Fawcett, 1991; Fixsen et al., 2019; Hovell et al., 1986). For instance, low-dose lead exposure may decrease an individual's IQ by only a few points (Jakubowski, 2011), but in a population like that of the United States this is enough to create huge ripple effects, such as changes in intellectual functioning that were sufficient to shift an incalculable number of children from regular to special education (Nevin, 2009). To use money as a convenient big-picture marker of the implications of this unfortunate shift, exposure to toxic levels of lead increased education costs and decreased lifetime earning potential for many affected individuals. It has therefore been estimated that environmental lead mitigation in the United States during the late 20th century, by virtue of preserving relatively small amounts of functioning for many thousands of children who otherwise would have been poisoned, created many billions of dollars in annual economic benefits (e.g., Needleman, 2004; Needleman & Bellinger, 1981).

Positive behavioral interventions and supports (PBIS) is one prevention-oriented success story of which ABA can be proud. PBIS entails a tiered continuum of school-wide instructional interventions and behavioral supports; the greater a student's needs, the more targeted and intensive the supports (Sugai & Horner, 2020). It is a multifaceted intervention that restructures school environments in order to promote respectful, prosocial behavior and reduce the incidence of problem behavior (Bradshaw, 2013; Horner & Sugai, 2015; Pinkelman & Horner, 2019).

Table 1 documents that beyond school-based discipline problems, ABA has begun to explore prevention in a number of domains, including cancer, infections, kidnapping, poisoning, crime, sexual abuse, substance abuse, and accidents in the workplace or those involving guns. To date, most of this research has focused on changing individual behavior, such as teaching adults to detect cancer symptoms and teaching children who happen upon a gun to not touch it, get away, and call for adult help. Most of this work has yet to be implemented at a scale at which community or population-wide benefits can be assessed.[9] Proof-of-concept studies are necessary and important to demonstrate the capacity to change behaviors that contribute to societal problems, but "prevention" can only be claimed when it is documented that cancer survival rates go up and the number of child gun accidents goes down at the community or population level.

Survival

Individual well-being behaviors improve quality of life for many, but probably do not determine the continuation of a way of life, or of life itself. That is the province

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[9] A notable exception is the APOPO project (https://www.apopo.org/en), which teaches rats to detect landmines and tuberculosis (Poling et al., 2011).

of species-survival behaviors, which Skinner (1987) emphasized in his article, "Why We Are Not Acting to Save the World."

> Most thoughtful people would agree that the world is in serious trouble. A nuclear war could mean a nuclear winter that would destroy all living things; fossil fuels will not last forever, and many other critical resources are nearing exhaustion; the earth grows steadily less habitable; and all this is exacerbated by a burgeoning population that resists control. (p. 1)

Table 1 reveals much attention to individual well-being behaviors but relatively little to species-survival behaviors. If extensive evidence (emphasis on *extensive*) exists that research by behavior analysts has reduced nuclear proliferation, led to the adoption of renewable energy sources in replacement of fossil fuels, or mitigated unbridled population growth, to cite just a few examples, we missed it in our article search. At the same time, it should be recognized that no other scientific discipline has found the solution to these "super wicked problems" (Lazarus, 2009; Levin et al., 2012).

Empirical efforts by behavior analysts to address species-survival behaviors are limited in number and scope. Environmental stewardship, for example, is crucial to human survival (Chance & Heward, 2010; Cone & Hayes, 1977; Newland, 2013), but the work we found in this domain—on recycling, for example, or reducing driving or energy use—was modest in scale, in general involving small geographic areas and relatively few consumers or participants (for a review, see Gelino et al., 2021).[10] According to one well-known source, the top three solutions for reducing carbon dioxide are cutting food waste—from production to table—health and education, and plant-rich diets (Project Drawdown, n.d.). It is not difficult to imagine behavior analysts having something to offer with respect to these solutions, as well as to many other proenvironmental endeavors such as reducing water pollution or promoting sustainable farming practices and land-use strategies that reduce soil depletion or flood risk.

Assuming that we are correct that behavior analysts have made limited forays into the domain of species-survival behaviors, we are impelled to ask *why*. Drawing upon points raised in preceding sections, we can suggest at least three related contributing factors. First, lack of content knowledge: people who specialize exclusively in behavior analysis, by virtue of specialized training in a discipline, may know too little about species-survival behaviors to begin developing strategies to address them. Second, lack of experience with studying and implemented scaled or comprehensive interventions: ABA has historically emphasized the measurement and change of individual behavior (Baer et al., 1968), often in settings that are circumscribed spatially or functionally. This approach is compatible with many

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[10] Large-scale field experiments conducted by economists and public policy scientists with hundreds of thousands of consumers have found that peer comparison feedback, a behavioral intervention, reduces home electricity and natural gas usage (Ayres et al., 2013; Allcott & Rogers, 2014). Behavior analysts interested in sustainable practices should recognize and celebrate studies like these and view them as opportunities to collaborate.

individual well-being behaviors, but not necessarily with species-survival behaviors, which demand a formidably larger scale of analysis. For example, what individual reinforcement-based strategies might be developed to combat nuclear proliferation (e.g., Marcattilio & Nevin, 1986; Nevin & Fuld, 1993)? Can individualized energy-use interventions be implemented for citizens of a city of several million individuals? In short, perhaps applied behavior scientists tend to shy away from topics that a traditional ABA skill set has not prepared them to investigate. Third, lack of effective contingencies: most well-trained applied behavior scientists are already fully engaged with other areas of study. Perhaps species-survival behaviors receive little study because professional reinforcement mechanisms favor attention to individual well-being behaviors in selected domains of study (e.g., Holland, 1978). These barriers may be intimidating, but they are not indomitable, especially in university or community settings where opportunities abound to make connections with colleagues who can benefit from our methods and technology, and compensate for the "lacks" we have identified.

Advice From the Founding Generation: The Implementation Imperative

Some 70 years ago, Skinner began sketching the notion that behavior analysis could be a general-purpose science relevant to the entire human experience. Taken as a whole, the lengthy inventory of domains in Table 1 suggests that his view was not too grandiose. ABA has something to contribute to just about every conceivable domain of socially significant behavior. But those who believe behavior analysis can help make the world a better, more humane place have their work cut out for them.

For inspiration about how to go forward, we look once again to ABA's pioneers, who exhibited little hesitance when first transporting behavior analysis from laboratory to field. When presented with problems to which behavior analytic principles had not been applied, they created solutions as they went along. Although perhaps not of the scale of the concerns that confront us, those early problems could be intimidating, as Ted Ayllon observed of working with patients in a psychiatric hospital: "I didn't think it was going to work . . . with people [with whom] everybody's tried everything. . . . I would try it for myself to see. . . . But I didn't see how it could work" (quoted in Rutherford, 2009, p. 67). It is important to note that Ayllon plunged in anyway, resulting in an early demonstration of ABA transportability (Ayllon & Michael, 1959) and, eventually, the first token economy (Ayllon & Azrin, 1968). Helping create a more humane world, it seems obvious to say, requires no less of a can-do spirit.

Forty-five years ago, Don Baer, a member of that dauntless founding generation, said that "It is certainly time for applied behavior analysis to go beyond its current parameters. In fact, it has always been time to do that" (Baer, 1987, p. 335). Baer also warned us to expect a rocky path to an all-encompassing science of behavior, because:

(a) We are not empowered to try to solve those bigger remaining problems, (b) we have not yet made the analysis of how to empower ourselves to try them,

and (c) we have not yet made the system-analytic task analyses that will prove crucial to solving those problems when we do empower ourselves sufficiently to try them. (Baer, 1987, p. 335)

Nonetheless, to Baer and his generation, the difficulty of a problem should have no bearing on one's willingness to try to solve it. As Ayllon did with his formidable psychiatric patients, plunging in was the only way to discover what might be accomplished.

Expanding out parameters and improving the individual and collective human experience will require comprehensive, sustained, high-rate efforts that give systematic attention to the tremendous breadth of socially significant behaviors and involve as many kinds of people as possible. It will require sharing our research with those best equipped to put it to use, and acquiring insights wherever they may be found, including through diverse research methods and the expertise of other disciplines. It will require addressing complex contingency systems that underlie behaviors that threaten both individual well-being and humanity's future. "Ultimately, we need to develop truly systematic research programs that show the conditions under which interventions do, and do not, work in the various domains, and we need to scale up from our cherished n-of-3 designs to diverse populations" (M. Christopher Newland, personal communication). Those are tall orders. We do not pretend to know how to fill them; neither can we hesitate to try.

One model that has demonstrated many of these elements is positive behavioral interventions and supports (PBIS), mentioned above. It is both an "intervention" in its own right and a form of collaboration. The architects of PBIS recognized that "Despite their relevance to the solution of social problems, the behaviors of the relatively powerful (service providers, administrators, policymakers, and others 'upstream' to social problems) are rarely targeted for change" (Fawcett, 1991, p. 624). As of October 2019, PBIS had been in place as a whole-school approach in over 27,000 U.S. schools (Florida Positive Behavioral Interventions & Supports Project, n.d.). This scale of implementation is possible in part because PBIS was developed in close consultation with policy makers, school officials, and other stakeholders with decision-making authority in the educational system (Horner & Kittelman, 2021). We believe that programs of this scale and scope can be introduced to other realms, as is a goal of the Matrix Project as well as the Coalition of Behavioral Science Organizations. The Coalition states that its mission "is to expand . . . awareness [of what behavioral science has contributed to human well-being] and thereby support research and dissemination of culturally competent practices that enhance nurturing societies. . ." (Association for Behavior Analysis International, n.d.). Grounded in a cohesive set of guiding principles, this group may provide an engine for amplifying the message and impact of behavior analysis at a system level.

Turning ABA's widespread success in a few domains and exploratory developments in many others into a full suite of life-enhancing interventions will require a global team of thousands of behavior analysts young and old (but especially the young!) to pursue a difficult, decades-long journey. With respect to such challenges, Winston Churchill (1921) said,

Every day you may make progress. Every step may be fruitful. Yet there will stretch out before you an ever-lengthening, ever-ascending, ever-improving path. You know you will never get to the end of the journey. But this, so far from discouraging, only adds to the joy and glory of the climb. (p. 544)

We hope Table 1 has placed evidence of the growth and scope and potential of applied behavior analysis in front of you. The history of this remarkable field is behind us; many wonderful discoveries and contributions lie ahead.

Appendix

How Our List Was Compiled

We sought to create a resource that is inclusive (see "Applied," below) without necessarily being comprehensive. For each domain of socially significant behavior identified we cited two illustrative primary articles, to document that the domain was addressed in the peer-reviewed research literature in some data-based way. Although our goal of presenting two primary empirical articles was met for most domains, for several domains, we could find only one published article. For several well-researched domains in which many articles exist, we cited literature reviews. For a small handful of domains where ABA practice is common but published empirical work scarce (e.g., zoo animal management), we selected discussion articles that selectively cite empirical work. Once we found useful sources for a given domain, we typically stopped looking, so relevant articles are not cited for many domains. The list is not intended to provide a complete picture of advances in any single domain, and no implication is made that articles included in the list are "better" or more compelling than those that were not included.

Domains were identified as the process described below revealed them to us. We do not claim to have identified every single domain in which applied behavior science has been conducted, nor claim to have categorized the domains in an authoritative way. We beg forbearance if domains are not organized according to reader preferences. Finally, we labeled domains using everyday language. Thus, while many domain labels mention specific behaviors (shoplifting), others refer to a context in which behavior takes place, such as a disorder/disease (cystic fibrosis) or type of institution (government). The intent was to highlight social significance in a way that would be transparent to the general public. This approach meant omitting some interesting topics that are relevant to, but do not directly encompass, socially significant behaviors. For example, digital assistive technologies aid in the implementation of ABA (e.g., Trevisan et al., 2019) but might not be widely recognized as a problem in behavior per se.

Article Selection Criteria

Applied

In selecting sources, in general we tried to steer clear of controversy surrounding what does and does not count as "true" or "complete" ABA research as described by

Baer et al. (1968).[11] To be included in our initial collection, an article merely had to address socially significant behavior (*applied* in the framework of Baer et al., 1968; see Kimball & Heward, 1993) in a face valid way, most typically as indicated by the mention of a specific socially significant behavior in the title and/or abstract.

Behavioral

An article also had to employ behavior theory (*behavioral* and *conceptually systematic* in the framework of Baer et al., 1968). Articles published in a dedicated behavior analysis journal like *Journal of Applied Behavior Analysis* were considered to have been adequately vetted through peer review. For other articles, we examined the title and/or abstract for obvious reference to behavioral principles and/or intervention procedures. By design, our search process reflected one major omission: We made no concerted effort to include applications based on acceptance and commitment therapy (ACT; Hayes & Strosahl, 2004). ACT has spawned a vast literature and has greatly expanded the scope of practice of applied behavioral science by opening the door to socially significant behaviors that traditional ABA has not energetically addressed (e.g., Dixon et al., 2018; Rehfeldt & Tyndall, 2021). Yet there currently exists considerable ambivalence about whether ACT is an extension of, or departure from, traditional ABA. For example, ACT procedures look different from those usually employed in ABA (Critchfield & Rehfeldt, 2020; Hayes & Strosahl, 2004). Proponents argue that ACT is compatible with the behavior analytic canon (e.g., Dixon et al., 2020; McEnteggart et al., 2015), but also that it is part of a "post-Skinnerian" theoretical revolution (e.g., Hayes et al., 2001). A majority of practicing applied behavior analysts reportedly see ACT as within the general scope of ABA but say that it is beyond the scope of their own practitioner repertoires (Enoch & Nicholson, 2020). We therefore excluded ACT to sidestep this confusion and to promote economy of mission. However, we believe an ACT-focused project parallel to this one would provide a valuable resource to behavior science. Until one is created, the interested reader can examine a searchable database that contains numerous examples of empirically supported ACT interventions for socially significant behaviors (Association for Contextual Behavioral Science n.d.).

Article Identification and Categorization

We constructed the list in three stages. In stage 1, we collected relevant published sources, beginning with those with which we were already familiar (Heward & Critchfield, 2020). Between 2019 and 2021, we collected additional sources via newly published books and articles, the reference lists of sources in our possession, and not-necessarily-systematic electronic searches using Google Scholar, combining a given domain of possible application with face-valid descriptors like "applied behavior analysis" or "reinforcement."

In stage 2, we assigned sources to domains of socially significant behavior. We usually relied on how the behavior was labeled and described in a given article,

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[11] See Johnston and Pennypacker (1986) for an argument in favor of embracing only "pure behavioral research" (p. 36) that incorporates a full complement of traditionally expected features from Baer et al. (1968) and rejects "quasi-behavioral research" (p. 38), which employs only some of those features.

though on occasion we relabeled for specificity or transparency. For example, an article whose title referred to "sustainability practices" might appear in our list under "recycling," and an article whose abstract referred to "matching law in sport behavior" might appear under "football." When many sources were available for a domain, we preferred, where possible, those describing an intervention to create socially important behavior change.

In stage 3, each member of the author team independently inspected the full, domain-labeled list and identified items that they were not convinced met our inclusion criteria. An article that any one author regarded as suspect was dropped from the final list.

Throughout the process just described, we relied on the well-established Stewart categorization threshold,[12] which is based on expert judgment—in this case our combined 162 years of experience researching, teaching, and applying behavior analysis in various capacities. We acknowledge that expert judgment can introduce bias to a process (e.g., Boerner & Renz, 2008; but cf. Biederman & Shiffrar, 1987), and hence a different team of experienced behavior analysts using the same process would generate a somewhat different list of domains and articles. Nevertheless, our list appears to achieve a degree of replicability at two levels. At the micro level, we are confident that most behavior analysts will agree that most of the sources in our list focus on socially significant behavior. At the macro level, we are confident that most behavior analysts will agree that the list tells an informative tale of the scope of applied behavioral research. On both counts, of course, readers will form their own opinions.

Declarations

Conflicts of Interest The authors declare no conflicts of interest relevant to this article.

Ethical Approval Not applicable

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[12] In *Jacobellis* v. *Ohio*, Supreme Court Justice Potter Stewart wrote that, "I shall not today attempt further to define the kinds of material I understand to be . . . 'hard-core pornography.' . . . But *I know it when I see it*" (quoted in Gewirtz, 1996, emphasis in original). Likewise, we judged ourselves qualified to recognize behavioral analyses of socially significant behavior when we saw them.

References

Allcott, H., & Rogers, T. (2014). The short-run and long-run effects of behavioral interventions: Experimental evidence from energy conservation. *American Economic Review, 104*(10), 3003–3037. https://doi.org/10.1257/aer.104.10.3003

Association for Contextual Behavioral Science (n.d.). Publications. Retrieved April 30, 2022, from https://contextualscience.org/publications

Association for Behavior Analysis International (n.d.). *Shared values and guiding principles of the coalition of behavioral science organizations*. Retrieved April 30, 2022, from https://www.abainternational.org/aboutus/policies-and-positions/coalition.aspx

Axelrod, S. (2017). A commentary on Critchfield and Reed: The fuzzy concept of applied behavior analysis research. *The Behavior Analyst, 40*, 167–171. https://doi.org/10.1007/s40614-017-0117-6

Ayllon, T., & Azrin, N. H. (1968). *The token economy: A motivational system for therapy and rehabilitation*. Appleton-Century-Crofts.

Ayllon, T., & Michael, J. (1959). The psychiatric nurse as a behavioral engineer. *Journal of the Experimental Analysis of Behavior, 2*, 323–334. https://doi.org/10.1901/jeab.1959.2-323

Ayres, I., Raseman, S., & Shih, A. (2013). Evidence from two large field experiments that peer comparison feedback can reduce residential energy usage. *Journal of Law, Economics, & Organization, 29*(5), 992–1022. https://doi.org/10.1093/jleo/ews020

Baer, D. M. (1962). Laboratory control of thumbsucking by withdrawal and representation of reinforcement. *Journal of the Experimental Analysis of Behavior, 5*, 525–528. https://doi.org/10.1901/jeab.1962.5-525

Baer, D. M. (1977). Perhaps it would be better not to know everything. *Journal of Applied Behavior Analysis, 10*, 167–172. https://doi.org/10.1901/jaba.1977.10-167

Baer, D. M. (1987). Weak contingencies, strong contingencies, and many behaviors to change. *Journal of Applied Behavior Analysis, 20*, 335–337. https://doi.org/10.1901/jaba.1987.20-335

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1*, 91–98. https://doi.org/10.1901/jaba.1968.1-91

Baer, D. M., Wolf, M. M., & Risley, T. R. (1987). Some still-current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 20*, 313–327. https://doi.org/10.1901/jaba.1987.20-313

Baron, A., Perone, M., & Galizio, M. (1991). Analyzing the reinforcement process at the human level: Can application and behavioristic interpretation replace laboratory research? *The Behavior Analyst, 14*, 95–105. https://doi.org/10.1007/bf03392557

Beaulieu, L., Addington, J., & Almeida, D. (2019). Behavior analysts' training and practices regarding cultural diversity: The case for culturally competent care. *Behavior Analysis in Practice, 12*, 557–575. https://doi.org/10.1007/s40617-018-00313-6

Behavior Analyst Certification Board (2022). BACB certificant data. Retrieved April 30, 2022 from https://www.bacb.com/bacb-certificant-data/

Biederman, I., & Shiffrar, M. M. (1987). Sexing day-old chicks: A case study and expert systems analysis of a difficult perceptual-learning task. *Journal of Experimental Psychology: Learning, Memory, & Cognition, 13*, 640–645. https://doi.org/10.1037/0278-7393.13.4.640

Biglan, T., & Ogden, T. (2008). The evolution of the evidence based movement. *European Journal of Behavior Analysis, 9*, 81–95.

Bijou, S. W. (1957). Patterns of reinforcement and resistance to extinction in young children. *Child Development, 28*, 47–54. https://doi.org/10.2307/1125999

Birnbrauer, J. S. (1979). Applied behavior analysis, service, and the acquisition of knowledge. *The Behavior Analyst, 2*, 15–21. https://doi.org/10.1007/bf03391830

Birnbrauer, J. S., Wolf, M. M., Kidder, J. D., & Tague, C. E. (1965). Classroom behavior of retarded pupils with token reinforcement. *Journal of Experimental Child Psychology, 2*, 219–235. https://doi.org/10.1016/0022-0965(65)90045-7

Boerner, S., & Renz, S. (2008). Performance measurement in opera companies: Comparing the subjective quality judgements of experts and non-experts. *International Journal of Arts Management, 10*(3), 21–37. http://proquest.umi.com/pqdweb?did=1486042401&Fmt=7&clientId=9874&RQT=309&VName=PQD. Accessed 30 Apr 2022.

Bondy, A. S., & Frost, L. A. (1994). The picture exchange communication system. *Focus on Autistic Behavior, 9*, 1–19. https://doi.org/10.1177/108835769400900301

Bradshaw, C. P. (2013). Preventing bullying through positive behavioral interventions and supports (PBIS): A multitiered approach to prevention and integration. *Theory into Practice, 52*, 288–295. https://doi.org/10.1080/00405841.2013.829732

Bumstead, A., & Boyce, T. E. (2005). Exploring the effects of cultural variables in the implementation of behavior-based safety in two organizations. *Journal of Organizational Behavior Management, 24*, 43–63. https://doi.org/10.1300/J075v24n04_03

Butler, B. R., Lewis, C. W., Moore III, J. L., & Scott, M. E. (2012). Assessing the odds: Disproportional discipline practices and implications for educational stakeholders. *Journal of Negro Education, 81*, 11–24. https://doi.org/10.7709/jnegroeducation.81.1.0011

Chance, P. (2007). The ultimate challenge: Prove B. F. Skinner wrong. *The Behavior Analyst, 30*, 153–160. https://doi.org/10.1007/BF03392152

Chance, P., & Heward, W. L. (2010). Climate change: Meeting the challenge. *The Behavior Analyst, 33*, 197–206. https://doi.org/10.1007/BF03392219

Churchill, W. (1921). Painting as a pastime - I. *The Strand Magazine, 62*, 534–544.

Cone, J. D., & Hayes, S. C. (1977). Applied behavior analysis and the solution of environmental problems. In I. Altman & J. F. Wohlwill (Eds.), *Human behavior and environment* (pp. 129–179). Springer. https://doi.org/10.1007/978-1-4684-0808-9_4

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied behavior analysis* ((3rd ed.). ed.). Pearson.

Craig, A., Nall, R., Madden, G. J., & Shahan, T. S. (2016). Higher rate alternative non-drug reinforcement produces faster suppression of cocaine seeking but more resurgence when removed. *Behavioral & Brain Research, 306*, 48–51.

Critchfield, T. S. (2002). Evaluating the function of applied behavior analysis: A bibliometric analysis. *Journal of Applied Behavior Analysis, 35,* 423–426.

Critchfield, T. S., & Farmer-Dougan, V. F. (2014). Isolation from the mainstream: Recipe for an impoverished science. *European Journal of Behavior Analysis, 15*, 32–40. https://doi.org/10.1080/15021149.2014.11434473

Critchfield, T. S., & Reed, D. D. (2004). Conduits of translation in behavior-science bridge research. In J. E. Burgos & E. Ribes (Eds.), *Theory, basic and applied research, and technological applications in behavior science: Conceptual and methodological issues* (pp. 45–84). University of Guadalajara Press.

Critchfield, T. S., & Reed, D. D. (2017). The fuzzy concept of applied behavior analysis research. *The Behavior Analyst, 40*, 123–159. https://doi.org/10.1007/S40614-017-0093-X

Critchfield, T. S., & Rehfeldt, R. A. (2020). Engineering emergent learning with nonequivalence relations. In J. O. Cooper, T. E. Heron, & W. L. Heward (Eds.), *Applied behavior analysis* (3rd ed., pp. 497–526). Pearson.

Dardig, J. C. (1985). I'd been doing it wrong for so long it looked right to me: Using the case method to teach introductory behavior analysis. *The Behavior Analyst, 18*, 161–166. https://doi.org/10.1007/BF03392702

Detrich, R. (2013a). Science, mousetraps, and dissemination. *Sustain, 53*, 55–56.

Detrich, R. (2013b). Innovation, implementation science, and data-based decision making: Components of successful reform. In M. Murphy, S. Redding, & J. Twyman (Eds.), *Handbook on innovations in learning* (pp. 31–47). Center on Innovations in Learning.

Detrich, R. (2018). Rethinking dissemination: Storytelling as a part of the repertoire. *Perspectives on Behavior Science, 41*, 541–549. https://doi.org/10.1007/s40614-018-0160-y

Detrich, R. (2020). Cost-effectiveness analysis: A component of evidence-based education. *School Psychology Review, 49*, 423–430. https://doi.org/10.1080/2372966X.2020.1827864

Dixon, M. R., Belisle, J., Rehfeldt, R. A., & Root, W. B. (2018). Why we are still not acting to save the world: The upward challenge of a post-Skinnerian behavior science. *Perspectives on Behavior Science, 41*, 241–267. https://doi.org/10.1007/s40614-018-0162-9

Dixon, M. R., Hayes, S. C., Stanley, C., Law, S., & al-Nasser, T. (2020). Is acceptance and commitment training or therapy (ACT) a method that applied behavior analysts can and should use? *The Psychological Record, 70*, 559–579. https://doi.org/10.1007/s40732-020-00436-9

Drucker, P. F. (2020). *The essential Drucker*. Routledge.

Enoch, M. R., & Nicholson, S. L. (2020). Acceptance and commitment therapy and relational frame theory in the field of applied behavior analysis: The acceptability and perspective of the practicing BCBA. *Behavior Analysis in Practice, 13*, 609–617. https://doi.org/10.1007/s40617-020-00416-z

Ericsson, K. A., Nandagopal, K., & Roring, R. W. (2005). Giftedness viewed from the expert-performance perspective. *Journal for the Education of the Gifted, 28*, 287–311. https://doi.org/10.4219/jeg-2005-335

Fawcett, S. B. (1991). Some values guiding community research and action. *Journal of Applied Behavior Analysis, 24*, 621–636. https://doi.org/10.1901/jaba.1991.24-621

Field, T. M. (1993). The therapeutic effects of touch. In G. G. Brannigan & M. R. Merrens (Eds.), *The undaunted psychologist: Adventures in research* (pp. 3–11). Temple University Press.

Fixsen, D. L., & Blase, K. A. (2019). The teaching-family model: The first 50 years. *Perspectives on Behavior Science, 42*, 189–211. https://doi.org/10.1007/s40614-018-0168-3

Fixsen, D. L., Blase, K. A., & Van Dyke, M. K. (2019). *Implementation: Practice and science*. Active Implementation Research Network.

Florida Positive Behavioral Interventions & Supports Project (n.d.). *positive Behavioral Interventions & Supports (PBIS) in schools*. Retrieved April 30, 2022, from https://flpbis.cbcs.usf.edu/foundations/PBIS.html

Fong, E. H., Ficklin, S., & Lee, H. Y. (2017). Increasing cultural understanding and diversity in applied behavior analysis. *Behavior Analysis: Research & Practice, 17*(2), 103–113. https://doi.org/10.1037/bar0000076

Friman, P. C. (2006). The future of applied behavior analysis is under the dome. *ABA Newsletter, 29*, 4–7.

Friman, P. C. (2014). Publishing in journals outside the box: Attaining mainstream prominence requires demonstrations of mainstream relevance. *The Behavior Analyst, 37*, 73–76. https://doi.org/10.1007/s40614-014-0014-1

Friman, P. C. (2021). Dissemination of Direct Instruction: Ponder these while pursuing that. *Perspectives on Behavior*. *Science, 44*, 307–316. https://doi.org/10.10007/s40614-021-00285-z

Furman, T. M., & Lepper, T. L. (2018). Applied behavior analysis: definitional difficulties. *The Psychological Record, 68*, 103–105. https://doi.org/10.1007/s40732-018-0282-3

Gelino, B. W., Erath, T., & Reed, D. D. (2021). Going green: A systematic review of proenvironmental empirical research in behavior analysis. *Behavior & Social Issues, 30*, 587–611. https://doi.org/10.1007/s42822-020-00043-x

Gewirtz, P. (1996). On "I know It when I see it.". *Yale Law Journal, 105*, 1023–1047. https://doi.org/10.2307/797245

Greflund, S., McIntosh, K., Mercer, S. H., & May, S. L. (2014). Examining disproportionality in school discipline for Aboriginal students in schools implementing PBIS. *Canadian Journal of School Psychology, 29*, 213–235. https://doi.org/10.1177/0829573514542214

Hayes, S. C., Barnes-Holmes, D., & Roche, B. (Eds.). (2001). *Relational frame theory: A post-Skinnerian account of human language and cognition*. Kluwer Academic/Plenum.

Hayes, S. C., Strosahl, K. D., Bunting, K., Twohig, M., & Wilson, K. G. (2004). What is acceptance and commitment therapy? In S. C. Hayes & K. D. Strosahl (Eds.), *A practical guide to acceptance and commitment therapy* (pp. 3–29). Springer.

Heward, W. L., & Critchfield, T. S. (2020). ABA from A-to-Z. In J. O. Cooper, T. E. Heron, & W. L. Heward (Eds.), *Applied behavior analysis* (3rd ed., pp. 22–23). Pearson.

Holland, J. G. (1974). Political implications of applying behavioral psychology. In R. E. Ulrich (Ed.), *Control of human behavior: Behavior modification in education* (Vol. *3*, pp. 413–419). Scott Foresman http://neurodiversity.com/library_holland_1972.html. Accessed 30 Apr 2022.

Holland, J. G. (1978). Behaviorism: Part of the problem or part of the solution? *Journal of Applied Behavior Analysis, 11*, 163–174. https://doi.org/10.1901/jaba.1978.11-163

Horner, R. H., & Kittelman, A. (2021). Advancing the large-scale implementation of applied behavior analysis. *Behavior & Social Issues, 30*, 94–105. https://doi.org/10.1007/s42822-021-00049-z

Horner, R. H., & Sugai, G. (2015). School-wide PBIS: An example of applied behavior analysis implemented at a scale of social importance. *Behavior Analysis in Practice, 8*, 80–85. https://doi.org/10.1007/s40617-015-0045-4

Hovell, M. F., Elder, J. P., Blanchard, J., & Sallis, J. F. (1986). Behavior analysis and public health perspectives: Combining paradigms to effect prevention. *Education & Treatment of Children, 9*, 287–306. http://www.jstor.org/stable/42898988. Accessed 30 Apr 2022.

Hyten, C. (2017). OBM is already using the "fuzzy concept" criteria for applied behavioral research: Commentary on Critchfield and Reed. *The Behavior Analyst, 40*, 179–182. https://doi.org/10.1007/s40614-017-0096-7

Jakubowski, M. (2011). Low-level environmental lead exposure and intellectual impairment in children: The current concepts of risk assessment. *International Journal of Occupational Medicine & Environmental Health, 24*, 1–7. https://doi.org/10.2478/s13382-011-0009-z

Jarmolowicz, D. P., Reed, D. D., DiGennaro Reed, F. D., & Bickel, W. K. (2016). The behavioral and neuroeconomics of reinforcer pathologies: Implications for managerial and health decision making. *Managerial & Decision Economics, 37*, 274–293. https://doi.org/10.1002/mde.2716

Johnston, J. M., & Pennypacker, H. S. (1986). Pure versus quasi-behavioral research. In A. Poling & R. W. Fuqua (Eds.), *Research methods in applied behavior analysis: Issues and advances* (pp. 29–54). Plenum. https://doi.org/10.1007/978-1-4684-8786-2_3

Jones, S. H., St Peter, C. C., & Ruckle, M. M. (2020). Reporting of demographic variables in the *Journal of Applied Behavior Analysis. Journal of Applied Behavior Analysis, 53*, 1304–1315. https://doi.org/10.1002/jaba.722

Kazdin, A. E. (1975). The impact of applied behavior analysis on diverse areas of research. *Journal of Applied Behavior Analysis, 8*, 213–229. https://doi.org/10.1901/jaba.1975.8-213

Kazdin, A. E. (2018). *Innovations in psychosocial interventions and their delivery*. Oxford University Press.

Kimball, J. W., & Heward, W. L. (1993). A synthesis of contemplation, prediction, and control. *American Psychologist, 48*(5), 587–588. https://doi.org/10.1037/0003-066X.48.5.587

Kunkel, J. H. (1987). The future of JABA: A comment. *Journal of Applied Behavior Analysis, 20*, 329–323. https://doi.org/10.1901/jaba.1987.20-329

Laties, V. G. (2008). The journal of the experimental analysis of behavior at fifty. *Journal of the Experimental Analysis of Behavior, 89*, 95–109. https://doi.org/10.1901/jeab.2008.89-95

Laties, V. G., & Mace, F. C. (1993). Taking stock: The first 25 years of the journal of applied behavior analysis. *Journal of Applied Behavior Analysis, 26,* 513–525.

Lazarus, R. J. (2009). Super wicked problems and climate change: Restraining the present to liberate the future. *Cornell Law Review, 94*, 1153–1234.

Levin, K., Cashore, B., Bernsetin, S., & Auld, G. (2012). Overcoming the tragedy of super wicked problems: Constraining our future selves to ameliorate global climate change. *Policy Sciences, 45*, 123–152.

Li, A., Wallace, L., Ehrhardt, K. E., & Poling, A. (2017). Reporting participant characteristics in intervention articles published in five behavior-analytic journals, 2013–2015. *Behavior Analysis: Research & Practice, 17*(1), 84–91. https://doi.org/10.1037/bar0000071

Madden, G. J., Petry, N., Badger, G. J., & Bickel, W. K. (1997). Impulsive and self-control choices in opiate-dependent patients and non-drug-using control participants: Drug and monetary rewards. *Experimental & Clinical Psychopharmacology, 5*, 256–262.

Malott, M. E., & Glenn, S. S. (2006). Targets of intervention in cultural and behavioral change. *Behavior & Social Issues, 15*, 31–56. https://doi.org/10.5210/bsi.v15i1.344

Marcattilio, A. J. M., & Nevin, J. A. (1986). The threat of nuclear war: Some responses. *The Behavior Analyst, 9*, 61–70. https://doi.org/10.1007/BF03391930

Marsch, L., Lord, S., & Dallery, J. (Eds.). (2014). *Behavioral healthcare and technology: Using science-based innovations to transform practice*. Oxford University Press.

Mattaini, M. A., & Luke, M. (2014). "Saving the world" with a matrix. *Behavior and Social Issues, 23,* 1–3.

Mattaini, M. A., & Aspholm, R. (2016). Contributions of behavioral systems science to leadership for a new progressive movement. *The Behavior Analyst, 39*, 109–121. https://doi.org/10.1007/s40614-015-0043-4

McEnteggart, C., Barnes-Holmes, Y., Hussey, I., & Barnes-Holmes, D. (2015). The ties between a basic science of language and cognition and clinical applications. *Current Opinion in Psychology, 2*, 56–59. https://doi.org/10.1016/j.copsyc.2014.11.017

Moore, J. (2008). *Conceptual foundations of radical behaviorism*. Sloan.

Morris, E. K., Todd, J. T., Midgley, B. D., Schneider, S. M., & Johnson, L. M. (1990). The history of behavior analysis: Some historiography and a bibliography. *The Behavior Analyst, 13*, 131–158. https://doi.org/10.1007/BF03392530

Morris, E. K., Altus, A. E., & Smith, N. G. (2005). B. F. Skinner's contributions to applied behavior analysis. *The Behavior Analyst, 28*, 99–131.

Morris, E. K., Altus, D. E., & Smith, N. G. (2013). A study in the founding of applied behavior analysis through its publications. *The Behavior analyst, 36*(1), 73–107. https://doi.org/10.1007/BF03392293

Needleman, H. (2004). Lead poisoning. *Annual Review of Medicine, 55*, 209–222. https://doi.org/10.1146/annurev.med.55.091902.103653

Needleman, H. L., & Bellinger, D. C. (1981). The epidemiology of low-level lead exposure in child-hood. *Journal of the American Academy of Child Psychiatry, 20*, 496–512. https://doi.org/10.1016/S0002-7138(09)61642-3

Neuringer, A. (2011). Reach out. *The. Behavior Analyst, 34*, 27–29. https://doi.org/10.1007/BF03392230

Nevin, R. (2009). Trends in preschool lead exposure, mental retardation, and scholastic achievement: association or causation? *Environmental Research, 109*(3), 301–310. https://doi.org/10.1016/j.envres.2008.12.003

Nevin, J. A. (2010). The power of cooperation. *The Behavior Analyst, 33*, 189–191. https://doi.org/10.1007/BF03392217

Nevin, J. A., & Fuld, K. (1993). On armament traps and how to get out of them: Lessons from research on doves. *Behavior & Social Issues, 3*, 63–74.

Newland, M. C. (2013). Environmental health and behavior analysis: Contributions and interactions. In G. J. Madden (Ed.), *APA Handbook of behavior analysis: Vol. 2. Translating principles into practice* (pp. 225–253). American Psychological Association. https://doi.org/10.1037/13938-009

Normand, M. P., & Kohn, C. S. (2013). Don't wag the dog: extending the reach of applied behavior analysis. *The Behavior Analyst, 36*, 109–122. https://doi.org/10.1007/BF03392294

Peterson, M. E. (1978). The Midwestern Association of Behavior Analysis: Past, present, future. *The Behavior Analyst, 1-2*, 3–15. https://doi.org/10.1007/BF03392368

Pinkelman, S. E., & Horner, R. H. (2019). Applying lessons from the teaching-family model: Positive behavioral interventions and supports (PBIS). *Perspectives on Behavior Science, 42*, 233–240. https://doi.org/10.1007/s40614-019-00199-x

Poling, A. (2010). Looking to the future: Will behavior analysis survive and prosper? *The Behavior Analyst, 33*, 7–17. https://doi.org/10.1007/BF03392200

Poling, A., Weetjens, B., Cox, C., Beyene, N. W., Bach, H., & Sully, A. (2011). Using trained pouched rats to detect land mines: Another victory for operant conditioning. *Journal of Applied Behavior Analysis, 44*, 351–355.

Pritchett, M., Ala'i-Rosales, S., Cruz, A. R., & Cihon, T. M. (2021). Social justice is the spirit and aim of an applied science of human behavior: Moving from colonial to participatory research practices. *Behavior Analysis in Practice*. Advance online publication. https://doi.org/10.1007/s40617-021-00591-7

Project Drawdown (n.d.). *Table of solutions*. Retrieved April 30, 2000, from https://drawdown.org/solutions/table-of-solutions

Rehfeldt, R. A., & Tyndall, I. (2021). Why we are not acting to save ourselves: ACT, health, and culture. *Behavior Analysis in Practice, 15*, 55–70. https://doi.org/10.1007/s40617-021-00592-6

Rekers, G. A., Lovaas, O. I., & Low, B. (1974). The behavioral treatment of a "transsexual" preadolescent boy. *Journal of Abnormal Child Psychology, 2*, 99–116. https://doi.org/10.1007/BF00919093

Reyes, J. W. (2007). Environmental policy as social policy: The impact of childhood lead exposure on crime. *B. E. Journal of. Economic Analysis & Policy, 7*(1), 1–41 http://www.bepress.com/cgi/viewcontent.cgi?article=1796&context=bejeap

Rogers, E. M. (2010). *Diffusion of innovations*. Simon & Schuster.

Root-Bernstein, R. S. (1988). Setting the stage for discovery. *The Sciences, 28*(3), 26–34. https://doi.org/10.1002/j.2326-1951.1988.tb03019.x

Rutherford, A. (2009). *Beyond the box: B. F. Skinner's technology of behavior from laboratory to life, 1950s–1970s*. University of Toronto Press.

Seniuk, H. A., Cihon, T. M., Benson, M., & Luke, M. M. (2019). Making a footprint in environmental sustainability: A behavioral systems approach to engaging the behavioral community. *Perspectives on Behavior Science, 42*, 911–926. https://doi.org/10.1007/s40614-019-00233-y

Sidman, M. (1960). *Tactics of scientific research*. Basic Books.

Sidman, M. (2007). The analysis of behavior: What's in it for us? *Journal of the Experimental Analysis of Behavior, 87*, 309–316. https://doi.org/10.1901/jeab.2007.82-06

Simmons-Reed, E. A., & Cartledge, G. (2014). School discipline disproportionality: Culturally competent interventions for African American males. *Interdisciplinary Journal of Teaching & Learning, 4*(2), 95–109.

Skinner, B. F. (1948). *Walden two*. Macmillan.

Skinner, B. F. (1953). *Science and human behavior*. Macmillan.

Skinner, B. F. (1956). A case history in scientific method. *American Psychologist, 11*, 221–233. https://doi.org/10.1037/h0047662

Skinner, B. F. (1957). *Verbal behavior*. Appleton-Century-Crofts.

Skinner, B. F. (1984). The operational analysis of psychological terms. *Behavioral and Brain Sciences, 7,* 547–553.

Skinner, B. F. (1987). Why we are not acting to save the world. In I. B. F. Skinner (Ed.), *Upon further reflection* (pp. 1–14). Prentice Hall.

Skinner, B. F., & Vaughan, M. E. (1997). *Enjoy old age: A practical guide*. W. W. Norton.

St Peter, C. C. (2017). Beyond basic or applied. *The Behavior Analyst, 40*, 193–196. https://doi.org/10.1007/s40614-017-0104-y

Strain, P. S., Barton, E. E., & Dunlap, G. (2012). Lessons learned about the utility of social validity. *Education & Treatment of Children, 35*, 183–200. https://doi.org/10.1353/etc.2012.0007

Sugai, G., & Horner, R. H. (2020). Sustaining and scaling positive behavioral interventions and supports: Implementation drivers, outcomes, and considerations. *Exceptional Children, 86*(2), 120–136. https://doi.org/10.1177/0014402919855331

Trevisan, D. F., Becerra, L., Benitez, P., Higbee, T. S., & Gois, J. P. (2019). A review of the use of computational technology in applied behavior analysis. *Adaptive Behavior, 27*, 183–196. https://doi.org/10.1177/1059712319839386

Winett, R. A., & Winkler, R. C. (1972). Current behavior modification in the classroom: Be still, be quiet, be docile. *Journal of Applied Behavior Analysis, 5*, 499–504. https://doi.org/10.1901/jaba.1972.5-499

Winett, R. A., Moore, J. F., & Anderson, E. S. (1991). Extending the concept of social validity: Behavior analysis for disease prevention and health promotion. *Journal of Applied Behavior Analysis, 24*, 215–230. https://doi.org/10.1901/jaba.1972.5-499

Zarcone, J., Brodhead, M., & Tarbox, J. (2019). Beyond a call to action: An introduction to the special issue on diversity and equity in the practice of behavior analysis. *Behavior Analysis in Practice, 12*, 741–742. https://doi.org/10.1007/s40617-019-00390-1