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REVIEW

# The Evolution of the Conceptually Systematic Dimension and Its Current Functions in Applied Behavior Analysis

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## Abstract

What does it mean to be conceptually systematic in contemporary applied behavior analysis (ABA) research and practice? To answer this question, the present study conducted a historical analysis of ABA scholars' interpretations of the conceptually systematic dimension of ABA over the last 55 years. The present article found the current characteristics of the conceptually systematic dimension are indeed sufficient to suggest ABA's conceptual independence from the experimental analysis of behavior or any other subdisciplines of behavior analysis. Based on this finding, this article addresses the challenges in contemporary ABA field such as ABA's own basic and applied continuum, translational research, and its relationship with other disciplines' research and practice.

**Keywords** Applied behavior analysis · Basic · Behavior analysis · Conceptually systematic dimension · Historical analysis · Translational · Seven dimensions

What does it mean to be conceptually systematic in applied behavior analysis (ABA)? Answering this question is fundamental as it sheds light on many of the challenges contemporary ABA researchers and practitioners face today. The challenges include ABA's relationship with the experimental analysis of behavior (EAB), translational research, its connection with other behavior analysis subfields, the emerging division between the researchers and practitioners within ABA, and its interactions with other psychological and educational disciplines. These issues directly stem from the understanding of ABA's conceptually systematic dimension.

Baer et al. (1968) introduced the seven-dimension framework 55 years ago to characterize ABA as a scientific field of research and practice. These dimensions—applied, behavioral, analytic, technological, conceptual systems, effective, and generality—have since served as guiding principles for the field's research and practice (Critchfield & Reed, 2017; the terms "conceptual systems" and 'the conceptually systematic

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dimension' are often used interchangeably). Among the seven, behavior analysts have commonly treated the conceptually systematic dimension as a shared DNA across all subfields of behavior analysis. For instance, Critchfield and Reed (2017) noted that the seven-dimension framework ". . . included three dimensions that describe behavior analysis as a whole (Behavioral, Conceptual, and Analytical). . ." (p. 131). This understanding has led to the image of ABA representing the applied side of the basic-applied continuum within behavior analysis (see Figure 1.2 in Cooper et al., 2020, for a graphical representation of this image) and much of behavior analytic research, education, and practice, particularly translational research (e.g., Mace, 1994; Elcoro et al., 2023), have relied on this "continuum" notion.

This article examined whether the "continuum" notion is still relevant in the light of contemporary ABA practice through a historical review of how ABA scholars have defined this dimension over the last 55 years since Baer et al.'s (1968) initial conceptualization. Several scholars have conducted similar historical reviews time to time to characterize the significant issues facing the field (e.g., Deitz, 1982; Rider, 1991). In fact, Baer et al. (1968) called their seminal article "an anthropologist's account" (p. 313). If the conceptually systematic dimension has evolved or changed over time, this study aimed to update the characteristics of this fundamental aspect of ABA. Reimagining the conceptually systematic dimension in contemporary ABA not only offers ABA researchers and practitioners insights into the boundaries of scientific and clinical activities within the field of ABA but also assists in clarifying ABA's present-day challenges.

## Overview of Historical Review

This historical review revealed three significant changes over time. From roughly the 1970s to the 1990s, debates among ABA scholars centered on the potential independence of ABA as a scientific discipline separate from EAB. In the 1990s to the 2000s, with the expanding ABA community, distinct preferences for conceptual systems began to emerge. Moving into the 2000s, as ABA solidified as an independent behavior analytic subfield, it encountered new challenges such as defining its own basic-applied continuum, situating ABA within behavior analysis as an overarching discipline, and establishing relationships with nonbehavior analytic disciplines. Reflecting on this evolution, the current article identifies four updated characteristics of the conceptually systematic dimension. These characteristics are used to clarify various contemporary challenges within the field and give implications. Figure 1 is a diagram of the evolution of ABA in its relation to other related fields as a visual aid to this review.

## 1968: The Conceptually Systematic Dimension at Birth

Baer et al. (1968) proposed the seven-dimension framework to help establish ABA as a field of research and practice. As Critchfield and Reed (2017) put it, it was "a Declaration of Independence from the experimental analysis of behavior" (p. 131).

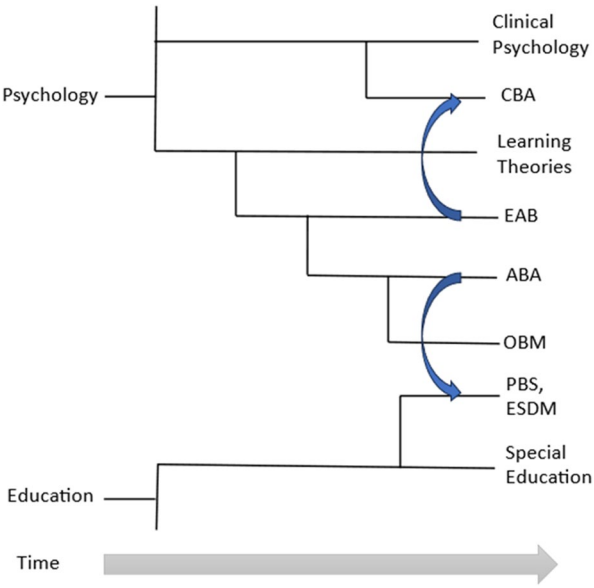


**Fig. 1** A Phylogenetic Tree Diagram of the Speciation of Applied Behavior Analysis and Its Related Disciplines. *Note*. This figure is a schematic and metaphoric representation of the evolution of applied behavior analysis and its related disciplines across time. CBA stands for clinical behavior analysis. EAB stands for the experimental analysis of behavior. ABA stands for applied behavior analysis. OBM stands for the organizational behavior management. PBS stands for the positive behavior supports. ESDM stands for the Early Start Denver Model. The curved arrows in blue represent an interspecies breeding metaphor

Though Baer et al. (1968) did not provide a clear definition of what the conceptually systematic dimension is, they asserted that "the field of applied behavior analysis will probably advance best if the published descriptions of its procedures are not only precisely technological, but also strive for relevance to principle" (p. 96). Thus, by "conceptually systematic" Baer et al. meant ABA research findings are organized according to the behavioral principles previously established in the field of EAB, the then-parent discipline of ABA (e.g., Wahler & Fox, 1981). This idea produced the applied-basic continuum relationship between ABA and EAB.

Although Critchfield and Reed (2017) wrote that Baer et al. (1968) added the conceptually systematic dimension as a reluctant acknowledgement about its debt to EAB, it is worth mentioning that Baer et al.'s writings could be seen as more ambitious. For example, Baer et al. wrote, "the differences between applied and basic research are not differences between that which 'discovers' and that which merely 'applies what is already known'" (p. 1). That is, Baer et al. also aimed for ABA research to be a place for the discovery of new behavioral principles and not simply the "applied" side of EAB on its conceptual ground. Regardless of Baer et al.'s initial predisposition, the question remains whether ABA as a field has become conceptually independent from EAB over time or have remained common with EAB.

## From the 1970s to 1990s: Is ABA Independent of EAB?

Roughly from the 1970s to the 1990s, the main topic of discussion related to the conceptually systematic dimension was whether ABA as a research field can be a scientifically independent discipline or if it is still the applied side of EAB. Throughout the late 1970s, the discussion centered around whether ABA was

addressing only technological issues or if it also had conceptual aspects in its research and practice (Azrin, 1977; Birnbrauer, 1979; Deitz, 1978; Hayes, 1978; Ribes, 1977). Both ABA researchers and practitioners in the 1970s administered treatment packages consisting of multiple procedures (e.g., Azrin discussed the use of breathing, relaxation, response awareness, prompting, and generalization training as a treatment package for stuttering), and evaluated the effectiveness of the treatment package as a whole. Although these treatment packages were proven effective, the criticism was that such treatment packages were considered "technological" research because no further analyses were given to discover behavioral principles underlying the treatment effectiveness. Although the conceptual research or "discovery" of new behavioral principles was still a job for EAB researchers in the 1970s, ABA researchers of the time were hopeful that they would one day engage in "discovery" research. Azrin (1977) put it nicely:

> The criticism is frequently made of such "package" programs that one cannot identify which variable(s) is effective. My strategy has been to use such programs unapologetically and to include as many component procedures as seem necessary to obtain, ideally, a total treatment success. Once a treatment program is found to be extraordinarily successful, analytic studies of the program will be useful. But little seems to be gained by limiting oneself to partial benefits initially in order to achieve conceptual purity. (p. 144)

This spirit continued in the 1980s. The cross-citation between ABA journals and EAB journals had decreased, showing ABA was becoming more independent from EAB (Poling et al., 1981; see also Rider, 1991, for a historical analysis). Both ABA and EAB scholars pointed out a few reasons for the decrease in interaction such as: (1) ABA's continued focus on the effectiveness of the packaged treatments; (2) the use of most general behavior analytic principles such as reinforcement and extinction in ABA practice and no other principles currently studied in EAB such as the matching law and the adjunct behavior; and (3) an increase in ABA memberships in relation to EAB memberships, among other factors (Baer, 1981; Baer et al., 1987; Cullen, 1981; Deitz, 1982; Hayes et al., 1980; Michael, 1980; Pierce & Epling, 1980; Poling et al., 1981; Woods, 1980; Wahler & Fox, 1981).

The tide shifted in the 1990s. On the one hand, with the development of the functional analysis methodology, there emerged an interesting difference between ABA and EAB on the definition of conceptual research that clearly separated them as scientific disciplines. On the other, the establishment of the Association of Behavior Analysis International (ABAI), a professional organization for behavior analysts, played a significant role in positioning ABA and EAB as subfields. Moreover, within the ABA community, there emerged the division of labor between researchers and practitioners. First, this article discusses how ABA and EAB researchers interpreted the term, conceptual research, and their takes on the functional analysis method. Then, the article describes the impact of ABAI and the dynamism between ABA researchers and practitioners later.

## Conceptual Research in ABA and Functional Analysis Method

Against the criticism that ABA was only focusing on "technological" research, Baer et al. (1987) claimed that ABA researchers not only demonstrate a given treatment package's effectiveness but also analyze the effectiveness of the package's each component to discover its function(s) on the target behavior using a sound experimental design. They called this component analysis "conceptual research." This echoed Azrin's (1977) take on what it means to engage in conceptual research (recall his statement, "to achieve conceptual purity," from the above quote) as opposed to technological research in ABA. Azrin's point was that ABA would, in the future, engage in conceptual research to find out what component(s) of a treatment package is effective in bringing about meaningful changes in socially significant behavior. Both Baer et al. and Azrin claimed that the act of identifying the effectiveness (or functional relationship in contemporary term) of each component of a treatment package on socially significant behavior is considered conceptual research, as opposed to the act of identifying whether a package is effective as technological research. Moreover, because the act of identifying the functional relationship between a procedure and a target response falls under the analytic dimension of ABA, Baer et al. (1987) treated the conceptually systematic dimension as a part of the analytic dimension (the present article calls this "the conceptual-as-analytic view").

Baer et al.'s (1987) conceptual-as-analytic view gained momentum in the 1990s. Morris (1992) stated "the pivotal issue . . . turns on what we mean by 'analysis' in applied behavior analysis. . ." (p. 9). In 1991, the *Journal of Applied Behavior Analysis* (JABA) published a special issue, "Is Applied Behavior Analysis Technological to a Fault?," to discuss what it means to conduct conceptual research in ABA. Some scholars accepted Baer et al.'s (1987) conceptual-as-analytic view and described the analytic dimension as the identification of a functional relationship between a procedure and a target response using a sound experimental design (Iwata, 1991; Morris, 1991, 1992). For example, Iwata (1991) described that conceptual research and technological research in ABA were really just a difference in the degree of precision. Iwata stated that "most of our theories exist as functional relations describing how phenomena *have been* controlled" (p. 423). He pointed out that even newly discovered phenomena in behavior analysis such as stimulus equivalence were really about identifying functional relations between stimuli and responses. Thus, Iwata concluded the difference between technological research and conceptual research in ABA could be seen as the degree of precision in component analysis: whether the target is a treatment package (technological research; low in precision) or its component (conceptual research; high in precision).

On the other hand, EAB researchers objected to Baer et al.'s (1987) conceptual-as-analytic view and saw conceptual research as studies of behavioral processes (Geller, 1991; Hayes, 1991; Johnston, 1991; Mace, 1991). These authors claimed that the analysis (of a functional relationship between a treatment procedure and a target behavior) in ABA research was too limited in scope and not itself a study of behavioral processes (or behavioral principles). Hayes (1991) points out that "the idea that what is important in applied science is the specification of empirically validated treatments in operational terms boils down to the idea that a scientific

discipline can be based solely on statements high in precision but low in scope, depth, and organization" (p. 418). Johnston (1991) also said that "analytical efforts have tended to be fairly superficial, emphasizing procedures rather than behavior and falling well short of experimentally explicating procedural mechanisms at the level of basic principles of operant behavior" (p. 425). Both Hayes and Johnston indicated that the findings of conceptual-as-analytic research in ABA are only addressing how to treat a target behavior in a specific context using a very specific treatment procedure, and this type of knowledge is not the same as the studies of basic behavioral processes or behavioral principles, which are supposed to capture general laws of behavior ubiquitous across situations (or treatment procedures) and topographically different behaviors.

This difference in view toward conceptual research between ABA and EAB can be seen as "the procedure vs. process difference" (Catania, 1969; Lattal & Poling, 1981). ABA researchers define a concept procedurally as a functional relationship between a particular treatment procedure and a particular target behavior, whereas EAB researchers define a concept as a behavioral process that reflects generic nature of behavior. This difference manifested clearly in how ABA and EAB scholars reacted to the then newly developed functional analysis methodology. Iwata and his colleagues have developed the functional analysis method to identify the environmental causes of challenging behavior in people with developmental disabilities (e.g., Iwata et al., 1994). Iwata viewed the functional analysis method as providing the conceptual foundation for ABA as a discipline because the functional analysis successfully teased apart a functional relationship between an environmental event and a target behavior as well as between a treatment procedure and a target behavior (Iwata, 1991, 2006), which was a major advancement from technological research in the 1970s and the 1980s.

On the other hand, for EAB scholars, the functional analysis method looked different. Mace (1994) noted that "functional analysis methods may also contribute to the integration of basic and applied research by permitting applied behavior analysts to incorporate advances in basic research into the analysis and treatment of behavior disorder" (p. 387). Mace viewed the identification of a functional relationship between a treatment procedure and a target behavior is not in itself conceptual research, but it is a step toward such investigation. The functional analysis method provides the basis on which conceptual research can be built because it provides good experimental control of behavior. Once there is good control of the functional relationship between a procedure and a target response, researchers can then study behavioral processes (e.g., by using parametric manipulations) and discover and examine new behavioral principles and theories (Burgos, 2003; Machado & Silva, 2007). Thus, EAB scholars do not equate conceptual research and the functional analysis method.

This procedure versus process difference also showed in translational research. ABA and EAB scholars made explicit efforts for translational research in the 1990s such that the JABA invited both EAB and ABA researchers to discuss possible implications of EAB studies to ABA research. This effort began in the 1993 issue and has been continuing till the present (Critchfield, 2011; Mace & Wacker, 1994). An interesting aspect of this translational exchange was that we could observe the

procedure versus process difference between ABA and EAB scholars. When the scholars attempted to translate EAB phenomena such as the matching law into ABA, what they actually discussed was the procedural aspects of the matching law rather than the process underlying it. For example, Mace and Wacker (1994) stated: ". . . before Herrnstein's findings can affect applied work, laboratory preparations must be translated into procedures suitable for studying applied problems" (p. 569). That is, whereas EAB researchers used the concurrent chain schedules of reinforcement to study various changes in behavior to examine the matching relations (process), ABA researchers asked how to use the concurrent schedule of reinforcement to improve socially significant behavior in applied settings (procedure). This difference directly reflects how ABA and EAB scholars viewed concepts in their disciplines and points to the difficulty of being conceptually systematic between each other.

Thus, the conceptually systematic dimension of ABA evolved to be "conceptual-as-analytic" in nature with its "procedure-over-process" preference. This indicates that ABA and EAB were no longer on a simple basic-applied continuum as their understanding of conceptual research were not the same. Moreover, to do justice to EAB, during this period, EAB research had also undergone a dynamic evolution of its behavioral dimension (e.g., Catania, 1981/2012), its analytic dimension (e.g., Baron, 1999), and its conceptual dimension (e.g., Machado et al., 2000; Staddon, 1993; Killeen, 2013). Even from EAB researchers' standpoint, EAB and ABA shared very little common conceptual ground (e.g., Jarmolowicz, 2018; Killeen, 2018).

## Behavior Analysis and ABA: The Development of ABAI

In the 1990s, as ABA researchers and practitioners continued to grow in population, ABA at the level of a professional organization also developed substantially. With it came two separate issues. One was the positioning of ABA as a subfield in an overarching discipline of behavior analysis and the other was the division of labor within ABA.

Reflecting on the growing body of membership, behavior analysts established the Association for Behavior Analysis International (ABAI), the primary professional organization for behavior analysts (notice that "behavior analysts" include not only ABA researchers and practitioners but any behavior analysts). ABAI then specifically developed the professional accreditation board and academic programs to unify the educational and professional training programs for ABA practitioners across universities (notice that the programs were mainly for ABA practitioners: Ellis & Glenn, 1995; Glenn, 1993; Hopkins & Moore, 1993; Shook, 1993). Developing an accredited graduate program in ABA meant identifying the content areas relevant to the training of ABA practitioners. In terms of the conceptually systematic dimension, the direct relevance here is the content areas for academic coursework requirements. What was included as a part of the coursework requirements to obtain a certification or degree in ABA would indicate, though indirectly, what was considered to be conceptually systematic in ABA at the time both for its researchers (most of them as professors) and practitioners (as students).

When Hopkins and Moore (1993) laid out the program requirements for accreditation, they made an interesting categorization such that they organized the content areas as principle, applied, basic, and conceptual, all of which to be taught in an accredited program curriculum. In particular, the ABAI accreditation guidelines (ABAI, 1993/2013) defined the principles as "the use of technical terminology pertaining to the concepts and principles of behavior analysis" (p. 12) such as contingencies of reinforcement, positive and negative reinforcement, extinction, punishment, and stimulus control. Applied referred to the demonstration of ". . . the operations of principles of behavior in applied research in multiple areas of investigation and practice" (p. 12). Basic was defined as ". . . demonstrating the operations of principles of behavior in the context of basic research in multiple areas of investigation" (p. 12). Conceptual referred to ". . . Skinner's writings as primary sources" and topics such as "private events, phylogeny and ontogeny, and cultural design" (p. 12).

We can see some interesting points here. First, the guidelines asked to spend some portion of its curriculum on EAB, which reflected the translational effort in the 1990s (Poling et al., 1994). Second, the guidelines named the topics of social significance that were not yet addressed in EAB or ABA research as "conceptual," which was a new way to use the term (in addition to "the conceptually systematic dimension" and "conceptual research" discussed above). Third, and perhaps most interesting, it made the principles a separate content area from either EAB or ABA content. That is, the guidelines described EAB as a place to *demonstrate* "the operation of principles of behavior" in a laboratory setting instead of treating EAB as a place to discover and study the very principles (note that ABAI (2019) changed this description of EAB in 2019 to ". . . how principles of behavior are discovered and described in the context of basic research" p. 26). This was important at that time because the guidelines implicitly indicated that the only difference between ABA and EAB was the setting: ABA demonstrates the behavioral principles in the applied setting, whereas EAB does it in the lab. It is also noted that by the behavioral principles, ABAI primarily referred to the findings from early Skinner's research (e.g., Fester & Skinner, 1957, Skinner, 1938/2019; this article follows Day's (1969) suggestion to designate "early" and "late" Skinner to reflect his different philosophical stances, see also Araiba, 2020). Thus, this redefined ABA's position within behavior analysis such that ABA and EAB would be conceptually systematic *under* the principles of behavior. That is, the guidelines placed ABA and EAB as subfields of the overarching discipline called behavior analysis to which the principles of behavior is its shared ancestry DNA.

ABAI, as a result, provided a new way to categorize the field overall. Behavior analysis became the name of the overarching discipline where both EAB and ABA were the subfields on the equal ground. Thus, the behavioral principles became the discipline's overarching conceptual backbone, on which EAB activities and ABA activities coexisted. Though ABAI's new categorization of the field of behavior analysis might only be for professional and educational purposes, this surely influenced the field of

ABA. In particular, ABA became an independent body of scientific study and equal to the EAB subfield compared to the 1970s where EAB was a parental discipline of ABA. As for the conceptually systematic dimension, the behavior principles were detached from both ABA or EAB and became a legacy guiding paradigm of the overarching discipline that loosely connects its subfields.

### Emergence of the Basic-Applied Continuum within ABA

As the ABA community established itself as an independent subfield of behavior analysis, within it some had voiced that a division of labor such that ABA researchers and ABA practitioners were now different groups (Baer, 1992; Johnston, 1992, 1996; Malott, 1992; Marr, 1991; Rider, 1991; Reid, 1992; see also, Sidman, 2011). In particular, Malott (1992) questioned whether it is necessary to train future ABA practitioners on the methodologies and issues of ABA research because most students of ABA would become practitioners and not researchers. Baer (1992) pointed out that Malott's questioning was actually ". . . already a widespread reality: That is what we are doing right now and have been doing for some time" (p. 89).

The idea that ABA practitioners and ABA researchers engage in different tasks was also reflected in Johnston's (1996) claim that "in general, applied researchers should not be asked to solve practical problems in any immediate or local sense but to learn enough to permit practitioners to solve problems consistently under the varied conditions they may encounter" (p. 42). This statement resembles the original dichotomy between EAB and ABA in the 1960s where EAB scholars provide general knowledge of behavioral principles to ABA scholars who then apply them in practical problems. It is ironic that in the 1990s, the ABA community faced a similar situation with its own researchers and its own practitioners being on the continuum, which clearly was a result of ABA's growth as a field and its way to becoming a self-sustainable scientific body that provides both the discovery and application. This prompted the emergence of the basic-applied research continuum within ABA, which would fully manifest in the following decades.

In sum, from the 1970s to the 1990s, three themes in the conceptually systematic dimension of ABA were observed:

1. Conceptual research in ABA meant discovering a functional relationship between a procedure and a target behavior characterized by the conceptual-as-analytic view and the procedure-over-process preference.
2. ABA became an independent discipline of scientific study in relation to EAB, but both ABA and EAB communities entered as subfields under the overarching discipline of behavior analysis.
3. Behavioral principles became the legacy conceptual system of behavior analysis as a whole.
4. There emerged the basic-applied division of labor within the ABA community.

## From the 1990s to 2000s: Conceptual Systems Unique to ABA

As the ABA community entered the 2000s, it had become increasingly independent as a self-sufficient scientific field of its own. During this period, given the "conceptual-as-analytic" view and the "procedure-over-process" preference, we can see the emergence of various conceptual systems that are uniquely ABA. That is, these new types of conceptual systems in ABA did not share the same characteristics with those seen in EAB. It is important to note that this new development consolidated the unique characteristics of the conceptually systematic dimension of ABA that we see today.

Perhaps the antecedent of all these conceptual developments was late Skinner's *Verbal Behavior* (1957) where different verbal responses were categorized by social events and not as generic stimulus change, a departure from early Skinner's behavior principles and other EAB's conceptual systems (Araiba, 2020; Catania, 1998; Day, 1969). Following late Skinner's example, behavior analytic scholars began formulating unique conceptual systems over the years. Some examples are Iwata and his colleagues' (e.g., Iwata et al., 1994) functional analysis method, which categorized various responses (challenging behavior) based on social functions such as escape from a task and access to tangible items and attention (see also Iwata, 2006). Michael (1993) had begun developing a conceptual system based on the concept of motivating operations (MO). Sundberg and his colleagues incorporated Skinner's verbal behavior into ABA research and practice as the verbal behavior approach (e.g., Sundberg & Michael, 2001). Hayes et al. (2001) developed a conceptual system called the relational frame theory (RFT). Here, we can observe how ABA researchers and practitioners adopted the above-mentioned conceptual systems as a part of ABA research and practice. Two examples are MO and RFT.

### Motivating Operations

Studies of MO began to flourish both conceptually and in applied research in the 1990s (McGill, 1999; Michael, 1993; Smith & Iwata, 1997; Vollmer & Iwata, 1991) and established its place in ABA in the year 2000 as could be seen in JABA's special issue on MO (until then MO was called establishing operations [EO]). MO research shed light on ABA's unique preferences for conceptual systems.

Although Michael (1993) proposed MO to both EAB and ABA scholars, by the time Michael had completed a systematic taxonomy of MO in 2000, ABA scholars were the ones who adopted Michael's MO taxonomy (signified by the fact that Laraway et al., 2003 article was published in JABA). For one thing, in EAB, many of the MO concepts overlapped with previously established processes such as the reinforcer effectiveness, behavioral momentum, and various types of Pavlovian conditioning phenomena (Catania, 1993; though Michael, 1983, 1993, argued these phenomena do not include either evocative effect or reinforcer-establishing effect) and did not attract EAB researchers as much (Laraway et al., 2003). For another, MO concepts were descriptive and procedural, and not process-focused or experimentally derived

(Catania, 1993; Klatt & Morris, 2001; Schlinger, 1993). In other words, Michael laid out a descriptive taxonomy of various MO procedures such as EO, abolishing operation, and conditioned MOs. As the names imply, these are *operations* that demonstrate a functional relationship with a target response as opposed to the identification of processes. Schlinger and Blakely (1994) called this type of taxonomy a "functional classification approach." Moreover, at its most elaborate form, Michael's MO taxonomy completely rewrote the entire conditioning terminologies and became a stand-alone taxonomic system that is incompatible with other existing taxonomies in behavior analysis (Michael, 1993; see also Schlinger & Blakely, 1994, on how Michael's system replaced early Skinner's operant/respondent distinctions).

As mentioned above, Michael's MO taxonomy is not empirically driven, but descriptive. Smith and Iwata (1997) wrote:

> . . . there is a lack of consensus at the theoretical level on how best to describe or classify antecedent variables. . . . At least three theoretical frameworks currently exist: Skinner's operant theory . . . Kantor's interbehavioral account of setting events . . . and Michael's system of evocative functions. . . . Thus, attempts to relate the outcomes of antecedent manipulations in applied work to behavioral principles find little in the way of a unifying system of interpretation. (p. 344)

A descriptive taxonomy is incompatible with other descriptive taxonomies (in the above quote, MO against early Skinner's operant/respondent system and Kantor's interbehavioral field theory) because it merely classifies the same (or related) observed phenomena from different perspectives by the process of induction (Nosik & Carr, 2015; Schlinger & Blakely, 1994; Whelan & Barnes-Holmes, 2010). The survival of such taxonomies in behavioral science depends on preference or usefulness rather than its empirical verification, especially when a taxonomy is not based on some physical property (e.g., DNA in evolutionary biology). On the other hand, the benefit of such a descriptive taxonomy is its usefulness. Miguel (2013) described that ABA researchers welcomed Michael's new MO taxonomy with enthusiasm as a useful conceptual system for their research and practice as the MO taxonomy provided various procedures that directly influenced target responses of interest (the present article calls this "the direct taxonomy-to-procedure link"). *JABA*'s special issue on MO in 2000 reported many fruitful and increasing amounts of applied research on MO (e.g., Iwata et al., 2000).

## Relational Frame Theory

In view of ABA researchers and practitioners' adaptation of new conceptual systems, they treated RFT just the same way they did Michael's MO taxonomy. First, RFT has an aspect of a functional and descriptive taxonomy (Clayton & Hayes, 1999; Hayes et al., 2001). Second, RFT researchers proposed this system originally within the EAB community, and ABA researchers later adopted it for its procedural usefulness in guiding ABA research and practice on stimulus

equivalence and other nonequivalent relations (the direct taxonomy-to-procedure link; e.g., Cooper et al., 2020; Zentall et al, 2002).

RFT is unique in such a way that its researchers conducted much of its research on human verbal behavior in EAB. This created some confusion as to what RFT entails. For example, in EAB research, Sidman (1990; see also Gross & Fox, 2009) claimed stimulus equivalence as a new principle and added it to the existing list of behavioral principles. Malott (2003) explained this phenomenon using only existing behavioral principles such as reinforcement and stimulus generalization. Both of them as EAB researchers attempted to explain stimulus equivalence phenomena by invoking elementary behavior processes. Hayes et al. (2001), on the other hand, categorized stimulus equivalence as an instance of arbitrarily applicable relational responding (AARR; e.g., Barnes-Holmes & Barnes-Holmes, 2000). It is important to note that Hayes *categorized* rather than *explained* stimulus equivalence using induction process (Hayes et al., 2001). Thus, to the question of how to explain stimulus equivalence phenomena using RFT without appealing to some mediating processes, Barnes-Holmes and Barnes-Holmes (2000) responded:

> The important point here, is that RFT considers what some may call a mediating behavioral event (e.g., indirect reflexivity) to be part of a relational frame (e.g., a contextual cue for symmetry). In this way, RFT is particularly parsimonious because it incorporates a so-called mediating event into the generalized operant of relational framing itself. (p. 262)

That is, RFT does not explain the stimulus equivalence phenomenon in terms of another more elementary mechanism such as a mediating behavioral event or other elementary behavioral processes as other EAB researchers would, but only categorizes what was observed *procedurally* into its taxonomy (see Hayes et al., 2001). Once RFT is understood as a descriptive functional taxonomy, this type of misunderstanding can be avoided (e.g., see also a debate between Gross & Fox, 2009, and McIlvane, 2003). Whereas EAB researchers have had difficulty examining RFT for this very reason (e.g., Burgos, 2003), ABA researchers found a place for RFT as one of the new conceptual systems.

Thus, both MO and RFT examples capture ABA's unique preference for its conceptual systems. Schlinger (1993; also Schlinger & Blakely, 1994) called these conceptual systems "taxonomies," which captured the characteristics of these conceptual systems. Schlinger's point was that the above-mentioned conceptual systems are not logical-empirical in nature (that is, empirical, formal/theoretical, and testable by the method of experimentation as seen in EAB and other psychological disciplines; see Burgos, 2003; Machado & Silva, 2007), but they are taxonomic classifications (description and categorization of observed phenomena based on a given set of assumptions). ABA researchers and practitioners prefer a descriptive and functional taxonomy with its emphasis on its direct procedural implications to behavior change ("the direct taxonomy-to-procedure link"). At this point, it is clear that ABA's conceptual systems are unlike any in EAB (consider Sidman, 2000, on the theoretical evaluation of stimulus equivalence or Baum, 2002, 2018, on the evaluation of the "paradigm shift" in EAB, which is rather a taxonomic change but

approached differently). The conceptually systematic dimension of ABA, an ancestry DNA inherited from EAB, has undergone mutation, and became a new species.

## Characteristics of ABA Conceptual Systems

To summarize, ABA researchers and practitioners have consolidated the characteristics of the conceptually systematic dimension in this era. ABA's conceptual systems are characterized by (1) their conceptual-as-analytic attitude; (2) their procedure-over-process preference; (3) their descriptive and functional taxonomy; and (4) their direct taxonomy-to-procedure link.

These new characteristics of the conceptually systematic dimension of ABA come with its own advantages and problems. For its advantages, ABA researchers and practitioners adopted various new concepts, which contributed to the effectiveness of their practices. This new attitude toward the conceptual systems also distinguishes itself from the EAB's conceptual systems. Unlike EAB researchers who evaluate theoretical competitions and integrations formally and empirically with a goal of developing an accurate representation of reality (e.g., Baum, 2002; Morris, 1997), the taxonomies in ABA are pragmatic, functional, and qualitative in nature and emphasizes its socially significant effects.

The downside of these characteristics is whether one can still call these "systematic" in any way. Even when one can say ABA is conceptually systematic within itself or that ABA has a comprehensive conceptual system of its own, these taxonomies are not systematic with each other. Some have attempted to integrate different systems to make a coherent ABA conceptual system, but such attempts either ended up allowing one taxonomy to swallow up the others or taking fragments of each taxonomy and making a Frankenstein's monster of different taxonomies (e.g., Barnes-Holmes et al., 2000; Fienup, 2018; Sundberg, 1993). A textbook treatment of these taxonomies became a mere bag of conceptual tricks put together as chapters as well (e.g., Cooper et al., 2020, contain different chapters on early Skinner's behavioral principles, late Skinner's verbal behavior, Iwata's functional analysis, Michael's MO and Hayes's RFT, among others).

Though one can argue that ABA is still at the stage of categorizing and classifying its phenomena in its scientific process and has not reached at the level of experimentation and theory building (see Machado & Silva, 2007, for scientific process), based on this article's historical analysis, ABA conceptual systems are fundamentally not orienting toward developing such a unified theory of behavioral processes. This is because of the conceptual-as-analytic attitude as its core value. That is, the conceptual-as-analytic attitude values the identification of a functional relationship between a procedure and a target response as its fundamental unit of conceptual research. In turn, there is no regard to whether a list of such identified functional relations between various procedures and various target responses has one (or a few related) general underlying process(es) (except perhaps one can call these as instances of some types of an operant, though what this "operant" means differ among various conceptual systems).

Take, for example, ABA researchers' adaptations of developmental psychological concepts such as joint attention (e.g., Taylor & Hoch, 2008), naming (e.g., Stromer et al., 1996), and developmental milestones (e.g., Sundberg, 2008). Although some researchers made efforts to systematize various developmental phenomena into one coherent behavioral conceptual system such as behavioral cusps (Rosales-Ruiz & Baer, 1997), behavior analytic view of child development (Bijou, 1993; Schlinger, 1995), as well as various curricula for people with developmental disabilities (Dixon, 2014; Partington, 2010; Partington & Mueller, 2012; Sundberg, 2008), there has not yet been any consensus as to what the phenomena of interest are. This is because, unlike developmental psychologists who view various behavioral processes as a manifestation of a child's generic developmental phenomenon (e.g., Keil, 2013), ABA's conceptual-as-analytic attitude does not assume whether there is such an underlying phenomenon or a subject matter. This is also why ABA researchers and practitioners can adopt any conceptual systems such as MO and RFT from other disciplines, though by the time ABA scholars adopt them, these systems often lose their conceptual generality with its original context whether it is EAB or developmental psychology.

ABA's attitude toward conceptual systems can be concerning because the only real criterion to evaluate a given conceptual system is its pragmatism in applied settings (e.g., Burgos, 2003). This pragmatic nature of ABA's conceptually systematic dimension might have partly been responsible for the challenges in contemporary ABA.

## From the 2000s to the Present: ABA's New Challenges

Now let's see how this new set of characteristics of the conceptually systematic dimension has influenced the contemporary challenges in ABA. From the 2000s to the present, ABA researchers and practitioners have faced two major issues. One is ABA's domestic policy: ABA researchers and practitioners found different clinical and educational challenges to be important, which in turn prompted further separation within the field. The other is ABA's foreign relation: ABA researchers and practitioners' growing presence in clinical and educational settings occasioned interactions with researchers and practitioners of the disciplines outside behavior analysis more actively (Critchfield, 2002; Poling, 2010), which caused some researchers outside ABA to argue their research as a part of (or not a part of) ABA research (the interspecies breeding in the evolutionary metaphor). Both challenges are directly related to how different groups of researchers and practitioners understood ABA's conceptually systematic dimension. Thus, this article provides some implications to these challenges in the view of the updated characteristics.

### ABA's Domestic Policy

The contemporary ABA community saw a new influx of research topics from the side of practitioners. That is, ABA practitioners began encountering issues that ABA

researchers have not yet addressed experimentally. Topics include developmental psychological issues (e.g., Taylor & Hoch, 2008), supervision (e.g., Simmons et al., 2021), cultural responsiveness (e.g., Jimenez-Gomez & Beaulieu, 2022), interpersonal relationships (e.g., Kazemi et al., 2022), ABA practitioners in school (e.g., Layden, 2023), collaboration with other service providers in various settings (e.g., Bowman et al., 2021; Brodhead, 2015; Henderson et al., 2023), telehealth practice (Pollard et al., 2021), among many others. Such issues became the "applied" research topics in ABA and often featured in journals such as *Behavior Analysis in Practice* (*BAP*). This is the contemporary ABA community's basic-applied research continuum. ABA practitioners discussed many issues that emerged in practice in places such as *BAP* and then ABA researchers brought these topics under investigation in the lab in places like *JABA*. This established ABA as a self-sufficient body of science that discovers and solves issues of social significance on its own.

On the other hand, the ABA community also saw an emerging divide between its researchers and practitioners, which recently resulted in two different bodies of the graduate program accreditation bodies: ABAI and the Association of Professional Behavior Analysis (APBA; BACB, 2022). This emerging separation is partly due to their differences in what to prioritize in training and education of ABA researchers and practitioners. As discussed above, ABAI accreditation program has included basic (EAB) research in content area. APBA, the representative body of ABA practitioners, on the other hand, saw it as unnecessary and proposed to be a separate accreditation body, stating, "Let's start by outlining requirements present in other accreditation options that APBA's accreditation does not have: An additional (i.e., in relation to the BACB® required courses) stand-alone course in basic behavior analysis" (though ABAI denied this claim; Newland et al., 2023). This APBA's de-emphasis in "basic behavior analysis" directly reflects the change in the way ABA practitioners understand the conceptually systematic dimension. Whereas ABAI still carries out the basic-applied continuum relation of EAB and ABA, APBA's attitude seems to be more sensitive to the current state of ABA community as a self-sufficient, independent body of science with its own urgent applied research questions.

**Implications to ABA's Domestic Policy** The present historical analysis pointed out that ABA as an independent field of science has developed into possessing the basic-applied continuum of its own. The basic research in ABA is characterized by the features of the conceptually systematic dimension above, whereas the applied research comes from the issues faced by its practitioners. This evolution allowed ABA researchers and practitioners to engage in a self-sufficient scientific activity of inductive (applied) and deductive (basic) research programs on socially significant behavior at hand. APBA's stance reflects this new reality. Updating the understanding of ABA's conceptually systematic dimension's characteristics is important in accurately assessing this situation.

**Implications to Subfields of Behavior Analysis** ABA has evolved into its own species as a scientific body and found its own niche mainly in the field of autism and developmental disabilities. Though some have expressed concerns that ABA's niche became too narrow (Axelrod et al., 2012), this trend has continued since the 1960s

(Smith & Eikeseth, 2011). Whereas Critchfield and Reed (2017) proposed to widen ABA's scope to increase its niche, an alternative is to accept that ABA is no longer an all-encompassing applied research branch of behavior analysis. Rather, ABA has evolved into a new species with its small niche, more appropriate to call it a "developmental behavior analysis" or some such title. Once we accept this new reality, we can find other possibilities. The emergences of other subfields in behavior analysis are promising as they can pick up the niches ABA did not. Other subfields such as organizational behavior management (OBM) and clinical behavior analysis (CBA) are on the way to their maturity (Culig et al., 2008; Ferreira et al., 2021; Hantula, 2022; VanStelle et al., 2012). Likewise, if there are topics of interest that have not been addressed in any subfields, behavior analysts can establish a new subfield to encompass it. This perspective fits better with the present article's analysis of the field's evolutionary trajectory (see Fig. 1 for the diagram).

Given the present reconceptualization of ABA's conceptually systematic dimension, what then does translational research among subfields of behavior analysis look like? A traditional conceptualization of translational research rests upon the notion of the basic-applied continuum such as Elcoro et al.'s (2023) biomedical model of translational research between EAB and applied subfields such as ABA and OBM. On the other hand, this article pointed out that, unlike the biomedical fields, the subfields of behavior analysis have different aims and interests with different conceptual understandings. Thus, translational research among subfields of behavior analysis is not a matter of a simple basic-applied continuum (however multidirectional it might be, as indicated by Mace & Critchfield, 2010). What then should we look for in translational research in behavior analysis? One idea is to seek the development of an innovative new procedure. Time to time, an innovative procedure emerges and benefits all the subfields of behavior analysis. The stimulus equivalence procedure (Sidman, 1994) is a good example. Whereas Sidman continued his investigation on "process" in EAB, Hayes and his colleagues subsequently devised various nonequivalence procedures to benefit CBA and ABA, and Horne and Lowe (1996) proposed a naming concept in the verbal behavior subfield. An innovation like these spreads among the subfields of behavior analysis not as a continuum from basic to applied, but as a web of networks. Although much innovation has been rather a byproduct of each field's pursuit of their own goals, the kind of translational research this article recommends can devote our effort into such innovations more intentionally.

## ABA's Foreign Policy

There is also a major change in the way the ABA community was perceived by the ones outside behavior analytic discipline compared to the previous decades. Namely, some researchers saw the ABA community as a desirable (or undesirable) place to belong (or to distinguish from). This prompted many researchers and practitioners outside behavior analysis to work together with ABA researchers and practitioners to develop new groups (interspecies breeding in the evolutionary metaphor; Fig. 1). What then happened was that scholars both inside and outside behavior analysis used

the seven-dimension framework to evaluate the appropriateness of their research and practice as part of (or not) ABA research and practice. This way of using the seven-dimension framework as the evaluative criteria was new and turned out to be ineffective, especially when it comes to the conceptually systematic dimension. Below are some notable cases.

**Early Start Denver Model** Vivanti and Stahmer (2021) discussed whether the Early Start Denver Model (ESDM) is considered as ABA research and practice. ESDM is an early intervention approach for children with autism that incorporates behavioral and developmental approaches (Vivanti & Stahmer, 2021). They argued that ESDM meets all the seven dimensions of ABA. What is of interest to us, of course, is how they treated the conceptually systematic dimension. Vivanti and Stahmer (2021) stated that "the conceptually systematic dimension refers to intervention practices being consistent with the fundamental principles that underlie (in the words of Baer et al., 1968) 'behavior development'" (p. 233), and "the ESDM is designed to achieve this goal, as intervention procedures are described with detailed reference to their conceptual framework, so that practitioners can connect treatment practices to their underlying foundations and operate conceptually driven treatment decisions. . ." (p. 233). These statements indicated that ESDM procedures are closely connected to a uniform conceptual system. But which conceptual system? They stated that the ESDM "is more than the 'collection of tricks' that Baer et al. (1968) guarded against in their definition of the conceptual criterion, as the ESDM's technologies are tied to fundamental concepts of behavior development (in typical development and ASD)" (p. 233). That is, ESDM's conceptual system is that of developmental psychology. Thus, they concluded that ESDM is conceptually systematic with ABA *because* their interventions are conceptually systematic with developmental psychology. Then they asked, "Is the inclusion of scientific knowledge on child development a fatal threat to the conceptual criterion? . . . this is unlikely to be the case" because, ". . . developmental and behavioral principles can arguably coexist in a conceptually cohesive system because they share the same overarching commitment to empiricism" (p. 233). The way Vivanti and Stahmer (2021) interpreted the conceptually systematic dimension of ABA was that any intervention (or a set of interventions) that is systematic in any discipline's conceptual system could be qualified to meet the conceptually systematic dimension of ABA. It is clear that this does not match the characteristics of ABA's conceptually systematic dimension identified in this article. To be fair, Vivanti and Stahmer's argument was an act based not on theoretical discussion but on practical interest as they stated "arguably, state mandates should fund any treatment that has demonstrated effectiveness for children with ASD, regardless of the scientific discipline and conceptual framework that the treatment draws upon" (p. 263). Although Vivanti and Stahmer's motivation was elsewhere, their article showed an important point: the conceptually systematic dimension as it had been conceptualized in the past was not useful to evaluate whether a given research/practice of a foreign discipline as those of ABA.

**Positive Behavior Support** The positive behavior support (PBS, also known as positive behavioral interventions and supports) community presented an opposite

argument. PBS is a school-wide, nonaversive behavioral intervention system (Johnston et al., 2006). In the argument of whether PBS research/practice is a part of ABA, most practitioners from the PBS community preferred to distance themselves from the ABA community. Anderson and Freeman (2000) discussed the relationship between PBS and ABA. First, they described that "PBS uses a wide variety of procedures and strategies drawn from applied behavior analysis . . ." (p. 86) and mentioned that "in fact, behavior analysis is the theoretical and technological foundation of PBS. . ." (p. 92). But they claimed that "PBS capitalizes on the best values and techniques from various perspectives, such as person-centered planning and applied behavior analysis, and provides a model of best practices" (p. 92). In the end, they concluded PBS is compatible with ABA but it is superior in emphasizing a more ecological perspective. Johnston et al. (2006) also emphasized the difference, stating that "although the origins of PBS in ABA are clear, we view the differences as important and problematic" (p. 51). Johnston et al. argued that PBS is more successful than ABA in the developmental disabilities community because it is branded as a different approach. Carr and Sidener (2002) also acknowledged that the majority of PBS scholars rather want to separate themselves from the ABA community. Again, the motivation is clearly that of practice, and, in this case, the funding favored PBS more than ABA. Here is a case where people in the PBS community do not see any benefits of being associated with the ABA community. It is an interesting phenomenon because the proportion of what constitutes PBS's research and practice is no different from ESDM (in fact, Critchfield & Reed (2017) uses PBS as an example of a fuzzy, inclusive ABA research, which is their proposed version of ABA that includes all kinds of applied topics), and yet, some PBS scholars claim that they are different from ABA.

**Acceptance and Commitment Therapy** Acceptance and commitment therapy (ACT) is a "third-wave" psychotherapy (Hayes et al., 2004, ch. 1). Tarbox et al. (2020) and Dixon et al. (2020) recently both argued that ACT and acceptance and commitment training (ACTraining) are a part of ABA using the seven-dimension framework. ACT and ACTraining present yet another interesting case because ACT and ACTraining come from CBA, a subfield of behavior analysis. Dixon et al. (2020) claimed that despite ACT's long history in behavior analysis, the ABA community still does not accept ACT and ACTraining as its practice. Dixon et al. (2020) wrote that "given how centrally located this work was in behavior analytic journals and how old it is (29–35 years), it is ironic that there is still controversy about whether ACT's underlying model is behavior analytic, and whether BCBAs [Board Certified Behavior Analysts] should be using it" (p. 563). They hypothesized three reasons why ACT and ACTraining were not viewed as ABA. These were (1) the lack of research on people with developmental disabilities; (2) the resistance to RFT; and (3) no clear consensus on whether BCBAs can practice ACT as a part of ABA practice.

Aside from Dixon et al.'s hypotheses, based on the present study's updated characteristics of the conceptually systematic dimension of ABA, there might have been other reasons too. The first reason might be the membership issue. Hayes and colleagues developed ACT within the behavior analytic discourse in the 1980s (Tarbox

et al., 2020; Zettle, 2005), though the development was primarily within CBA, which is in itself the result of interspecies breeding between EAB and clinical psychology (Sandoz et al., 2022; Figure 1). Thus, it is possible that ABA scholars do not readily accept ACT and ACTraining as a part of ABA research and practice because ABA and CBA are separate subfields just like ABA and EAB are. Tarbox et al. (2020) seemed to recognize this issue as they said: "the importance of remaining conceptually systematic is perhaps even greater when adapting interventions that were originally developed for practitioners outside of ABA. . ." (p. 13).

The second reason could be the direct taxonomy-to-procedure link issue. ACT/ACTraining deals with psychological disorders by using so-called "middle-level terms" such as acceptance and defusion. The opposition to calling ACT and ACTraining a part of ABA seemed to arise when ABA scholars saw a large gap between the procedures of ABA and those of ACT and ACTraining (Cihon et al., 2022; Sandoz et al., 2022). Both Cihon et al. (2022) and Sandoz et al. (2022) emphasized that ACT or ACTraining has not demonstrated this procedural aspect enough to be adopted in ABA practice. Take, for example, cognitive defusion. Assaz et al. (2023) conducted a review to find the operational definition of cognitive defusion as a procedure (in addition to as process and outcome), but they found no studies that provided a clear definition as they said, "these [procedures or techniques] tend to be experiential exercises and metaphors" (p. 1025). That is, there is no one study that reliably induces cognitive defusion as a functional relationship between a procedure and the change in target response. Tarbox et al. (2020) admitted that ACT procedures were not clearly specified as other ABA procedures are and said, "it is likely fair to state that this is a dimension [the technological dimension] in which ACTraining requires further development, perhaps largely due to the fact that it is a relatively new area of practice within ABA" (p. 20). This is not just a matter of the technological dimension of ABA's seven-dimension framework. There is no direct taxonomy-to-procedure link in ACT/ACTraining concepts and procedures, whereas, in the case of RFT in ABA conceptual systems, ABA researchers and practitioners use various match-to-sample procedures for establishing both equivalent and non-equivalent relations (e.g., Dixon's PEAK curriculums, 2014).

Thus, in the case of ACT and ACTraining, the membership within behavior analytic discipline and the taxonomy-to-procedure link do not reflect ABA's updated conceptually systematic dimension characteristics. Even though ACT and ACTraining might qualify as "behavior analytic" because the CBA subfield is a part of the discipline, ACT and ACTraining cannot readily be considered as "applied behavior analytic" as the ABA subfield has a strong independence against other subfields. Dixon et al. (2020) and Tarbox et al. (2020) did not seem to recognize this independence and treated "behavior analytic" and "applied behavior analytic" interchangeably, regarding ABA still on the simple basic-applied continuum.

**Implications of ABA's Foreign Policies** As ABA researchers and practitioners interact with people from other disciplines, they have produced unique groups and systems such as ESDM, PBS, and ACT. These systems are interdisciplinary and difficult to evaluate as to whether they are a part of ABA or not. Whereas the traditional seven-dimension framework turned out to be ineffective as an evaluative tool, the

newly updated conceptually systematic dimension based on this article is useful in shedding the light on clarification. Nevertheless, the ABA community needs an updated evaluation tool to identify whether such an interdisciplinary project or service can be considered a part of ABA (both conceptually and in practice). This is urgent not only for researchers who seek to develop a conceptual and practical system of interventions, but also for practitioners who need to discriminate which services fall under ABA practice and their competency areas of practice. Moreover, this addresses the issue of funding, which is also a crucial lifeline for the survival of the ABA community.

In addition, this foreign policy issue raises another question on education in ABA for the ones who operate ABA-related educational programs and practices in places where there is no historical background in ABA, behavior analysis, or psychology. For example, many U.S.-based ABA programs are now in the education department where psychology is not a required course (Shepley et al., 2018). Moreover, the ones in the countries outside the United States usually have different cultural and academic backgrounds even in psychology (e.g., Roll-Pettersson et al., 2020). If they are to adopt ABA research and practice, it is crucial for them to understand the historical development of ABA as well as its current status as this article and others have pointed out (e.g., Critchfield & Reed, 2017; Deitz, 1982; Rider, 1991). Although the present article concluded that ABA has become a self-sufficient body of science with its own basic and applied branches, it is difficult to understand contemporary ABA's characteristics are unique and fundamental to the way they operate their research and practice without the knowledge of history in psychology and behavior analysis. To effectively implement ABA programs and practice as well as to form/join an ABA community, it is crucial to have a shared understanding of how the ABA community evolved and what contemporary ABA encompasses.

In conclusion, since the 2000s, the contemporary ABA community has seen new challenges. One is its own domestic development as the basic-applied research body. The other is its foreign diplomacy with other disciplines. The conceptually systematic dimension appears crucial in both issues.

## Current Characteristics of the Conceptually Systematic Dimension of ABA

What does it mean to be conceptually systematic in contemporary ABA research and practice? Some characteristics have emerged from this historical review:

1. ABA conceptual research emphasizes the investigation of a functional relationship between a treatment procedure and socially significant behavior (the conceptual-as-analytic view).
2. ABA conceptual research show the procedure-over-process preference.
3. ABA conceptual systems are a descriptive and functional taxonomy.
4. ABA conceptual systems prefer the direct taxonomy-to-procedure link.

And four subcharacteristics are:

5. The ABA community distinguishes itself from behavior analysis, which is an overarching discipline, and so do its conceptual systems.
6. The ABA community distinguishes itself from other subgroups of behavior analysis such as EAB and CBA, and so do its conceptual systems.
7. The ABA community adopts any concepts from other psychological and related disciplines (e.g., speech-language pathology, special education), though once adopted, these concepts become a descriptive and functional taxonomy.

Thus, this article concludes that the conceptually systematic dimension of ABA has evolved to be unique to the ABA community and not easily shareable with other subfields of behavior analysis.

## Conclusion

The present historical review investigated the last 55 years of the interpretations of the conceptually systematic dimension of ABA in order to reconceptualize its characteristics that speak to the contemporary ABA's challenges. The supposed basic-applied continuum between EAB and ABA does not seem to be relevant any longer. To substitute the continuum metaphor, the present article proposes the evolutionary metaphor where the conceptually systematic dimension as a DNA inherited from EAB some 55 years ago and has mutated to the point that it became another species (Fig. 1). In addition, the interspecies breeding between different disciplines inside and outside ABA produced unique offsprings. This evolutionary metaphor implies different approaches to many of the challenges the contemporary ABA community faces. Finally, it is reminded that this type of historical analysis is a moment photograph of ABA as an ever-evolving scientific community, the dynamism of which is the heart of evolution.

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