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Evaluating the Work of Applied Animal Behaviorists as Applied Behavior Analysis

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Within the field of behavior analysis, there is a divide between human and nonhuman animal research and application. Although behavior-analytic techniques could be used with nonhuman animals, to become a board-certified behavior analyst (BCBA), nonhuman animal practice is not allowed. Animal behavior professionals (e.g., certified applied animal behaviorists, certified professional dog trainers, animal behavior consultants) and BCBA's completed a 31-item survey to evaluate the extent to which their professional activities meet the definition of applied behavior analysis and the extent to which they are consistent with the Behavior Analyst Certification Board (BACB) task list. Although there are differences in the techniques being implemented, the survey yielded more similarities than differences in the work of these two groups of professionals. Both animal behavior professionals and BCBA's are engaging in work that meets the standards of the BACB's task list and the definition of applied behavior analysis.

Keywords: basic and applied research, board-certified behavior analyst, certified applied animal behaviorist, certified professional dog trainers, International Association of Animal Behavior Consultants

In 1958, the *Journal of the Experimental Analysis of Behavior* was founded (Laties, 2008), marking the formalization of behavior analysis. Since its inception, behavior analysis has grown into a sophisticated and well-developed discipline. The experimental analysis of behavior (EAB) and applied behavior analysis (ABA) are empirical branches of this field, supported by the underlying philosophy of behaviorism. EAB uses data to identify behavioral principles within a laboratory setting, frequently with nonhuman animal subjects (Mace & Critchfield, 2010). ABA is the practice of utilizing principles of behavior to solve socially significant problems (Baer, Wolf, & Risley, 1968, 1987). Although distinct, each area of

research is heavily influenced by the other, and they share common assumptions via their shared philosophy of behaviorism and their status as science.

Although less than 10% of psychological journals have dealt with animal behavior, the contribution that animal research has made in the field of behavior analysis is astounding (Lattal, 2001). Many behavior-analytic techniques were identified using nonhuman animals before being implemented with humans. For instance, Skinner's pigeons are known both within behavior analysis and in the general population. Without the research Skinner conducted on nonhuman animals, the field of ABA may never have developed basic techniques such as reinforcement, punishment, and generalization (Dymond, Roche, & Barnes-Holmes, 2003). Thus, the nonhuman animal roots of the science of behavior analysis directly inform its application.

Despite the historical demonstration of behavioral principles using nonhuman subjects, there is a divide in the application of behavior-analytic techniques between practitioners who work with humans and those who work with nonhuman animals. On the human side, we have

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board-certified behavior analysts (BCBAs), who are governed by the Behavior Analysis Certification Board (BACB). The BACB sets the requirements for the BCBA credential via its task list (BACB, 2012) to ensure consistency within the training of behavior analysts.

On the nonhuman side of behavioral problem solving, we have a variety of professionals, including applied animal behaviorists and certified dog trainers. The purpose of the present study is to evaluate (a) the extent to which the work of these animal behavior professionals is consistent with the definition of applied behavior analysis (cf. Baer et al. 1968, 1987), (b) the extent to which the animal training community's practice reflects elements of the BACB's task list, and (c) the extent to which the tasks performed by animal behavior professionals are similar to work done by BCBAs.

To obtain certification within the field of behavior analysis, the BACB specifies that an individual must meet certain requirements beyond classroom instruction. For instance, she or he may have to complete 1,500 hours of supervised independent fieldwork in behavior analysis. Appropriate clients to gain this experience are defined as "any persons for whom behavior-analytic services are appropriate" (BACB, 2015). By stating that clients must be *persons*, work with nonhuman animals, even if that work is behavior-analytic, does not count toward certification requirements. Thus, people who work with nonhuman animals can obtain an alternative credential, certified applied animal behaviorist (CAAB), or become a certified professional dog trainer. To obtain the CAAB certification, a person must demonstrate proficiency in (a) the theoretical ideologies of animal behavior, (b) the practice of performing experimental research on the actions of animals either in a laboratory setting or in a real-world environment, (c) the use of animal behavioral techniques to solve problems, and (d) the distribution of correct information regarding animal behavior by teaching and research (Applied Animal Behaviorists, 2015).

Both BCBA and CAAB apply research-based techniques. Additionally, both BCBAs and CAABs have the primary goal of using those procedures to solve significant behavioral problems. If an individual can effectively use differential reinforcement to resolve a dog's problem behavior, it seems logical that he or she could

also implement an equivalent procedure with a human being. That ability to be able to apply knowledge in multiple populations (e.g., human and canine) is a goal within the field of behavior analysis (Baer et al., 1968, 1987). In a discussion of such cross-species application, Bailey and Burch (2006) caution that "dogs are a different species from children with autism, so you will need species-specific training" (pp. 75–76). Such species-specific training might include information about the phylogenetic history of the organism and build skills associated with identifying relevant species-specific stimuli (e.g., reinforcers). Although the procedures used with human and nonhuman animals might differ—your typically developing college students would probably be baffled if you used a clicker when they responded correctly in class, while your border collie might respond with zeal—but the foundational principles (e.g., reinforcement) are the same.

Given that there are similarities in the applied goals of CAABs and BCBAs, this study is an evaluation of the extent to which the practice of animal behavior professionals is consistent with the practice of BCBAs. This analysis was designed to evaluate the prevalence of techniques used and, to a lesser extent, the principles that underlie them. An electronic survey was distributed to CAABs, certified dog trainers, and BCBAs. The survey consisted of questions based on the seven dimensions of applied behavior analysis (Baer et al., 1968, 1987) and items on the current version of the BCBA task list (BACB, 2012). This survey was designed to evaluate the extent to which the practice of these professionals is consistent, as well as where it differs, to situate the practice of applied behavior analysis among related fields.

Method

Participants

Surveys were distributed electronically to animal behavior professionals and BCBAs. *Animal behavior professionals* is an inclusive term encompassing CAABs, certified professional dog trainers, and also International Association of Animal Behavior consultants. These participants were found using directories available on animal behavior professional websites.

In total, 145 animal behavior professionals were contacted via email solicitation by the first author. Of the 145 potential participants, 75 responded, yielding a response rate of 52%, which is quite high for electronic survey research (cf. Coughlin et al., 2011). This sample was predominately female ($n = 67$) and Caucasian ($n = 70$) with a mean age of 49.16 years ($SD = 10.95$). The mean for number of years in their field was 16.60 ($SD = 9.75$).

A total of 55 behavior analysts completed this survey: 4 with the Board Certified Assistant Behavior Analyst (BCaBA) credential, 43 with the BCBA credential, and 8 with the Board Certified Behavior Analyst-Doctoral (BCBA-D) credential. These participants were recruited via email solicitation using the mailing list of a state professional organization in the northeastern United States and by direct solicitation by the second author. This sample consisted of 45 females and 10 males and was predominately Caucasian ($n = 50$). The mean age of BCBA-Ds was 38.11 ($SD = 11.38$), with an average of 12.66 years ($SD = 9.39$) working in the field.

Survey

A 31-item survey was delivered electronically to participants via email solicitation. Twenty-four items were based on the BCBA task list. An example of such an item is, "How often in your daily work do you plan for unwanted effects of your intervention?" This survey was based on the requirements within the BACB task list. Twenty-four items describing behavioral principles, techniques, and elements of the ethical code were included. The survey items were selected by the authors in an attempt to develop a set of questions that cover the broad spectrum of behavior-analytic practices. However, items related to verbal behavior were excluded because one set of professionals deals exclusively with nonverbal clients (i.e., nonhuman animals). Other questions within the survey were derived from the seven dimensions of behavior as stated by Baer et al. (1968, 1987). For instance, the item "How often in your daily work do you deal with problems that are socially important?" originated from the applied dimension of applied behavior analysis. The survey consisted of a 5-point Likert-type scale

in which 1 = *never*, 2 = *sometimes*, 3 = *neutral*, 4 = *often*, and 5 = *very often*.

For analysis and interpretation, the questions were divided into three groups: principles and techniques, research, and social validity. The category of principles and techniques consisted of survey items regarding behavioral principles (e.g., reinforcement, punishment) and techniques that could be implemented with a variety of clients, including shaping, errorless learning, conditioned reinforcement, and so forth. The research category was composed of items concerning research strategies and procedures, such as organizing data and exercising control over a particular behavior. The social validity category consisted of questions that were concerned with how these individuals are affecting society or interacting with other people; items in this section asked about consideration of client preferences and arranging for orderly termination of services.

In addition to asking the participants about the type of work they perform, demographic information was also collected, including age, gender, ethnicity, and number of years working in their particular field. The participants solicited via the state professional organization mailing list were instructed to specify their credential (BCBA-D, BCBA, BCaBA, other, or none, to filter out individuals without a relevant credential who may have responded [e.g., students]). All procedures were approved by our university's institutional review board.

Results

The frequencies of answers to each item for both animal behavior professionals and BCBA-Ds are presented in Table 1. The table contains the percentage of responses in each category, so it is possible to compare the responses between the unequal groups. For instance, for the question "How often in your daily work do you use reinforcement or reward?" 70 (95.9%) of the animal behavior professionals and 49 BCBA-Ds (69.1%) indicated that they use reinforcement very often.

Chi-square tests for independence were used to evaluate if there were differences between the distribution of responses across the categories (i.e., never to very often) between the behavior analysts and the animal behavior professionals. Table 2 presents the results of the chi-square

Table 1
Percent of Survey Responses in Each Category

	Animal behavior professionals					Board-certified behavior analysts				
	1	2	3	4	5	1	2	3	4	5
How often in your daily work do you										
Principles and techniques										
Measure frequency (rate, duration, etc.) of a certain behavior?	5.3	9.3	20.0	22.7	42.7	0	1.8	9.1	20.0	69.1
Use reinforcement or reward?	0	1.4	0	2.7	95.9	0	0	1.8	9.1	89.1
Use punishment?	10.8	63.5	13.5	8.1	4.1	9.1	63.6	18.2	3.6	5.5
Use shaping?	0	8.0	10.7	26.7	54.7	0	3.6	16.4	25.5	54.5
Use extinction?	1.3	30.7	16.0	28.0	24.0	1.8	9.1	20.0	21.8	47.3
Use errorless learning procedures?	11.3	12.7	21.1	23.9	31.0	5.5	7.3	10.9	27.3	49.1
Use response-independent (time-based) schedules of reinforcement (i.e., noncontingent reinforcement)?	12.0	36.0	18.7	16.0	17.3	3.6	12.7	23.6	36.4	23.6
Use other conditioned reinforcement systems (e.g., clickers)?	2.7	4.0	10.7	14.7	68.0	21.8	16.4	18.2	23.6	20.0
Use procedures that arise from a specific and identifiable theoretical base rather than being a set of packages or tricks?	0	1.4	6.8	23.0	68.9	0	3.7	1.9	27.8	66.7
Deal with behavior that can be measured?	1.3	5.3	12.0	24.0	57.3	0	0	1.8	12.7	85.5
Program for maintenance of a behavior (ensuring the behavior change will last once the intervention has ended)?	1.3	0	10.7	32.0	56.0	0	3.7	13.0	33.3	50.0
Define behavior in observable and measurable terms?	0	1.4	5.4	24.3	68.9	0	0	5.5	16.4	78.2
State intervention goals in observable and measurable terms?	2.7	5.4	12.2	31.1	48.6	0	3.6	3.6	29.1	63.6
Consider biological/medical variables that may be affecting the client?	0	0	6.9	15.3	77.8	1.8	1.8	12.7	29.1	54.5
Research										
Review and interpret research literature?	2.7	27.0	17.6	24.3	28.4	1.8	21.8	30.9	34.5	10.9
Design data collection systems?	20.0	24.0	28.0	14.7	13.3	0	7.3	21.8	32.7	38.2
Plot data that you have collected?	33.8	37.8	13.5	9.5	5.4	0	5.5	9.1	34.5	50.9
Interpret data you have collected?	12.2	10.8	21.6	23.0	32.4	0	3.6	3.6	29.1	63.6
Organize, analyze, and interpret observed data?	8.0	6.7	18.7	29.3	37.3	0	5.5	3.6	27.3	63.6
Arrange independent variables to demonstrate their effects on dependent variables?	20.3	14.9	16.2	20.3	28.4	1.9	16.7	16.7	27.8	37.0
Procedures or techniques produce strong results?	0	0	2.7	44.0	53.3	0	0	5.5	60.0	34.5
Exercise control over behavior? (how often can you control a behavior to occur or not)	0	4.1	14.9	36.5	44.6	1.8	3.6	18.2	45.5	30.9
Describe your procedures well enough so that someone else can replicate or copy your procedure?	0	2.7	4.0	36.0	57.3	0	1.8	10.9	27.3	60.0
Evaluate the effectiveness of the behavioral program?	0	0	8.2	28.8	63.0	0	1.8	7.3	36.4	54.5
Social validity										
Evaluate the accuracy or reliability of your measurement procedures?	10.7	24.0	22.7	26.7	16.0	1.8	14.5	34.5	32.7	16.4
Deal with problems that are socially important?	2.7	1.3	9.3	33.3	53.3	0	0	0	12.7	87.3
Plan for any possible unwanted effects of your intervention?	1.4	8.1	9.5	28.4	52.7	1.8	10.9	20.0	34.5	32.7
Explain concepts using nontechnical language?	0	0	5.3	14.7	80.0	0	3.6	7.3	21.8	67.3
Procedures result in behaviors occurring in new environments and continuing after the formal treatments have ended?	0	6.8	9.6	50.7	32.9	0	0	23.6	40.0	36.4
Arrange for the orderly termination of services when they are no longer required?	6.8	16.2	20.3	16.2	40.5	3.6	20.0	45.5	18.2	12.7
Select intervention strategies based on client preferences?	2.7	13.7	15.1	37.0	31.5	0	0	21.8	41.8	36.4

Table 2
Chi-Square Values for Survey Items

Survey question	<i>n</i>	Chi-square value
How often in your daily work do you/your		
Principles and techniques		
Measure frequency (rate, duration, etc.) of a certain behavior?	130	12.52*
Use reinforcement or reward?	128	4.55
Use punishment?	129	1.69
Use shaping?	130	1.79
Use extinction?	130	12.75*
Use errorless learning procedures?	126	6.77
Use response-independent (time-based) schedules of reinforcement (i.e., noncontingent reinforcement)?	130	15.55**
Use other conditioned reinforcement systems (e.g., clickers)?	130	34.07**
Use procedures that arise from a specific and identifiable theoretical base rather than being a set of packages or tricks?	128	2.65
Deal with behavior that can be measured?	130	13.66**
Program for maintenance of a behavior (ensuring the behavior change will last once the intervention has ended)?	129	3.87
Define behavior in observable and measurable terms?	129	2.07
State intervention goals in observable and measurable terms?	129	5.72
Consider biological/medical variables that may be affecting the client?	127	9.01
Research		
Review and interpret research literature?	129	8.62
Design data collection systems?	130	29.58**
Plot data that you have collected?	129	69.07**
Interpret data you have collected?	129	23.28**
Organize, analyze, and interpret observed data?	130	14.88**
Arrange independent variables to demonstrate their effects on dependent variables?	128	10.02*
Procedures or techniques produce strong results?	130	4.71
Exercise control over behavior? (how often can you control a behavior to occur or not)	129	3.73
Describe your procedures well enough so that someone else can replicate or copy your procedure?	130	3.07
Evaluate the effectiveness of the behavioral program?	128	2.31
Social validity		
Evaluate the accuracy or reliability of your measurement procedures?	130	7.03
Deal with problems that are socially important?	130	18.21**
Plan for any possible unwanted effects of your intervention?	129	6.06
Explain concepts using nontechnical language?	130	4.53
Procedures result in behaviors occurring in new environments and continuing after the formal treatments have ended?	128	8.62*
Arrange for the orderly termination of services when they are no longer required?	129	15.85**
Select intervention strategies based on client preferences?	128	10.24*

* $p < .05$. ** $p < .01$.

analysis for each item, grouped by category. Of the 31 survey items, only 14 items yielded significant results when a chi-square test was conducted comparing the groups, suggesting that these two groups of professionals responded in a similar way for the majority of the items.

The category regarding behavioral principles and techniques contained 14 survey items. Of

those, significant differences in response patterns between groups were found for five of the questions. For example, for the survey item asking, "How often in your daily work do you use other conditioned reinforcement systems (e.g., clickers)?" a significant effect was found, $\chi^2(4, n = 130) = 34.07, p < .01$, with animal behavior professionals indicating they are more

likely to partake in this task than BCBAs. However, of the 14 questions, nine of the survey items were not significant (64.3%), indicating that the groups are using these principles and techniques equally. No significant differences were observed for the survey items regarding the use of reinforcement or reward, $\chi^2(4, n = 128) = 4.55, p = .21$, or punishment, $\chi^2(4, n = 129) = 1.69, p = .79$. Additionally, for the survey item asking, "How often in your daily work do you use procedures that arise from a specific and identifiable theoretical base rather than being a set of packages or tricks?" no significant effect was found, $\chi^2(4, n = 128) = 2.65, p = .45$. Overall, animal behavior professionals and BCBAs are more alike than different in their responses to this set of questions.

Of the 10 items regarding research, 5 demonstrated a statistically significant difference between the distributions of responses when a chi-square test was conducted. For the survey item "How often in your daily work do you design data collection systems?" a significant effect was found, $\chi^2(4, n = 130) = 29.58, p < .01$, with BCBAs reporting that they are more likely to engage in this task. Additionally, a significant effect was also found for the survey item asking, "How often in your daily work do you organize, analyze, and interpret observed data?" $\chi^2(4, n = 130) = 14.88, p = .005$, with BCBAs performing this task more often than animal behavior professionals. There was no significant difference for the survey item regarding "How often in your daily work do you review and interpret research literature?" $\chi^2(4, n = 129) = 8.62, p = .07$, or for the item asking about exercising control over a behavior, $\chi^2(4, n = 129) = 3.73, p = .44$. Overall, the groups were split within this category, with only 50% of the items regarding research strategies differing between these participants.

For the category concerning social validity, four of the seven items yielded statistically significant chi-square tests. For the question asking, "How often in your daily work do you arrange for the orderly termination of services when they are no longer required?" a significant effect was found, $\chi^2(4, n = 129) = 15.85, p = .003$, with the animal behavior professionals planning for termination more often than the BCBAs. Of the 55 BCBAs, only 7 reported planning for terminations of their services very often, whereas of the 74 animal behavior

professionals, 30 reported planning for termination of their services very often. The questions that did not produce significant results include explaining concepts using nontechnical language, $\chi^2(4, n = 130) = 4.53, p = .21$, and planning for any possible unwanted effects of interventions, $\chi^2(4, n = 129) = 6.06, p = .20$. Again, there were more similarities than differences in the reported practice of BCBAs and animal behavior professionals.

Discussion

The results of this survey reveal that there is a lot of overlap between BCBAs' work tasks and those of animal behavior professionals. Overall, the results show that of 31 items to assess the work these professionals are engaging in, 17 questions had no significant difference in their endorsement, suggesting that animal behavior professionals and BCBAs are engaging in similar tasks as they carry out their work.

Within the survey items, there were several interesting and possibly concerning results. For instance, the distribution of responses for the question asking, "How often in your daily work do you use procedures that arise from a specific and identifiable theoretical base rather than being a set of packages or tricks?" was not significantly different for the two groups. It is interesting that both animal behavior professionals and BCBAs both consider their procedures to be from a theoretical base, suggesting a similarity of theory between the two fields. A potentially concerning result was found with the question "How often in your daily work do you arrange for the orderly termination of services when they are no longer required?" This survey item resulted in a significant effect, with the animal behavior professionals endorsing this item more than the BCBAs. Of 55 BCBAs, only 7 reported planning for termination of services very often, whereas 30 of 74 animal behavior professionals reported planning for termination of services very often. This is particularly worrying because the BACB requires the orderly termination of services when they are no longer required as an element of their task list (BACB, 2012). It is plausible that several of the BCBAs were involved in early intervention for children diagnosed with autism

spectrum disorder, in which the intervention does not have a clear termination point. Still, planning for the termination of services seem like important components of behavior-analytic practice.

The results regarding reinforcement and punishment usage were noteworthy as well. There was no significant difference found for either of these techniques, suggesting that both animal behavior professionals and BCBA's are utilizing these behavioral procedures. However, the intriguing aspect of these results was the fact that 96% of animal behavior professionals and 89% of BCBA's implemented reinforcement very often. For punishment, less than 1% of our respondents reported using this technique very often. These results highlight the parallel between professions with an emphasis on reinforcement and simultaneous reluctance to engage in punishment, which is consistent with the ethical guidelines put forth by the BACB.

Several possible reasons could account for the majority of overlap between behavior-change techniques for nonhuman and human animals. First, it is plausible that many individuals, regardless of profession, are using behavior-analytic techniques. Behavioral techniques may have been disseminated to the point that a variety of people are implementing these procedures, even without the explicit endorsement or knowledge of behavior analysts. Since both animal behaviorists and BCBA's have the common objective of altering behavior of their clients, it is not surprising that these professionals are engaging in similar, evidence-based practices to reach this goal.

As with all studies, there are limitations within the present analysis. The sample size of 75 animal behavior professionals and 55 BCBA's is relatively small, but our response rate was high, where we could measure it. Additionally, both samples were composed mostly of Caucasian women; this limited demographic may actually represent the composition of both professions. However, the mean work experience of both groups was similar to each other, which excludes the limitation of one group being more experienced than the other. Furthermore, the survey designed in this study consisted of only 31 items. There are many different techniques these professionals could

be implementing, and a brief survey is not exhaustive.

Future research should replicate with the intent to increase generality by using a broader sample of behavior-change professionals who work with human and nonhuman animals. Additional research may also ask questions focusing on a different set of elements of practice. The questions within this study were derived from the BCBA task list and the seven dimensions of applied behavior analysis (Baer et al., 1968, 1987). A different collection of questions addressing other behavioral techniques may provide a more detailed analysis of this particular issue. Another suggestion for future research would be to use different methods to figure out which techniques and procedures practitioners are using. For example, direct observation of practice may yield a more reliable and valid view of techniques that are employed than self-report methodologies.

The results of the present study demonstrate that animal behavior professionals and BCBA's are using similar techniques to achieve their goals, and they suggest that the theory and knowledge within each discipline may be similar. With this information, there are at least three possible routes the field of behavior analysis could take. The first option is for the field to continue as it is, with the behavior-analytic community failing to acknowledge these animal behavior professionals as participating in the behavior-analytic tradition. Another option could be to develop a training program for animal behavior professionals interested in both ABA and nonhuman animals to allow people to get experience in ABA while still working with animals as their main clients. This type of interaction could be akin to translational research, where application informs the search for basic principles, and basic principles potentially yield more effective intervention (e.g., Mace & Critchfield, 2010). Here, instead of going between true basic research and application, there could be a cross-species continuum, which would potentially enhance the practice in both professions.

A final option would be to integrate these two professions in some manner. To combine the ABA and animal training, open communication must be established between animal behavior professionals and BCBA's. One way for integration to take place is for BCBA's to attend con-

ferences with emphasis on training of nonhuman animals and for behavior professionals to attend BCBA conferences. To make this more likely, coordination should occur so that each group offers relevant continuing education experiences to attract professionals from the other discipline. Another way to integrate the fields is for practitioners in both disciplines to read research literature from the other discipline. By attending each other's conferences and reading research, collaborations could emerge, strengthening the integration of these professions. A main goal of this article is to start a dialogue between these two fields, potentially increasing the scope of behavior analysis and providing a mutually beneficial exchange of research and professional experiences. The application of ABA to nonhuman animals potentially strengthens behavior analysis because it would increase the diversity of application and skills within the field. Incorporating these animal behavior professionals would expand knowledge within the field and broaden the impact of behavior analysis, a recently stated goal of prominent behavior analysts (cf. Friman, 2014; Normand, 2014; Reed, 2014; Schlinger, 2014). An integration of these two areas of expertise would potentially expand the impact of behavior analysis, which may help to support its long-term survival. However, before any formal integration can be achieved, more research is necessary to clarify the skills needed within each profession and to identify the extent of cross-species generality of principles and procedures.

Even though no formal assimilation has occurred between these two disciplines, there is significant work and research being conducted that uses a combination of behavior-analytic procedures to solve socially significant issues by training certain nonhuman animals (e.g., Poling, Weetjens, Cox, Beyene, & Sully, 2010). This body of practical research has successfully utilized behavioral principles, specifically reinforcement, to train giant African pouched rats to detect landmines by smell (Mahoney et al., 2014). The Hero Rats, as they are now known, have cleared upward of 70,000 explosive devices, benefiting more than 900,000 people (Apopo Organization, 2015). This area of research demonstrates the potential that is possible if these two fields collaborate.

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