

Reflections on Historical and Future Aspects of Behavior Analysis

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The Norwegian Association of Behavior Analysis celebrated its 40th anniversary in 2013. At the annual meeting, we arranged a symposium on the historical and future trends in behavior analysis. Ten people agreed to be part of a panel in this symposium. The panel included national and international behavior analysts, both senior and younger behavior analysts and students within the field. The panel members were given 13 questions beforehand so they could prepare their answers. Two of the questions were mandatory, but they could choose three additional questions to answer. The panel members presented a variety of important areas to which behavior analysis has contributed and addressed some of the future impacts behavior analysis may have on society. The panelists' presentations are written as arguments we found to be the most interesting and is not meant to be a direct reproduction of their statements. In the discussion section, we highlight two important areas based on the statements raised by the panelists. Hence, we argue that behavior analysis has great potential and that it is important to improve the interdisciplinary perspective. In conclusion, we suggest some further actions that can be done in time to come.

Keywords: Behavior analysis, historical trends, future trends, interdisciplinary perspective, symposium, Norwegian Association of Behavior Analysis

The year 2013 was the 40th anniversary of the Norwegian Association of Behavior Analysis (NAFO). Coincidentally, it also marked 100 years since the publication of John Watson's founding document of behaviorism, *Psychology as the Behaviorist Views It*. On this occasion, a panel discussion was held at the annual seminar of the Norwegian Association. We wanted to present a discussion of the historical and future aspects of behavior analysis from a Norwegian perspective. A handful of nationally and some interna-

tionally recognized behavior analysts were invited to the symposium. In the following, the different aspects will be discussed in light of the various contributions from the panel members.

An overview of the history of behavior analysis appears in Cooper, Heron, and Heward (2007). There are a number of important publications within behavior analysis; while we will not address all of them, it is impossible not to mention the most pioneering one. In 1968, Baer, Wolf, and Risley described the current characteristics of applied behavior analysis, and they followed up on the same issue 20 years later (Baer, Wolf, & Risley, 1987). The seven characteristics they described are still important for applied behavior analysis: "(1) Applied — the behaviour or stimuli studied are selected because of their significance to society rather than their importance to theory. (2) Beha-

The manuscript is written in English since we had two English speaking panelists. Hence, all the panelists' presentations were given in English. We are thankful to Christoffer Eilifsen, Hanna Steinunn Steingrimsdottir and Steffen Hansen for taking notes during the symposium. In the present manuscript, we used their notes as the basis for our representations of the panel members' responses. However, we are responsible for the text presented, and it is not meant to directly reproduce the panelists' statements.

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vioural — the behaviour chosen must be the behavior that needs improvement, and it must be measurable. (3) Analytic — the analysis requires the demonstration of events that can be responsible for the occurrence or non-occurrence of the selected behaviour. (4) Technological — the interventions must be completely identified and described. (5) Conceptual systems — the procedures for behavior change are described in terms of the relevant principles from which they are derived. (6) Effective — the behavioural techniques must produce effects that are large enough to have practical value. (7) Generality — the behavioural change must be stable over time, appear across situations, or spread to untrained responses" (Arntzen, 2003, p. 45).

Another important issue to mention is the different dimensions of behavior analysis that are described and discussed in the behavior analysis literature (e.g., Cooper et al., 2007; Hawkins & Anderson, 2002; Moore, 2008) and further elaborated with respect to implications and areas of priority for behavior analysis (Løkke, Arntzen, & Løkke, 2012).

It is also important to emphasize the strong position behavior analysis has in Norway. For example, the NAFO was founded one year prior to ABAI (Association for Behavior Analysis International). In Norway, Arne Brekstad has had an invaluable impact on the dissemination of behavior analysis. As professor Douglas Greer has stated, "Arne Brekstad's position in Norway is like what Fred Keller's was in Brazil" (personal communication, December 16, 2005).

The purpose of this paper is to discuss historical and future trends, both national and international, in behavior analysis.

Comments Based on the Symposium

The text is not meant to directly reproduce the panelists' statements but rather written as arguments we found to be the most important ones raised by the panelists.

The participants were given an instruction to prepare an answer for Questions 1 and 2 and pick three other questions from the list to answer (See Table 1). The answers for each question should not exceed 12 minutes. Not all questions were answered. Dr. Erik Arntzen was the chair of the symposium.

Members of the panel

The panel consisted of nine members: (1) Dr. Hank Schlinger (HS), California State University; (2) Dr. Iver Iversen (II), University of North Florida; (3) Dr. Per Holth (PH), Oslo and Akershus University College; (4) Jon Arne Farsethås (JAF), psychologist and president of NAFO; (5) Arild Karlsen (AK), psychologist; (6) Dr. Torunn Lian (TL), Oslo and Akershus University College; (7) Kjetil Viken (KV), MS in Behavior Analysis, Assistant Professor at Lillehammer University College; (8) Trude Hoksørød (TH), Social Educator, Hedmark Habilitation Services; (9) Live Fay Braaten (LFB), MS student in Learning in Complex Systems at Oslo and Akershus University College; and (10) Anne Marie Moksness (AMM), MS in Learning in Complex Systems at Oslo and Akershus University College.

Questions

1 What do you believe are the most important developments in behavior analysis over the last 50 years?

II started out by stating that important developments are not necessarily positive. On the positive side is the extension of operant behavior control to new settings. Operant principles have been applied in schools, clinics, and zoos, among other places. The application of stimulus equivalence, stroke treatment, and the Food Dudes program are examples. Such extended application serves as an external validation of the operant principles developed in the laboratory. In contrast, the anti-Skinnerian culture developed in the laboratory at Harvard University has been negative. A culture seems to have developed in which students

Table 1. Questions for the Symposium.

1.	What do you believe are the most important developments in behavior analysis over the last 50 years?
2.	What do you think are the biggest challenges for behavior analysis in the future?
3.	Behavior analysts often claim that behavior analysis is superior to other approaches and has “all the evidence”. However, the number of behavior analysts remains relatively low. Why do you think the number of actual behavior analysts is low?
4.	In 1996, E. G. Carr wrote: “We spend much time decrying the fact that society does not listen to us. The real question, however, is why have we not listened to society? We have much to offer. Nonetheless, until we make it clear that we too cherish society’s highest values, speak its language, and are sensitive to its political yearnings, we should expect to be ignored; and we will be....” Have there been any improvements in the last 15 years concerning this statement? If so, can you give some examples?
5.	If you could recommend one particular area or topic to focus on at present, as Carr suggests, “listen to society.” What would that be?
6.	From a Norwegian perspective, do you have any thoughts on individual cases in the past that may have influenced the development of behavior analysis in Norway (particularly media issues) in either positive or negative ways?
7.	One could assume that conceptual BA, experimental BA, translational BA, applied BA, and service delivery are coherent subsystems in BA. Are all subsystems essential for the development of BA – if so, why? If not, then, why?
8.	Radical behaviorism is “radical” in the sense that it includes private behavior. What position should research and applied behavior analysis, including private behavior, take in the future? What would be the reason for the low number of publications on private behavior?
9.	Service delivery and applied behavior analysis are important pillars in a cumulative science of behavior; what could be done to increase the use of N=1 designs and their credibility in clinical practice?
10.	There is an ongoing debate about whether behavior analysts should consider neuroscience relevant to our practice and analyses. How do you view the possibility of and interest in cooperation between behavior analysts and neurologists in the future?
11.	A general adoption of a functionalistic psychology seems to emerge with ACT; what else could be done to promote applied behavior analysis? Alternatively, will behavior analysis be an autism-psychology in the future?
12.	Some areas in behavior analysis are almost completely “silent”, in spite of active research in traditional psychology on the same research questions. One such example is “self-editing” which is an active field in psycholinguistics. Is there hope for change in some areas in behavior analysis in the future?
13.	In spite of several conference contributions on “Saving the planet with BA”, the effects are miniscule. Should behavior analysts be trained in self- management as a first step in changing the world?

Note. Per Holth attended the symposium for the first question only.

of Skinner wanted to dispute his work instead of trying to build on the data that had previously been collected. William Baum and Howard Rachlin’s molar behaviorism, Breland and Breland’s article *Misbehavior of Organisms*, Richard Herrnstein’s debate with Skinner in *The American Psychologist*, and John Staddon’s work on superstition are examples. This culture most likely led to the

closure of the Harvard laboratory and is the reason there is no behavior analytic activity in the animal laboratory at Harvard today. II argued that this has had a negative impact on behavior analysis as a field.

AK followed up by asserting that one of the most important developments has been autism reversal or early intervention with children with autism, in which Ole Ivar

Lovaas was a pioneer. The application and development of single-subject designs in this field has been central. Skinner's book *Verbal Behavior*, influenced by Wittgenstein, has been important. Richard Dawkins' writings on biology have been of importance. The article *Selection by Consequences* was the most influential article published in behavior analysis since Baer, Wolf, and Risley's *Some Current Dimensions of Applied Behavior Analysis*.

PH started by mentioning an article published in *Psychology Today* (1982) in which various prominent psychologists were asked the same type of question. The answers varied. Psychologist Stanley Milgram replied that the most important development in psychology in the last 50 years was teaching sign language to apes. Another prominent psychologist answered that the most significant development was discovering that it was not possible to teach apes sign language. Others cited the importance of the discovery of endorphins. However, it can be argued that the credit for the research into this field should go to pharmacology and that the development of knowledge about the discovery of endorphins has little or nothing to do with psychology. Skinner was also asked this question for the article, and he answered that the most important development was the experimental analysis of behavior. In contrast, the cognitive psychologist Jerome Bruner cited psychology's recent freedom from the experimental analysis of behavior as the most essential development of the last 50 years. This lack of agreement supports the idea that John B. Watson may have been mistaken when he proclaimed in his Behaviorist Manifesto that psychology should be the science of behavior. Skinner also wanted the science of behavior to be the science of psychology, at least according to the book *About Behaviorism* in 1974. One of psychology's challenges is that it tries to answer very different types of questions. The questions concern (1) the immediate antecedent of events, (2) the disposition of the entities, (3) the mediational mechanism

involved in the causal chain, and (4) historical variables relevant to the events of entities. Behavior analysis is most concerned with the last issue, while other branches of psychology are mostly concerned with the others. It is vital to recognize the differences among the questions that are raised. The differences in the types of question that are asked have only become more evident in the last 50 years. The conclusion is that behavior analysis should be a science separate from psychology.

KV emphasized the following important events related to experimental and conceptual behavior analysis: (1) Skinner's publications; (2) molar behaviorism; (3) research on complex schedule preparations, in which B. F. Skinner and Richard Herrnstein have been central characters; (4) matching law; (5) behavioral economics; (6) delay discounting; (7) behavioral pharmacology; (8) research on variability and extinction; (9) conceptual work concerning motivating operations, in which Jack Michael has been central; (10) Murray Sidman's development of stimulus equivalence and the subsequent development of relational frame theory; and (11) in Norway, Terje Sagvolden's work on AD/HD rat strains. The works of Per Holth, Erik Arntzen and Svein Eikeseth have also been influential. Furthermore, important events concerning translational and applied behavior analysis include (1) the publication of Baer, Wolf, and Risley's *Some current dimensions of applied behavior analysis*; (2) Ole Ivar Lovaas's development of early intervention for children with autism; (3) the shift in early intervention from discrete trial training to incidental teaching and pivotal responses; and (4) work on generalization, especially the 1977 article *An implicit technology of generalization* by Trevor Stokes and Donald Baer; (5) the toilet training program developed by Nathan Azrin and Richard Foxx; (6) Ogden Lindsley's work on fluency and the development of precision teaching; (7) Brian Iwata's group in Florida and the work on functional analysis; (8) the publication of Cooper, Heron, and Heward's book *Applied Behavior Analysis*; (9) the shift

from consequence-based interventions to more complex ones, including PALS (*positiv atferd, støttende læringsmiljø og samhandling*) and others; and (10) third-wave behavior therapies, including ACT (Acceptance and Commitment Therapy). Furthermore, KV noted that in Norway, Arne Brekstad, Børge Holden, Gunn and Jon Løkke have played important roles in disseminating applied behavior analysis.

AMM stated that the main reason to discuss important events in behavior analysis within the last 50 years in the first place is behavior analysis's role in improving human lives. The development of universal laws of behavior and units of analysis based on orderly relations between the environment and behavior has been essential in improving behavior. Within the last 50 years, there have been important advances in our knowledge of the stimulus control of complex human behavior. One such development is the Murray Sidman formulation of stimulus equivalence, which led to a behavior analytic conceptual framework in an area that previously was considered the domain of cognitive psychology. Stimulus equivalence was once controversial, but it is now accepted by behavior analysis. In addition to providing a conceptual framework for understanding complex human behavior, stimulus equivalence has been applied in a number of important areas outside of the laboratory. This application has served to vary academic skills and methods for understanding cognitive deficits and to develop methods to counteract such deficits.

TH listed the following significant developments: (1) precision teaching, (2) staff training, and (3) ART (Aggression Replacement Training). She also emphasized that in Norway, Børge Holden, Jørn Isaksen, and Are Karlsen have been vital in disseminating behavior analysis.

JAF emphasized the increased interest in motivational operations as the most important development in behavior analysis in the last 50 years. Looking into further develop-

ments in behavior analysis during the last decades, an analysis of several volumes of JABA (Journal of Applied Behavior Analysis) found an emphasis on autism and/or mental retardation. The volumes are 1970, 1980, 1990, 2000, 2010, and 2012. Furthermore, the articles in those volumes have been grouped according to three categories (autism, developmental disabilities and other) and arranged according to proportion. From 1970 to 2012, there was a slight decrease in the number of articles about developmental disabilities. The categories autism and other, however, have changed places; initially, the number of autism-related articles was small, but autism became the dominant topic in the 2012 volume of JABA. This change indicates that the articles published in JABA are much less varied in subject than they once were. Behavior analysis needs to recover its sense of adventure, and its advocates must once again be entrepreneurs and start applying their principles in varied settings. Schools and kindergartens are as relevant to behavior analysis as autism treatment centers are.

LFB started by saying that behavior analysis has grown during the last 50 years, both in the number of principles the science employs and in the fields in which these principles are deemed relevant. The increased application of behavior analysis principles extends to the fields of developmental disabilities, autism, contingency management in drug treatment and parental skill training. Research on complex human behavior that involves establishing operations, rules, and stimulus equivalence has been important. Stimulus equivalence research has been especially important, as it has brought behavior analysis into a field of complex human behavior research, including research on memory and problem solving, that was previously dominated by cognitive psychology. The establishment of JEAB (Journal of the Experimental Analysis of Behavior) (1956) and JABA (1968) has been tremendously important. It may be illustrative to list the three most frequently downloaded

articles from the JABA archives: (1) Baer, Wolf and Risley's *Some current dimensions of behavior analysis*; (2) Friman's review of the book *Applied behavior analysis* by Cooper, Heron, and Heward; and (3) Hanley, Iwata, and McCord's *Functional analysis of problem behavior: A review*. Furthermore, the article by Baer et al. (1968) has over 5000 downloads, has been cited more than 2000 times, and has long provided guidelines for the field of behavior analysis. The article could be considered the most important in behavior analysis in the last 50 years. The establishment of several academic programs in behavior analysis has been important for behavior analysis in Norway. The bachelor's degree programs in social welfare (*vernepleier*) at HIOA and HIOF, the learning psychology bachelor's program at HIOA, and the Master in Learning in Complex Behavior are noteworthy. In addition, NAFO has been an important organization for behavior analysis in Norway.

HS examined the contribution of behavior analysis to our culture. The most important development has been autism treatment. Autism treatment has made people aware of behavior analysis and has shown that behavior analysis can provide results in an area where other methods have had limited efficacy. Regarding the experimental analysis of behavior, a challenge today is that much of the research presented in JEAB is not easy to understand and it seems to be written for only experts. Fifty years ago, articles were much shorter and much easier to read. There is a need for increased focus on translational research in the experimental analysis of behavior. In the conceptual field, an important development has been the application of the fundamental unit of analysis to interpret complex human behavior, such as memory, perception and consciousness. The fundamental unit of analysis (the three-term contingency) has been tremendously important for behavior analysis. Psychology does not have such a unit, but behavior analysis does.

TL closed the discussion of Question 1 by asking what society would say was the most important development in behavior analysis in the past 50 years. She asserted that society would most likely say that autism treatment is by far the most important development and that we should be proud of this.

2 *What do you think are the biggest challenges for behavior analysis in the future?*

KV started by pointing to two major challenges for behavior analysis: first, that it is viewed as sectarian, and second, that the principles of the field are only relevant for animals and humans with language deficits. Proponents must communicate that this is not the case, and to do so, we need to speak in a language that is more understandable outside of the field. Cooperation with other professions, such as teachers, nurses, and business environments, is necessary. One solution is to focus on the third-wave behavior therapies, such as ACT. In doing so, it is important not to lose fundamental units of analysis and methodology. A problem is that many ACT therapists, for example, are unable to conduct a functional analysis of behavior. More people with a classical behavior analytic background must join the ACT movement.

HS underlined that we must start conducting research in the experimental analysis of behavior that the culture understands and values. Money will not be available for esoteric research. There also has to be a greater focus on basic experimental research. The death of the experimental analysis of behavior will also be the death of applied behavior analysis. Applied behavior analysis has to expand beyond autism treatment. Such an expansion must be into fields that the culture values. What made the expansion into autism treatment possible? Primarily, the evidence-based nature of the treatment permitted its application to autism. The culture's experience with behavior analysis's success in autism treatment is a big foot in the door.

AMM said that the challenges for behavior analysis have remained constant for many years. Behavior analysis remains small and has limited influence. An important goal is to influence society's influencers. A challenge is the lack of jobs for behavior analysts outside of the fields of autism and developmental disabilities. Students of behavior analysis who are unable to secure jobs that allow them to work with the principles of behavior analysis will eventually stop being behavior analysts, at least in the workplace. Solutions to these challenges may include lobbying politicians and other influencers, establishing more extensive connections between institutions that educate behavior analysts and employers, and increasing the focus on translational research. Translational research should address fields that society values, such as primary medical care and pediatrics.

TL talked about the importance of ensuring that the different domains of behavior analysis remain coherent and cooperative. The four domains are service delivery based on behavior analytic principles, conceptual behavior analysis, applied behavior analysis and experimental behavior analysis. A split between these domains would be terrible. Another challenge is to establish more good research labs where researchers can conduct experimental analyses of behavior. An independent basic research program for behavior analysis is also important. While collaborations with other fields, such as cognitive psychology and neuroscience, may be advantageous, there is no guarantee that behavior analysis will receive any credit for such collaborations. The research may just be considered part of the field we cooperate with.

AK asserted that as behavior analysts, we must be able to convince teachers and social workers of the environment's effect on behavior. One strategy is to discuss behavior analysis with ordinary people, including on social media. Another strategy is to expand into the area of teaching machines.

II followed by arguing how behavior analysis should not give in to the line of thought that considers statistics the most important method of proof. This approach is a threat when behavior analysts publish in non-behavioral journals that require the use of statistics. In such settings, it is also important to avoid using hypothetical entities as explanations. While it is possible to analyze behavior using group averages and statistics when first analyzing behavior in single-subject designs, it is not possible to go the other way. Using a group approach in this way will result in the loss of important information about environment-behavior relationships. That said, it is essential that behavior analysts publish outside behavior analysis and further expand the science into new fields, such as memory, problem solving and language. Again, we must be careful not to use these terms as explanations of behavior. It would be smart for behavior analysts to invite journalists to their meetings. The media must be made aware of behavior analytic interventions such as Taub stroke treatment, Mamacare, pain management, biofeedback techniques, and applications of stimulus equivalence.

TH highlighted that the major challenge for behavior analysis is that the public knows so little about the field. It is rare to meet anybody who knows about behavior analysis. Behavior analysis must expand into new fields; Løkke's work with people with dementia and the work on AD/HD conducted in Hedmark are important recent examples of this. It is generally important to speak about behavior analysis to the outside community in an understandable language and to publish in mainstream journals. It is decisive to prove to the world that behavior analysis is a powerful tool that works.

JAF pointed out that the biggest challenge for behavior analysis is the world's lack of understanding of the field. He said that he personally had influenced more people during dog-training courses than in his day job in autism treatment. Conceptually,

the challenge is to address complex human behavior. One must have a convincing explanation for the occurrence of such behavior. It is clear that for now, behavior analysis does not provide the answers about behavior that people want. Lost ground concerning the possible applications of behavior analysis must be recovered. It is not good enough for behavior analysis to be relevant only in the fields of autism and developmental disability.

LFB underlined that behavior analysis must strive to become more accessible. Behavior analysts must publish in non-behavioral journals without straying from its core scientific principles. Collaborations with other fields are crucial, and one should strive to lower the linguistic barriers between behavior analysis and other areas of psychology. It is also vital to avoid division among the applied, conceptual, and experimental domains of behavior analysis.

HS commented on the other speakers by talking about the wide use of operant conditioning in neuroscience and how neuroscientists acknowledge the effects of behavior analytic procedures. However, behavior analysis operant conditioning is more than procedures; rather, it is an explanatory system for complex behavior. Behavior analysis must be presented to others not just a tool, but also a conceptual system. Furthermore, the term single-subject design is misleading. When talking about such experimental designs, the focus should be on the design's logic. Finally, why did "other" and "autism" trade places as the primary research topics published in JABA (as JAF mentioned earlier)? The answer to this question may hold the key to all the challenges of behavior analysis.

Comments and questions from the audience. Steffen Hansen (audience member): Were the challenges in behavior analysis the same 20 years ago as they are today?

II replied that in his experience, there were fewer conceptual debates 20 years ago. The discussions were centered much more on data from basic research.

HS commented that behavior analysis was also engaging in self-reflection 20 years ago as for example, the article *What happened to analysis in applied behavior analysis?* by Pierce and Epling, an article by Malagodi, and Skinner's reflection on *The happy few*.

Christoffer Eilifsen (audience member): Are behavior analysis's ambitions too high? Should behavior analysts be content with specializing in some selected fields that the mainstream already considers relevant?

JAF replied that there might be something to this. Behavior analysts have tried to behavioralize the culture. We will not succeed in doing this. We are, however, more welcome in more places than we were 20 years ago. We are not popular, but we are considered necessary.

KV answered with a simple "no". Behavior analysis must expand. Specifically, third-wave therapies, such as ACT, should be expanded. Too little has happened in the last 20 years.

3 Behavior analysts often claim that behavior analysis is superior to other approaches and has "all the evidence". However, the number of behavior analysts remains relatively low. Why do you think the number of actual behavior analysts is low?

LFB focused on what she considers the misrepresentation of behavior analysis in textbooks. Thorndike, Tolman, Pavlov, and Skinner are often treated together as representatives of an outdated paradigm of behaviorism. Textbooks that are more accurate must be published, and behavior analysts must teach psychology and behavior analysis in fields where behavior analysis is misrepresented or has a low profile. Educational facilities for teachers, social workers, and other related professionals are good examples of such arenas.

HS comments on this by pointing out the possibility of changing textbooks. Previously, a committee in the ABA was dedicated to this. Mostly, authors were highly sensitive to the suggestions made and changed their text accordingly. If you observed errors or misre-

presentation in textbooks, it was a low-cost intervention just to write to the author and very politely suggest some changes.

TH talked about the variations in *vernepleier* education in Norway and how it differs from college to college in its behavior analytic content. The practicum (internships) of students also varies considerably, with only a few groups of supervisors providing behavior analytic practicums. To increase the number of behavior analysis practicums, it is of great importance that books and papers are published in mainstream channels and that behavior analysts speak a language that people understand. Behavior analysts must also join public debates and generally adapt to trends in society. There are approximately 1000 behavior analysts in Norway. It is clear that the other 5 million people in the country will not follow us; instead, we must reach out to them.

TL was concerned about the uneven knowledge of theory and practice (meaning conducting experiments) among behavior analysts. It is impossible only to read up on behavior analysis. The lack of basic research laboratories is a barrier to increasing the number of people in behavior analysis. The competition from other paradigms within psychology is enormous. The fact that behavior analysis in some applied fields is immediately useful to society is not enough to ensure the field's growth. The application of behavior analytic principles must go hand in hand with a strong basic experimental analysis of behavior.

AK's opinion of why there are so few behavior analysts is that society's punishment has pushed them away from behavior analysis. Expanding the field is important to combat unscientific approaches whenever they are encountered.

KV commented on this by suggesting that NAFO maintain a database. It is important for behavior analysts to pay attention to relevant literature published outside of NTA (Norwegian Journal of Behavior Analysis) and eMAA (eMagazine of Behavior Analysis).

Publications outside of these channels should be rewarded within behavior analysis.

II picked up on the earlier talk about mainstream publication. He agreed with earlier comments about the misleading nature of the term single-subject or single-case design. The $N=1$ design expression is even worse. The $N=1$ term is actually taken from statistics, and means one data point. Such an expression is highly irrelevant for behavior analytic research, where many data points are collected over time. Behavior analysis reports must communicate that the subject is exposed to different experimental conditions and acts as its own control. Single-case designs have received increased attention from medical science recently, providing a great opportunity for behavior analysts to publish in medical journals. Behavior analysts must also be aware of the power of group designs. Such designs may serve to further validate single-subject studies and may convince influencers and the public of a procedure's effects. The Food Dudes program in the United Kingdom is a good example of the combination of single-subject research and group studies that led to the large-scale implementation of a behavior analytic intervention package. One should not back away from conducting group studies, at least not when they might increase the reach of behavior analysis.

HS commented that before 1940, all research within psychology was single-subject research. Group designs appeared under the influence of logical positivists and statisticians. Some problems are better approached by group designs, while others are best addressed with single-subject designs. Researchers must be able to identify which design is appropriate. Group designs may be useful for acquiring funding.

AK mentioned that in 1992, he was the only Norwegian behavior analyst to publish in a medical journal. He published an article about selection by consequences, which describes the three levels of selection without resorting to immaterial processes.

6 From a Norwegian perspective, do you have any thoughts on individual cases in the past that may have influenced the development of behavior analysis in Norway (particularly media issues) in either positive or negative ways?

AK listed some well-known cases in Norway and that he believed that most of the opinions on the different cases seem to be the result of truth by consensus. He concluded that this is a general problem with opinions within the behavior analytic community.

8 Radical behaviorism is “radical” in the sense that it includes private behavior. What position should research and applied behavior analysis, including private behavior, take in the future? What would be the reason for the low number of publications on private behavior?

HS emphasized that in behavior analysis, it is a common claim that behavior does not stop at the boundary of the skin. One draws a distinction between currently unobserved entities and entities that are unobservable by definition. There are at least three ways of dealing with unobserved behavior and events: (1) Do not address them at all (this is the approach proposed by Willam Baum and Howard Rachlin); (2) Address them through interpretation; or (3) Directly manipulate them, or at least apply a procedure that approximates direct manipulations (talk-aloud procedures would be an example of such a procedure).

KV continued that behavior analysis's failure to approach the issue of private behavior is problematic. There have been unfortunate disagreements on how to address that kind of behavior within behavior analysis. Future research should focus on the effects of language on behavior. An example of such a research program is relational frame theory's approach to language and, as an extension, emotion and cognition.

HS commented that RFT has generated considerable excitement. However, many of the claims that have surfaced must be better justified. Of course, this may happen in the

future. The theoretical proclamations have been very bold. Some of the statements made in relation to both research on relational frames and stimulus equivalence seem to eventually imply something cognitive (hypothetical). An alternative approach is to view language as the dominating explanation of relational framing and equivalence response.

TL mentioned that the existence of unmediated stimulus equivalence does indeed seem unlikely. However, studies within the equivalence tradition do show the importance of multiple exemplar training on complex behavior.

AK followed up by stating that, for example, *resistance behavior* always ends up being private. Resistance training is not about punishment, but is conducted to protect the person from punishment. Psychiatrists punish many private behaviors. Behavior analysts should be more active in developing and applying non-punishment-based procedures aimed at private behavior for use in psychiatry settings.

10 There is an ongoing debate about whether behavior analysts should consider neuroscience relevant to our practice and analyses. How do you view the possibility of and interest in cooperation between behavior analysts and neurologists in the future?

JAF stated that behavior analysis has a paradoxical attitude toward biology. It considers itself part of biology but is not very fond of it. However, it is not possible to stop a boy from opening his toys to see how they work. Working with neuroscience is a do-or-die prospect for behavior analysis. A collaboration with neuroscience may also bring more conceptual unity to behavior analysis, for example, by solving the respondent-operant debate.

KV commented with a question, “What will actually happen once we know the neural mechanisms of reinforcement?”

JAF replied that new methods of teaching will be developed.

AMM followed up on this and argued that a scientific understanding of ourselves as humans can occur on different levels. A question is whether neuroscience can say anything about functional relationships between behavior and the environment. A relevant line of research is ERP (event-related potential) studies of private events, which produce EEG (electroencephalogram) measurements that are similar regardless of whether verbal behavior is covert or overt. Additional studies of interest to behavior analysis are ERP studies on EEG activity related to stimuli within stimulus equivalence classes, which provide additional evidence for class formation. While much of neuroscience relies on group data, this is not necessarily the case for ERP studies using EEG measurements. If functional relationships related to individual organisms are obtained, neuroscience may be very useful and may provide supplementary evidence supporting behavior analytic principles.

TL and KV both commented and agreed on this: Neuroscience should have the status of a supplemental measurement. The independent and dependent variables are different. Neuroscience may not produce any new knowledge relevant to behavior analysis.

AMM mentioned that collaboration with neuroscience may not necessarily produce new knowledge but may be strategically important for behavior analysis.

HS continued further that neuroscience will lead to a more complete understanding of both behavior and being a human. However, knowledge gained from neuroscientific research may not necessarily add anything to the prediction and control of behavior. It is important not to dismiss or disregard neuroscience, and it may be useful for confirming the principles from the science of behavior.

II noted that behavior analysis can also contribute to neuroscience. Behavioral procedures for better controlling behavior are important to neuroscience. An example is procedures for systematically influencing

EEG measurement patterns in ALS (Amyotrophic Lateral Sclerosis) patients to allow them to move a mouse cursor on a computer. Behavior analysis may also spread and educate people about single-subject designs. II added that he felt he could contribute to neuroscientific research with such methods without having an extensive knowledge of the brain.

Discussion

We will not echo the answers above; rather, we will comment on two areas we find of special interest. The first is about interdisciplinary collaboration, and the second is related to the number of behavior analysts and the dissemination of behavior analysis. A number of the panel members commented on the importance of behavior analysis collaborating with other disciplines. We will emphasize the distinction between interdisciplinarity and eclecticism. Eclecticism would blur the strengths of the disciplines and would not be good for the science. Interdisciplinary collaboration is important and useful (e.g., Sidman, 2002), and such collaboration has shown to be very effective (e.g., Brady, 1993).

Furthermore, "... behavior analysis should continue to be seen as a coherent, but distinct, science. It is quite different from psychology in general, and from (1) developmental psychology, (2) organizational psychology, (3) social psychology, etc. To have behavior analysis as a coherent and distinct science is one of its strengths — there is only one behavior analysis" (Arntzen, 2012, p. 9). Hereafter, as mentioned previously, it is important to underline the mutual dependence of all of the dimensions of behavior analysis. As Sidman (2011) argued, findings within experimental analysis of behavior are important for applied behavior analysis, while Epling and Pierce (1986) underscored that applied behavior analysis is important for experimental behavior analysis. Researchers within behavior analysis have also talked about

the importance of bridge studies (Hake, 1982; Wacker, 2000, 2003) and translation studies (Critchfield & Fienup, 2013; Green, Myerson, & Critchfield, 2011; McIlvane, 2010). A favorite example of this type of work is by Poling and coworkers (Poling, Weetjens, Cox, Beyene, & Sully, 2010), who trained giant African pouched rats to detect landmines. Additionally, Taub's work (e.g., Iversen, 2013; Taub, 2012) on improving motor deficits produced by brain damage in stroke patients is an important area of research.

The flight from behavior analysis to other areas, such as mainstream psychology or areas associated with mentalistic thinking, has long been commented on and discussed within the field (e.g., Baer, 1981; Branch & Malagodi, 1980; Michael, 1980). Furthermore, both Skinner (1959) and Catania (1981) have written about the flight to mathematic models (see the special issue in the *European Journal of Behavior Analysis*, 2013), for example. The question of how to prevent the flight from behavior analysis is very difficult to answer simply. Nevertheless, we will argue that a further focus on all the dimensions of behavior analysis in university programs for undergraduates and graduate students is one important issue. Furthermore, universities should more actively encourage experimental behavior analysis, and organizers of conferences within behavior analysis should ensure that all dimensions of behavior analysis are represented.

Conclusion, with suggestions for further action

We would like a society in which behavioral analysis is a central part of the culture's design. We would like behavioral analysts to promote welfare and help implement socially significant contingencies within society. We believe that in behavioral analysis, we have an ethical, humane and effective technology based on a solid foundation of science, yet our field is still viewed as harmful or as an old psychological direction; at best, it is ignored.

A suggestion that often is raised is if we should speak differently; in particular, should we speak less technically? We will argue that we need to do both; in some contexts, we need to speak in a very technical and sophisticated manner, while in other contexts, we should speak in a more understandable way without ignoring the behavior analytic principles. Another issue that has been discussed is the need to increase the number of publications in journals outside the behavior analytic community. For example, it will be interesting to see what type of influence the newly published two-volume *APA Handbook of Behavior Analysis* (Madden, Dube, Hackenberg, Hanley, & Lattal, 2013a, 2013b) will have on people outside of the behavior analysis community.

In Norway, a new generation of behavior analysts is upcoming, and much has happened in the last few years' concerning education and new applied areas. There is nobody knocking on our door; we must start to collaborate and work with people from other disciplines, and we certainly have to pick up on the important social issues, address them and show our results. Perhaps we should select particular, appropriate people to conduct part of the business.

The purpose of NAFO is to help spread behavior analysis, and the association has been and still is doing several things to that end, such as presenting the annual conference, publishing behavioral journals such as *NTA* and *EJOBA* (*European Journal of Behavior Analysis*), and supporting various activities. There is a delicate balance between being intrusive and smoothly promoting our field when conveying our message. It is of great importance that we show results where they matter to society while at the same time continuing to work with the groups of people we have traditionally worked with and who have most benefitted from behavior analysis; for example, people with autism. Moreover, we must continue to work hard on experimental, applied and conceptual knowledge so that we can cooperate with each other and

others. Although the applied area has had the most impact in Norway, all of the areas of behavior analysis are mutually dependent on each other.

To conclude, we have all the potential to survive and expand as a science. It is important that behavior analysis remain a coherent science while we adopt an interdisciplinary approach.

References

- Arntzen, E. (2003). Assessment in Applied Behavior Analysis. In R. F. Ballesteros (Ed.), *Encyclopedia of psychological assessment* (pp. 45–49). London: Sage Publications.
- Arntzen, E. (2012). Some thoughts on the future of behavior analysis. *Inside Behavior Analysis*, 4, 8–10. Retrieved from <http://www.abainternational.org/abai/newsletters/iba-february-4-%281%29.aspx>
- Baer, D. M. (1981). A flight for behavior analysis. *The Behavior Analyst*, 4, 85–91. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2741916/pdf/behavan00073-0003.pdf>
- Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, 1, 91–97. doi: 10.1901/jaba.1968.1-91
- Baer, D. M., Wolf, M. M., & Risley, T. R. (1987). Some Still-Current Dimensions of Applied Behavior Analysis. *Journal of Applied Behavior Analysis*, 20, 313–327. doi: 10.1901/jaba.1987.20-313
- Brady, J. V. (1993). Behavior analysis applications and interdisciplinary research strategies. *American Psychologist*, 48, 435–440. doi: 10.1037//0003-066X.48.4.435
- Branch, M. N., & Malagodi, E. F. (1980). Where have all the behaviorists gone? *The Behavior Analyst*, 3, 31–38. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2741806/pdf/behavan00074-0032.pdf>
- Catania, A. C. (1981). The flight from experimental analysis. In C. M. Bradshaw, E. Szabadi & C. F. Lowe (Eds.), *Quantification of steady-state operant behaviour* (pp. 49–64). Amsterdam, Holland: Elsevier/North Holland Biomedical Press.
- Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied Behavior Analysis* (2nd ed.). Columbus, Ohio: Pearson Merrill Prentice Hall.
- Critchfield, T. S. (2011). Translational Contributions of the Experimental Analysis of Behavior. *The Behavior Analyst*, 34, 3–17. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3089409/pdf/bhan-34-01-3.pdf>
- Critchfield, T. S., & Fienu, D. M. (2013). A "happy hour" effect in translational stimulus relations research. *Experimental Analysis of Human Behavior Bulletin*, 29, 2–7. Retrieved from <http://www.eahb.org/2013/03/a-happy-hour-effect-in-translational-stimulus-relations-research/>
- Epling, W. F., & Pierce, W. D. (1986). The basic importance of applied behavior analysis. *The Behavior Analyst*, 9, 89–99. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2741882/pdf/behavan00062-0092.pdf>
- Green, L., Myerson, J., & Critchfield, T. S. (2011). Introduction to the special issue: Translational research on discounting. *The Psychological Record*, 61, 523–526. Retrieved from <http://www.springer.com/psychology/journal/40732>
- Hake, D. F. (1982). The basic-applied continuum and the possible evolution of human operant social and verbal research. *The Behavior Analyst*, 5, 21–28. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2742021/pdf/behavan00070-0023.pdf>
- Hawkins, R. P., & Anderson, C. M. (2002). On the distinction between science and practice: A reply to Thyer and Adkins. *The Behavior Analyst*, 25, 115–119. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2731590/pdf/>

- behavan00007-0117.pdf
- Iversen, I. H. (2013). Constraint-Induced therapy as behavior analysis neurorehabilitation intervention: an interview with dr. Edward Taub. *European Journal of Behavior Analysis, 14*, 361–384. Retrieved from <http://www.ejoba.org/>
- Løkke, J. A., Arntzen, E., & Løkke, G. E. H. (2012). Indeling av atferdsanalysen i subsystemer eller arbeidsområder. *Norsk Tidsskrift for Atferdsanalyse, 39*, 63–71. Retrieved from <http://www.nta.atferd.no/journalissue.aspx?IdDocument=308>
- Madden, G., Dube, W. V., Hackenberg, T. D., Hanley, G. P., & Lattal, K. A. (Eds.). (2013a). *APA handbook of behavior analysis: Methods and principles* (Vol. 1). Washington, DC: American Psychological Association.
- Madden, G., Dube, W. V., Hackenberg, T. D., Hanley, G. P., & Lattal, K. A. (Eds.). (2013b). *APA handbook of behavior analysis: Translating principles into practice* (Vol. 2). Washington, DC: American Psychological Association.
- McIlvane, W. J. (2010). Translational behavior analysis: From laboratory science in stimulus control to intervention with persons with neurodevelopmental disabilities. *The Behavior Analyst, 32*, 273–280.
- Michael, J. (1980). Flight from behavior analysis. *The Behavior Analyst, 3*, 1–21. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2741836/pdf/behavan00075-0003.pdf>
- Moore, J. (2008). *Conceptual Foundations of Radical Behaviorism*. New York: Sloan Publishing.
- Poling, A., Weetjens, B. J., Cox, C., Beyene, N. W., & Sully, A. (2010). Using giant african pouched rats (*Cricetomys gambianus*) to detect landmines. *The Psychological Record, 60*, 715–728. Retrieved from <http://www.springer.com/psychology/journal/40732>
- Sidman, M. (2002). Notes from the beginning of time. *The Behavior Analyst, 25*, 3–13. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2731602/pdf/behavan00007-0005.pdf>
- Sidman, M. (2011). Can an understanding of basic research facilitate the effectiveness of practioners? Reflections and personal perspectives. *Journal of Applied Behavior Analysis, 44*, 973–991. doi: 10.1901/jaba.2011.44-973
- Skinner, B. F. (1959). The flight from the laboratory. In B. F. Skinner (Ed.), *Cumulative record* (pp. 242–257). New York, NY: Appleton-Century-Crofts.
- Taub, E. (2012). The behavior-analytic origins of constraint-induced movement therapy: an example of behavioral neurorehabilitation. *The Behavior Analyst, 35*, 155–178. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3501420/pdf/bhan-35-02-155.pdf>
- Wacker, D. P. (2000). Building a bridge between research in experimental and applied behavior analysis. In J. C. Leslie & D. E. Blackman (Eds.), *Experimental and applied analysis of human behavior* (pp. 205–234). Reno, Nevada: Context Press.
- Wacker, D. P. (2003). Bridge studies in behavior analysis: Evolution and challenges in JABA. *The Behavior Analyst Today, 3*, 405–411. Retrieved from <http://www.baojournal.com/BAT%20Journal/BAT-Journals-2009.html>