

Operants

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Why Darwin?





**from the
president**



In talking with colleagues and friends, I often encounter questions about the “mind.” Like most behavioral scientists, B. F. Skinner did not believe in a non-material mind. Of course, people have brains, but brains are physical parts of our bodies. Our brains are complex, but their activities are part of the natural world. New technologies have made it possible to see what goes on inside our brains. When researchers look into a brain, they see activity. The parts of the brain that light up depend upon the contingencies researchers set up in their experiments. Neuronal activity is behavior. Even single neurons can be conditioned to fire, and they stop firing when reinforcement is no longer forthcoming. Like the behavior of any other part of our body, brain activity is determined by genetic and environmental factors. Skinner would have loved to have seen contingencies operating even inside our brains.

**Julie S. Vargas, Ph.D.
President, B. F. Skinner Foundation**

Chinese Traditional Translated by Kiwiya Zhang

聊天时我经常遇到关于“心灵”的问题。像所有行为科学家一样，B. F. Skinner 不相信非物质的心灵。当然，人们有大脑，但大脑只是肢体的组成部分。我们的大脑是复杂的，但是他们的活动是自然世界的一部分。新的技术已经能解读大脑里面在发生什么。当研究者研究大脑时，他们看得是活动。大脑的使用取决于研究者们设置了怎样的前后刺激。神经元的活动也是行为。甚至单个神经元也可以激发，而当强化物不再出现后这种激活就停止了。就像我们身体其他部位的行为一样，大脑的活动是由基因和环境因素决定的。Skinner教授会很乐意看到我们大脑里的因果关系。

French Translated by MarieCeline Clemenceau

En parlant avec des collègues et des amis, je reçois souvent des questions concernant «l’esprit». Comme la plupart des scientifiques du comportement, B. F. Skinner ne croyait pas à un esprit non-matériel. Bien sûr, les gens ont un cerveau, mais ce cerveau est une partie physique de notre corps. Notre cerveau est complexe, mais son activité fait partie du monde naturel. Les nouvelles technologies ont permis de voir ce qu’il se passe dans notre cerveau. Lorsque les chercheurs examinent un cerveau, ils voient l’activité. Les parties du cerveau qui s’allument dépendent des contingences mises en place par les chercheurs dans leurs expériences. L’activité neuronale est un comportement. Même les neurones individuels peuvent être conditionnés à fonctionner et ils cessent de fonctionner quand le renforcement n’est plus disponible. Comme le comportement de toute autre partie de notre corps, l’activité cérébrale est déterminée par des facteurs génétiques et environnementaux. Skinner aurait aimé voir des contingences fonctionner au sein même de notre cerveau.

German Translated by Natalie Werner

Wenn ich mit Kollegen und Freunden spreche, begegnen mir häufig Fragen über den Geist (engl. „mind“). Wie die meisten Verhaltenswissenschaftler glaubte B.F. Skinner nicht an einen nicht-materiellen Geist. Natürlich haben Menschen Gehirne, aber Gehirne sind physische Teile unserer Körper. Unsere Gehirne sind komplex, aber ihre Aktivität ist Teil der natürlichen Welt. Neue Technologien haben es ermöglicht zu sehen, was in ihnen vorgeht. Wenn Forscher in ein Gehirn schauen, sehen sie Aktivität. Die Teile des Gehirns, die aufleuchten, hängen von den Kontingenzen ab, die Forscher in ihren Experimenten arrangieren. Neuronale Aktivität ist Verhalten. Auch einzelne Neuronen können konditioniert werden zu feuern und sie hören auf, wenn keine Verstärkung mehr verfügbar ist. So wie das Verhalten jedes anderen Körperteiles, wird die Gehirnaktivität von genetischen und Umweltfaktoren bestimmt. Skinner hätte es gefallen zu sehen, wie Kontingenzen auch in unseren Gehirnen arbeiten.

Hebrew Translated by Shiri Ayzazo

בשיחות עם קולגות וחברים אני נתקלת פעמים רבות בשאלות אודות ה"נפש" (או, תודעה). כמו מרבית המדענים ההתנהגותיים, ב. פ. סקינר לא האמין בתודעה שאינה חומרית. כמובן, לאנשים יש מוחות, אך מוחות הינם חלקים פיזיקליים של גופנו. המוחות שלנו מורכבים, אך פעילותם הינה חלק מן העולם הטבעי. טכנולוגיות חדשות אפשרו שנוכל לראות מה קורה בתוך מוחנו. כשחוקרים מסתכלים אל תוך המוח, הם רואים פעילות. חלקי המוח הנדלקים תלויים בתלייות שהחוקרים ארגנו בניסוייהם. פעילות נוירולוגית הינה התנהגות. אפילו נוירונים בודדים יכולים לעבור התניה לירות (מסר נוירוני), והם מפסיקים לירות כאשר החיזוק אינו מגיע עוד. כמו התנהגות של כל חלק אחר מגופנו, פעילות מוחית נקבעת על ידי גורמים גנטיים וסביבתיים. סקינר היה שמח לראות תלייות פועלות אפילו בתוך מוחנו.

Icelandic Translated by Kristjan Gudmundsson

Oft þegar ég er að spjalla við samstarfsmenn og vini, þá er ég spurð um “hugann.” Eins og flestir atferlisfræðingar þá trúði B. F. Skinner ekki á óefniskenndan huga eða sál. Vissulega er fólk með heila, en heilinn er efnislegur hluti af líkamanum. Heili okkar er flókin, en virkni hans er hluti af náttúrulegri starfsemi. Ný tækni hefur gert okkur kleift að sjá hvað er að gerast inni í heila okkar. Þegar rannsakendur skoða innviði heilans, þá sjá þeir virkni. Þeir hlutar heilans sem sýna virkni hvert sinn eru háðir þeim skilyrðum sem rannsakendur setja upp í tilraunum sínum. Taugavirkni er hegðun. Hver einasta einstaka taugafruma getur skilyrðst til að senda boð, sem síðan hætta þegar því fylgja ekki lengur styrkingar. Eins og hegðun annarra hluta líkamans, þá er heilavirkni ákvörðuð af erfða- og atferlisfræðilegum þáttum. Skinner hefði elskað að sjá þessi skilyrði virka inni í heila okkar.

Italian Translated by Anna Luzi

Parlando con colleghi e amici, mi trovo spesso a dover rispondere a domande sulla “mente”. Come la maggior parte degli scienziati comportamentali, B. Skinner non credeva nell’esistenza di una “mente” che non facesse parte di qualcosa di organico. Ovviamente le persone possiedono un cervello, ma il cervello costituisce una parte fisica del nostro corpo. Il nostro cervello è complesso, ma la sua attività fa parte del mondo naturale. Le nuove tecnologie hanno permesso di vedere ciò che accade all’interno del nostro cervello. Quando i ricercatori osservano un cervello, ne vedono l’attività. Le parti del cervello che si illuminano dipendono dalle contingenze che i ricercatori predispongono nei loro esperimenti. L’attività neuronale è un comportamento. Anche i singoli neuroni possono essere condizionati a sparare e a smettere di farlo quando il rinforzo non è più disponibile. Come il comportamento di qualsiasi altra parte del nostro corpo, l’attività cerebrale è determinata da fattori genetici e ambientali. A Skinner sarebbe piaciuto molto vedere come le contingenze funzionano anche all’interno del nostro cervello.

Japanese Translated by Naoki Yamagishi

職場の同僚や友人と話をしていると、しばしば「心」に関する質問に出会います。多くの行動科学者と同様に、B. F. Skinnerは物質でない心信じていませんでした。もちろん、人には脳がありますが、脳は物質的な身体の一部です。脳は複雑ですが、その活動は自然界の一部です。新しい技術は脳の中で何が起きているのかを見ることを可能にしました。研究者が脳の中を覗き込むとき、活動を見ます。活動している一部の脳は実験において研究者が設定した随伴性に依存します。神経活動は行動です。単一の神経細胞でも発火の条件づけが可能であり、強化がもう来なければ発火を停止します。私たちの身体の他の部分の行動と同じように、脳の活動は遺伝要因と環境要因によって決定されます。Skinnerは脳の内部にも随伴性が働くのを喜んで見たかもしれません。

Korean Translated by Theresa Yunhee Shin

동료들과 친구들에게 말하자면, 저는 자주 “마음”에 대한 질문에 맞닥뜨리게 됩니다. 많은 행동과학자들처럼, B. F. Skinner 는 비물질적인 마음은 믿지 않았습니 다. 물론, 사람들은 두뇌를 가지고 있지만, 두뇌는 우리 몸의 신체 한 부분입니다. 우리의 뇌는 복잡하지만, 뇌의 활동들은 자연세계의 한 부분입니다. 새로운 기술들은 우리의 뇌 안에서 무엇이 일어나는지를 보는 것이 가능하게 되었습니다. 연구자들이 뇌 안을 살펴볼 때, 그들은 뇌의 활동을 봅니다. 밝혀진 뇌의 부분들은 그들의 실험에서 연구자들이 설정한 유관에 의존합니다. 신경적 활동은 행동입니다. 심지어 단일 뉴런들은 점화할 상태에 놓여질 수 있고, 그들은 강화가 더이상 마련되어 있지 않을 때, 점화를 멈춥니다. 우리 신체의 어느 다른 부분의 행동처럼, 뇌의 활동은 유전적이고 환경적인 요소에 의해 결정되어 집니다. Skinner는 심지어 우리 뇌 내부에 조작적 유관성을 살펴보고 싶어했을 것입니다.

Polish Translated by Monika Suchowierska-Stephany

Rozmawiając ze współpracownikami i znajomymi często spotykam się z pytaniami o “umysł”. Jak większość naukowców behawioralnych, B.F. Skinner nie uznawał istnienia niematerialnego bytu, jakim jest umysł. Oczywiście ludzie mają mózgi, ale mózg to fizyczna część naszego ciała. Nasze mózgi są bardzo złożone, a ich aktywność to część świata naturalnego. Nowe technologie umożliwiają nam przyjrzenie się pracy mózgu. Gdy naukowcy badają mózg, widzą jego aktywność. W zależności od uwarunkowań ustalonych przez eksperymentatora, różne części mózgu obrazują się w różnych kolorach. Aktywność neuronalna to zachowanie. Aktywować mogą się nawet pojedyncze neurony, natomiast ich stan pobudzenia się kończy, gdy przestaje działać wzmacnianie. Podobnie jak zachowanie każdej innej części naszego ciała, aktywność mózgu jest determinowana czynnikami genetycznymi i środowiskowymi. Skinner byłby zafascynowany mogąc zobaczyć, jak uwarunkowania środowiskowe oddziałują na nasz mózg.

Portuguese Translated by Bruna Colombo dos Santos

Ao conversar com colegas e amigos, eu frequentemente encontro questões sobre a “mente”. Como a maioria dos cientistas comportamentais, B. F. Skinner não acreditava em uma mente não material. É claro que pessoas tem cérebros, mas cérebros são partes físicas de nossos corpos. Nossos cérebros são complexos, mas sua atividade é parte do mundo natural. Novas tecnologias tornaram possível observar o que ocorre dentro de nossos cérebros. Quando pesquisadores olham para um cérebro, eles veem atividade. As partes do cérebro que “acendem” dependem das contingências que os pesquisadores estabelecem em seus experimentos. Atividade neuronal é comportamento. Mesmo neurônios isolados podem ser condicionados a disparar, e eles param de disparar quando o reforçamento não é mais apresentado. Assim como o comportamento de qualquer outra parte do nosso corpo, a atividade cerebral é determinada por fatores genéticos e ambientais. Skinner teria adorado ver contingências operando dentro dos nossos cérebros.

Romanian Translated by Luciana Haloiu Richardson

În cadrul discuțiilor mele cu colegii și prietenii, mă confrunt deseori cu întrebări despre „minte”. Ca mai toți oamenii de știință axați pe studiul comportamentului, B.F. Skinner nu credea într-o minte fără materie. Bineînțeles, oamenii au creier, dar acestea sunt părți fizice ale corpului nostru. Creierul nostru sunt complexe, dar activitățile acestora fac parte integrantă din lumea naturală. Tehnologiile noi ne-au permis să observăm ce se întâmplă în interiorul creierului nostru. Atunci când cercetătorii studiază un creier, aceștia văd activitate. Părțile creierului care se activează depind de evenimentele configurate de către cercetători în cadrul experimentelor lor. Activitatea neuronală este comportament. Chiar și neuronii individuali pot fi condiționați să emită impulsuri, iar impulsurile se opresc atunci când întărirea impulsurilor dispăre. În mod similar comportamentului oricărei alte părți a corpului nostru, activitatea creierului este determinată de factorii genetici și de mediu. Lui Skinner i-ar fi plăcut să vadă contingențele care au loc în interiorul creierului nostru.

Russian Translated by Alexander Fedorov

В разговорах со своими коллегами и друзьями я часто сталкиваюсь с вопросами о «разуме». Как и большинство ученых-бихевиористов, Б.Ф. Скиннер не верил в существование нематериального разума. Безусловно, люди обладают мозгом, но мозг – это физическая часть нашего тела. Наш мозг сложен, но его активность является частью естественного мира. Новые технологии позволили увидеть, что происходит внутри него. И когда ученые заглядывают внутрь мозга, они видят активность. Активирующиеся части мозга зависят от тех контингенций, которые исследователи организуют в своих экспериментах. Нейронная активность – это поведение. Каждый отдельный нейрон можно научить активироваться, и их активность прекращается, когда исчезает подкрепление. Как и поведение любой другой части нашего тела, активность мозга детерминирована генетическими и средовыми факторами. Скиннер бы с удовольствием посмотрел на контингенции, действующие даже внутри нашего мозга.

Spanish Translated by Kenneth Madrigal and Gonzalo Fernández

Conversando con colegas y amigos, frecuentemente surgen preguntas acerca de la “mente”. Como la mayoría de los científicos de la conducta, Skinner no creía en una mente inmaterial. Claro, las personas tienen cerebro, pero éste es una parte física de nuestro cuerpo. Y, aún cuando nuestros cerebros son complejos, su actividad sigue siendo parte del mundo natural. Nuevas tecnologías han hecho posible observar qué es lo que ocurre dentro de nuestros cerebros. De tal manera que cuando los investigadores observan un cerebro, observan actividad. La iluminación de ciertas regiones del cerebro depende de las relaciones de contingencia establecidas por el investigador en el experimento. La actividad neuronal es conducta; incluso, es posible condicionar la activación de una neurona individual, y condicionar su desactivación al anular la disponibilidad del reforzador correlacionado con su actividad. Así como el comportamiento de cualquier parte de nuestro cuerpo, la actividad cerebral es determinada por factores genéticos y ambientales. A Skinner le hubiera encantado poder ver el establecimiento de relaciones de contingencia dentro de nuestros cerebros.

Swedish Translated by Dag Strömberg

Vid samtal med kollegor och vänner stöter jag ofta på frågor om “medvetandet”. Liksom de flesta beteendeforskare trodde B. F. Skinner inte på ett ickemateriellt medvetande. Människor har förstås hjärnor, men hjärnan är en fysisk del av vår kropp. Våra hjärnor är komplexa, men deras aktivitet är en del av den naturliga världen. Ny teknik har gjort det möjligt att se vad som pågår i våra hjärnor. När forskare tittar in i en hjärna ser de aktivitet. De delar av hjärnan som lysas upp beror på de kontingenser forskare riggar i sina experiment. Nervcellers aktivitet är beteende. Till och med enskilda neuron kan betingas att fyra av, och de upphör att fyra av när förstärkning inte längre är tillgänglig. Liksom alla andra kroppsdelars beteenden bestäms hjärnans aktivitet av genetiska och miljömässiga faktorer. Skinner skulle ha älskat att se kontingenser verka till och med inuti våra hjärnor.

Thai Translated by Sirima Na Nakorn

จากการพูดคุยกับเพื่อนร่วมงานและพี่ อนุพงษ์ ฉันมักพบคำถามเกี่ยวกับ “ใจ” เจกเช่นนักวิทยาศาสตร์พฤติกรรมทั้งหลาย บี. เอฟ. สกินเนอร์ไม่เชื่อเรื่อง “ใจ” ในรูปแบบที่เป็นนามธรรมแน่นอนว่าคนเรามีสมอง ที่เป็นอวัยวะหนึ่งของร่างกาย สมองของเราซับซ้อน แต่การทำงานของมันเป็นส่วนหนึ่งของโลกธรรมชาติ เทคโนโลยีใหม่ๆ ทำให้เราเห็นการทำงานของสมองได้ เมื่อนักวิจัยมองดูสมอง เขาเห็นไฟสว่างขึ้นที่ส่วนต่างๆของสมอง แสดงการทำงานตามเงื่อนไขหรือคำสั่งต่างๆในการทดลองนั้นๆ กิจกรรมของเซลล์ประสาทที่ปรากฏนี้เป็นพฤติกรรม เซลล์ประสาทเพียงตัวเดียวก็สามารถถูกกระตุ้น ทำให้เกิดประกายไฟสว่างได้ และมันก็จะหยุดเมื่อไม่ได้รับ การตอบสนองหรือรางวัล เช่นเดียวกับอวัยวะอื่นๆ การทำงานของสมองขึ้นอยู่กับตัวแปรด้านพันธุกรรมและสิ่งแวดล้อม สกินเนอร์คงต้องอยากเห็นการทำงานของสมองที่ปรากฏเป็นร่างกายไฟนี้แน่นอน

Turkish Translated by Yeşim Güleç-Aslan

Meslektaşlarım ve arkadaşlarımla konuşurken sıklıkla “zihin” ile ilgili sorularla karşılaşırım. Pek çok davranış bilimci gibi B. F. Skinner’da madde-dışı zihne inanmamıştır. Tabii ki insanların beyni var, ancak beyin bedenimizin fiziksel bir bölümüdür. Beynimiz karmaşıktır fakat beynimizin gerçekleştirdiği faaliyetler doğal dünyanın bir parçasıdır. Yeni teknolojiler beynimizin içinde neler olup bittiğini görmeyi mümkün kılmaktadır. Araştırmacılar beyni incelediklerinde beynin faaliyetlerini görmektedirler. Beynin aydınlatılmış kısımları, araştırmacıların deneylerinde ileri sürdükleri izlerliklere bağlıdır. Nöronal faaliyetler birer davranıştır. Tek bir nöron bile ateşlenme için koşullandırılabilir ve, pekiştirecin mevcut olmadığı durumlarda nöronlar ateşlenmeyi durdururlar. Bedenimizin herhangi bir bölümünün davranışı gibi, beyin faaliyetleri de genetik ve çevresel etkenlere bağlıdır. Skinner beynimizin içindeki izlerlikleri görmeyi muhtemelen çok isterdi.

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Janet Browne

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*Janet Browne's interests range widely over the history of the life and earth sciences and natural history. After a first degree in zoology, Janet studied for a PhD in the history of science at Imperial College London, published *The Secular Ark: Studies in the History of Biogeography* (1983). Ever since then she has specialized in re-assessing Charles Darwin's work, first as associate editor of the early volumes of *The Correspondence of Charles Darwin*, and more recently as author of a biographical study that integrated Darwin's science with his life and times. While it was framed as a biographical study, the intention was to explore the ways in which scientific knowledge was created, distributed and accepted, moving from private to public, as reflected in the two-volume structure of the work. The biography was received generously both in the UK and USA, and awarded several prizes.*

*Dr. Browne was based for many years at the Wellcome Trust Centre for the History of Medicine at University College London where she taught in the MA, MSc and undergraduate programs in the history of science, biology, and medicine. She has been editor of the *British Journal for the History of Science*. She is currently president of the *History of Science Society*.*

You are the author of major works on Charles Darwin's life. What motivated you to study Darwin?

It is a long answer, and I think an answer that many scholars will be able to understand. I was initially a biologist. I studied zoology as my first degree. And of course in zoology you study evolutionary theory, so I became extremely interested in the man who discovered, formulated, and presented evolutionary theory. In those days I didn't know that there were many people who had thought about evolution, I only had heard of Darwin. And as an undergraduate, I became extremely interested in the history of the field that I was studying, and decided when I left, as a BA, that I would take a master's in the history of science. Then I really understood that there were many more individuals of the past who thought about these matters. I learned a great deal about other fields as well, not just biology. And from the very first day that I did my master's studies, there was the introduction, a little drinks' party, then class one was Babylonian astronomy. Way back in time — and I was hooked! I thought this was the most amazing subject area. I had never known anything about this area of the history of science. So that was how I first became engaged. It was through studying biology that I became interested in Darwin, and Darwin led me to study the history of science where I then studied Darwin in very great detail.

We know that a reconstruction work of the life of a scientist is very hard and much historical information is lost or difficult to access. What were your greatest difficulties in the course of this project?

It's such an interesting question because we all believe that we have to have a great deal of material in order to understand somebody's theories and personality. The Darwin archive is very large. In fact, there's been no trouble for me in finding sufficient material. There are many, many documents and many, many books. All of Darwin's library has been kept, all of Darwin's letters have been kept, and yet very often we hope to find some information about one thing or another and it's not there. So your question is exactly right. In that, it is problematic, even if you have a lot of material you don't always find what you want to find.

So there are two things I'd like to tell you that I know would make a difference if they still existed. They may exist somewhere, who knows? I have been very interested in correspondence when I've been working on Darwin. I think the correspondence gives you a very deep insight into his growing up, becoming a mature thinker, the way he tried to develop his theories. And then after he published all the different books, how he wrote to his friends, reviewers, and his enemies to encourage them how they should be thinking about these topics. When he was on the Beagle voyage, he wrote very regularly, at least once a month over five years to his family back in Shrewsbury in England. Every single one of those letters arrived back. Every single one of those letters is still in the archive, except for one. And the one that never arrived back in England was the one he wrote when he was in the Galapagos Islands. Of course, it's the one letter that everybody would like to read. And it never arrived back. So I have had many interesting after-dinner conversations with my Darwin friends about what that letter would say. It's very exciting, that one missing letter.

So of course we would have liked to know what that letter said, but we have no way of knowing that.

And the other thing in relation to your question which I think is also very important is that Darwin's materials are mostly about him as a scientist. His correspondence is mostly to his scientific friends or to people who are engaged in reacting to his book. And we get quite a strong sense of him as a father and as a husband, and as a friend to individuals from different parts of his archive. But it would be nice if there were more letters between him and his wife. Of course they lived together, so we have in the archive what they wrote when they were apart. Often that was a stressful time — they would be apart for a reason, so those were very revealing letters. But there's not much ordinary material left in the archive, just between the husband and wife, simply because they were always living together. I find that a shame. We could know more about him as a person in that way.

I have found that the archive is very rich. Some historical figures don't have a rich archive, therefore it's much more difficult to write about them. Oddly enough it's quite easy to write about Darwin because there is so much. But, if I was writing a book about Alfred Russel Wallace for example, or a book about Lamarck, the archive is not so large and one would not be able to write such a deep analysis, and that's a big problem for historians. You know yourself that you need to find things, otherwise you're just repeating what other people have written. And for Darwin, there are many, many documents.

I've always had a big advantage, that I've lived and worked in centers which have large libraries and many facilities. I lived in Cambridge, England where the archive is held. There's a big archive in Philadelphia. But nowadays most people need it all to be digital so the materials can be accessed digitally, and that's very expensive. It'll happen, but it's very expensive.

There is an intrinsic relationship between the life of scientists and their scientific productions. How do you think your work fits into the context of the history of current science?

It is a really important concept that it's artificial to remove the ideas from the person. Because ideas are proposed by individuals, but they're also heard by individuals. And all these individuals live in particular contexts that either help them or impede the way they think about these ideas, so we have to have the people back in the science. Although, the result is somehow abstract and continues through time. The idea of evolution has been important for 150 or 200 years. There were people who discussed, criticized, and eventually agreed with Darwin's ideas. It's very easy for us to say now they were wrong, but that's not a good way to think about it. They were the ones

who really were innovators and probed the ideas to see if they would work and some pushed back against them. Some people accepted parts of Darwin's ideas and rejected other parts. It took quite some time to agree that it was workable. And, I think that's the really valuable aspect of the history of science. Looking at the ways the ideas and the people integrate in the context of their period, shows us that science is a gradual process. It is made up of discoveries, of course. Everybody wants to make a discovery, but sometimes it's hard to know if something is a discovery. It has to be accepted by other people, it has to be published, discussed, and agreed upon. By looking at the history in the way that you're expressing here, the life of the scientific individuals helps us understand that this is a living process.

Science changes and moves forward. Newton said it very beautifully. He said that he stood on the shoulders of giants. He used the work of others, he did what he did, and people in the future, he understood, would use his

work and that's a magnificent thing. There is something extraordinary in science that we don't normally see in the fine arts. Science is cumulative, and people value what came before. And then they look forward. So I think it is terribly important that the lives of the individuals are a part of how we think about these ideas. And you will know that Darwin in particular has become a very well-known figure. People enjoy finding out about Darwin. His life is very foreign to us, but still he had these amazing ideas and we still understand those ideas.

What were the main impacts of Darwinian's analysis on the biological sciences?

If we were going to be brief, we could say that Darwin and others, like Wallace, were able to think about the natural world without anything other than natural causes and effects. He decided that he had no need to seek

explanations that were outside the natural world. Darwin was deeply committed to the idea that you should not try to explain things with something that you don't know about. You keep it all within the natural world, and that's a really important methodological point he makes. His book *On the Origin of Species*, and other books as well, were attempting to explain things using what you could observe, what you could infer, and not calling on any supernatural explanation. That is partly what gives *Origin of Species* its particular framework, because it's always said that Darwin throws God out of the picture. And he is not only doing that in the *Origin of Species*, he doesn't really talk about God at all. He's certainly not setting himself up as a radical, revolutionary, atheist, or modernist thinker. What he's attempting to say is: "Here is a problem and I think I, Darwin, can explain this by using entirely natural laws and their consequences." But he did, in fact, throw God out of nature, so we can't ignore that.

If we are thinking about Darwin's place in history,



Operants special correspondent, Dr. Monalisa Leão, in Dr. Janet Browne's Harvard office.

from the time of the Ancient Greek philosophers to the present day, it is major. He is one of the few people who had a very pronounced impact on the process of separating Western civilization from religious traditions. We could see him as a revolutionary. In 4,000 years of Western civilization, Darwin has a very central place. However, if we just look at the fifty years in the middle of the XIX century, Darwin was one of several people who were trying to do those kinds of things. He is not the only person we want to single out, and he was not all that effective in those five decades. Of course there's been 150 years since his time and now we now know that he was right. At the time, it wasn't clear. So I think his impact depends on the timeframe that one wishes to use. He's one of the four greatest philosophers and thinkers in Western civilization and yet his impact during that small slice of middle years of the XIX century was not all that easy to see.

So, the first point is that Darwin removes any kind of religious and supernatural explanation from his way of thinking about the natural world. Another big impact is the way that he depends on evidence. The theory he's proposing is not something that has obvious evidence and so he's actually proposing a probability. It's not at all easy to read his book and then understand that there is no proof of this. You just have to accept it. Since Darwin's day, this is how science is done. It is a new kind of methodology. He had a major impact in cultural terms in Britain. He became a great hero of British science. His impact has been very large from that point onward. He had a hero's funeral, and his work has become more and more embedded in modern biology as it has become more substantiated by genetics and by experiments, fossil evidence, and even more excavation of human remains. More and more evidence has emerged to show that the theory is absolutely true. His impact as the first person to think of this is very large.

Despite a supposed consensus, evolutionary theory is still controversial and a matter of great debate. How do you assess the acceptance of the theory of evolution in the scientific and non-scientific context today?

Such an interesting question! You and I are both non-Americans and we see how very interesting this issue is in North America and also on a global scale now. We witness considerable discussion and controversy, and even sometimes violence between the fundamentalist thinkers. It is not just Christian conservatives, but all fundamentalist religious faith systems who push back against the idea of natural origins for humankind. They don't wish to believe that and there's many problems which we might want to talk about. Some of these anxieties are (sort of) justified — if

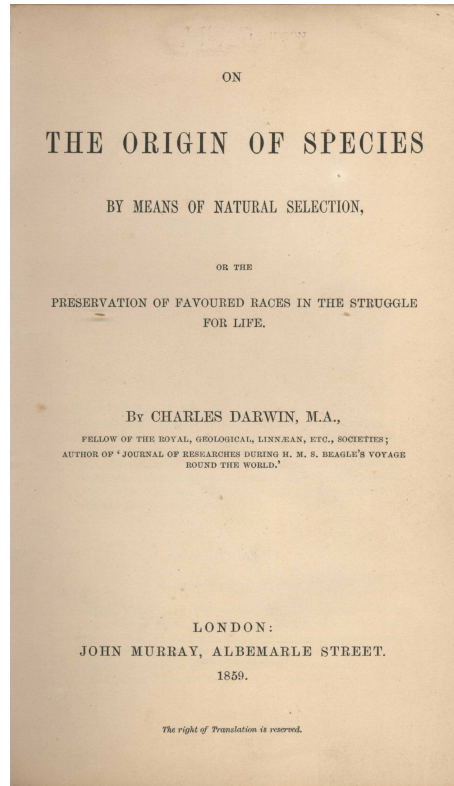
you don't have a strong biological training you might not know why we all think that Darwin is right. So, there is a great amount of push back and I see it very much in the US.

I think there are two things one could say about this lack of acceptance. It concerns much more than just evolutionary theory. I think for many of the individuals or groups of people in the US who are against the idea of natural origins for humankind, it's part of a bigger anxiety about modernity in general. I can see that in the churches that wish to show how evolutionary theory cannot be true. They also want to encourage their members to return to values that reflect stable family life, that reflect a more hierarchical structure in society that is drug-free, that is abortion-free, that has stronger family values in general. This is actually very worthwhile, but it's all tied together with rejecting science. Darwin gets wrapped up in this as being the very voice saying that humans are just animals. If we are to think that we are just animals, we have to ask ourselves where is the moral sense, where does it come from? How can we be good? How can we adopt laws, how can we have civilizations, how can we walk down the street not being cut down? If we are just animals what happens to our civilization? Some of the people who push back against evolutionary biology have very deep and real reasons to be anxious. I think they are completely wrong to put Darwin as the person who represents all of that because Darwin was not an atheist. Darwin felt very strongly about family values, he believed in duty. It is not right to have Darwin as the Antichrist in this story.

Skinner, like Darwin, explained the origin and evolution of behavior based on variation and selection. Do you think Darwin's lack of a good explanation for variation was one reason for his late acceptance in the scientific community?


It's so fascinating that of all the things that Darwin could do — he could look ahead and he could suggest magnificent theories — he couldn't find out how variation began. Now, you wouldn't expect one man to be able to do everything but he did have a theory of variation that all his friends rejected. He kept believing in it until he died, but it was not an effective theory. But, he knew he had to have some theory that should explain it. You're absolutely right that not having an explanation for how the variations emerge and how they are preserved and how they're transmitted was a very key factor in the reluctance some people had in adopting everything he had to say.

What we find is that twenty, thirty, fifty years after Darwin published, quite a lot of biologists and other thinkers were prepared to accept the idea of evolution, but they couldn't see how it happened. Darwin's natural

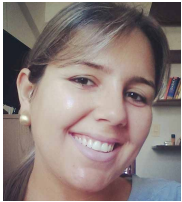


*The title page of the 1859 edition of
On the Origin of Species*

selection theory wasn't always accepted. But the idea of evolution was easier to accept. People believed in inheritance of acquired characteristics, people believed in blending inheritance. And the story is that only with the birth of genetics in the 1900s, and then actually with the evolutionary synthesis in the 1930s did this all gel together.

And it became clear that as late as the 1930s and 1940s that Darwin's ideas were really likely to be true and here were the mechanisms that supported it and if you worked on genetics and breeding experiments you might be able to find out how the variations emerge, are preserved, and are transmitted. 

About the Interviewer:



Dr. Monalisa de Fátima Freitas Carneiro Leão (Brazil) did her undergraduate studies in Psychology at the Federal University of Mato Grosso do Sul - CPAR, and master's in Behavior Analysis at the State University of Londrina. She recently completed her Doctoral degree in Theory and Behavior Research at the Federal University of Pará. In 2016, Monalisa spent six months at the Harvard University's archives and the B. F. Skinner Foundation to conduct research for her PhD thesis. Her interests focus on conceptual issues of radical behaviorism, relationship between behavior analysis and evolutionary biology, and on the historical, conceptual, and philosophical development of the Skinnerian science.

An Entry in B. F. Skinner's Notebook



**from the
archives**

10/12/87

SEEING IT AT LAST

It has taken me a long time to understand what I have done with my intellectual life. I think it can all be put this way:

I have investigated the contingencies of reinforcement which, in addition to the contingencies of natural selection, and with the help of the evolved social contingencies we call cultures, explain the behavior of a person and at the same time the bodily states or processes, which that person can partially feel and mistakenly call the causes of behavior.

"Feelings" and "Origins" of the body felt or introspectively observed may be due to the arrangements of setting, behavior, and consequences that are not necessarily contingencies of reinforcement. Some are also due to respondent conditioning and others to natural selection. Being astonished by a loud sound may be due to natural selection only. Being astonished by someone's sudden change of political position must be due entirely to operant contingencies.

From Operant Conditioning to Selection by Consequences

Julie S. Vargas, PhD
B. F. Skinner Foundation



Julie S. Vargas is president of the B. F. Skinner Foundation. She began her professional life as an elementary school teacher, and has kept her interest in public education from that time on. After receiving her doctorate, she taught at West Virginia University, working with practicing teachers and with undergraduate education majors. Her publications include Behavior Analysis for Effective Teaching. (2nd Ed. Routledge, 2013). She is currently working on a biography of her father, B. F. Skinner.

The phrase “selection by consequences” appeared in the title of one of B. F. Skinner’s publications for the first time in 1981. Skinner had discovered operant conditioning almost fifty years earlier. He did not talk about it as a selection process for many years. Why the delay? What contingencies over his behavior shifted to reveal parallels between operant conditioning and natural selection, and of “selection” as the process for cultural change? By looking at Skinner’s research at different points in his career, some reasons can be inferred for his taking so long to describe behavioral change as a selection process.

Selecting requires two parts. The evolution of species requires a population of individuals from which selection occurs and the features that are, or are not selected. In the behavioral domain, a variety of actions must exist from which properties of behavior are selected. Selection cannot occur without existing variability. As Skinner pointed out, features of a species, of behavior, or even of a culture remain unchanged if either “no variations have occurred”, or if “those which occurred were not selected by the prevailing contingencies.” Behavioral change requires an initial variability.

In the early 1930s, Skinner began the research that led to his discovery of operant behavior. Unlike the respondents studied by Pavlov, operants were not responses to antecedent stimuli. Operant behavior was under postcedent control. Skinner differed from Pavlov in another way, too. Pavlov appealed to neurophysiological processes to explain his experimental findings. Skinner sought experimental conditions that when altered would change behavior without appealing to physiological or hypothetical agencies. With behavior of rats providing the data, Skinner showed how different arrangements of postcedent contingencies determined the rate of bar-pressing. Unlike “trials” that stop the process of behavior for each trial, Skinner’s experimental procedures showed uninterrupted actions as they occurred over continuous time. Rate, or probability of actions over time, became his dependent variable. Skinner eventually published the highlights of more than five years of his research in *The Behavior of Organisms*. In this book, he mentions variability in the context of “drive.” To Skinner, “drive” referred to the likelihood of a rat eating versus not eating food even when not having eaten for some time. There is no talk in the book about variability of the rat’s behavior from which bar-pressing was selected.

In bar-pressing experiments Skinner did not need to consider variability of behavior. Moving front paws is a common action for a rat. To get a bar-press to reinforce, all Skinner had to do was to place a rat in his bar-press chamber and wait. The apparatus was wired so that a bar press operated the food-hopper. Sooner or later a bar press would occur and be automatically reinforced. In the research described in *The Behavior of Organisms*, it was equipment that presented food. Skinner arranged his equipment to deliver food under different contingencies of reinforcement. To be sure, the operant bar press was brought under an impressive array of contingencies, including discriminative control, but no new topography of behavior had to be shaped.

That changed in the 1940s, at the beginning of World War II. While riding on a train one day, Skinner was thinking about the war. Many pi-

lots had been shot down trying to bomb German ships. For any real accuracy, they had to fly within reach of anti-aircraft guns. Out the window of the train, Skinner saw birds swooping alongside, flying with great accuracy. Suddenly he thought, "Could they not guide a missile?" He was sure he could train birds to track ships even though no bird had ever dive-bombed ships before. Skinner began work, finally getting government funding for his project. He would have to teach new skills. As usual he and his coworkers set up equipment to deliver reinforcement in each step of this new project.

One day, bored with waiting for feedback from the government, Skinner and his assistants thought it would be fun to teach a bird to knock a ball around a box. They found a wooden ball about the size of a ping-pong ball. They would not have time to set up equipment for this diversion, so they rigged up a switch to operate the feeder by hand. To shape striking the ball sideways, they had to watch everything the bird already did. They had to select an action to reinforce. Skinner described the training as follows:

We began by reinforcing merely looking at the ball, then moving the head toward it, then making contact with it, and eventually knocking it to one side with a swiping motion. The pigeon was soon batting the ball about the box like a squash player. We had shaped a very complex topography of behavior through successive approximation in a matter of minutes.

Skinner was amazed at how rapidly behavior changed! He had "discovered how much easier it was to shape behavior by hand than by changing a mechanical device."

To create new actions with topographies never before seen, variability was needed. One property from among different actions had to be reinforced, and the criteria for selection had to shift as behavior improved. Now, without the need for equipment, shaping could be done with any animal anywhere!

As the war ended, Skinner thought about applying his science to cultural design. In *Walden Two*, he speculated on how a small community based upon behavioral principles could improve upon society at large. Though not specifically addressing variability, the book talks of diversity in members' skills and interests. Frazier, the designer who originally set up the community, attributes this variety mainly to members' leisure time, rather than to selective processes at work. Skinner wasn't talking about selection by consequences yet.

By 1948, Skinner had become a faculty member at Harvard University. A reporter from a popular magazine called *Look* heard about the technology called "shaping." If shaping was so easy, could Skinner teach a dog to jump two feet off the ground while the magazine took photos? Here was a chance to demonstrate shaping, and Skinner had no hesitation. Of course he could teach a dog to jump! All he would need, he said, was a dog, food the dog particularly liked, and a scheduled time before the dog was usually fed. He would do the rest.

To shape a jump Skinner had to be able to reinforce immediately. There was no way food could reach the dog instantaneously as it moved about. He needed a conditioned re-

inforcer. In the hand-switch training of the pigeon, the sound of the food hopper opening was the conditioned reinforcer—the brief stimulus paired with food. Since a flash of light was needed for the photographs, Skinner operated the flash as his conditioned reinforcer. In about 20 minutes, he shaped a jump with the dog leaping over a foot off the ground. The article, "Harvard-Trained Dog" came out in 1952. As with teaching a pigeon to knock a ball about, "successive approximations" were needed. Actions that were closer and closer to the desired performance had to be quickly reinforced.

At Harvard, Skinner was teaching a large undergraduate class. There was no textbook suitable for his course, so Skinner wrote his own, *Science and Human Behavior* (1953). Near the end of the text, Skinner talks about shaping as a selection process, drawing a parallel between operant conditioning and natural selection:

We have seen that in certain respects operant reinforcement resembles the natural selection of evolutionary theory. Just as genetic characteristics which arise as mutations are selected or discarded by their consequences, so novel forms of behavior are selected or discarded through reinforcement. There is still a third kind of selection which applies to cultural practices.

Skinner soon addressed two cultural practices: verbal behavior and education. Skinner had been interested in language since graduate school days. He realized that principles derived from laboratory work did not apply only to animal shaping, but also to human behavior. Selection by consequences removed "free will" from all behavior. No internal agency stored memories, interpreted events, or made decisions. No homunculus was involved. Change in behavior was all the result of selection processes. The processes applied to social behavior as well as to individual actions.

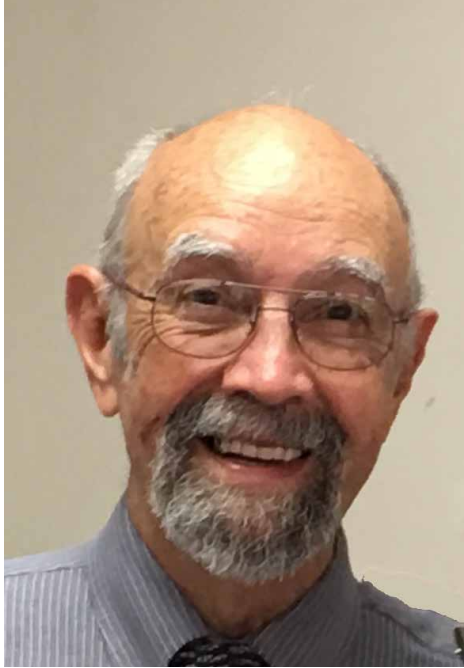
With sabbatical leave in the spring of 1956, Skinner finally finished his book on language *Verbal Behavior*. In it he wrote, "The formulation is inherently practical and suggests immediate technological applications at almost every step." Skinner had already embarked on one "immediate technological application." At a visit to his daughter's fourth-grade math class, he saw many students struggling to solve problems. He thought how easily skills could be taught with shaping. He realized, however, that with a class of many students, no teacher could present each next step just at the time that each student needed it. He would design a machine to help. It would do more than present material in small steps. Shaping required learners to constantly behave.

Soon Skinner brought his own course material into a shaping format. With Jim Holland, Skinner converted *Science and Human Behavior* into hundreds of steps. They started with text blanks anyone could fill in and gradually increased the complexity of terms and analyses students had to write. Skinner assumed that feedback of being correct would function as reinforcement, and that seemed to work. With dozens of paper strips showing all the students' responses, Holland and Skinner revised each sequence until students went through the sequences successfully. Skinner called this verbal shaping

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From Behaviorism to Selectionism

Ernest A. Vargas, PhD
Cambridge, MA



Dr. Ernest A. Vargas is a behaviorologist and a director of the B. F. Skinner Foundation. His primary interests are in the history of science and in behavioral theory.

The original version of this article appeared in the October, 1993 issue of *Education Technology*. That was almost 15 years ago, prior to board certification of behavior analysts was introduced. We thought it would be interesting for *Operants* readers to see what has changed and what has not.

The bed was too low for me to see the land; I could see through the window only the top of the trees along the river. The boat was sailing with such an even movement that I could not realize the fact of our moving, so that the trees, which, one after the other, were rapidly disappearing from my sight, caused me an extreme surprise.

"Ah, dear mother!" I exclaimed, "what is this? The trees are walking!" At that very moment the two noblemen came in and, reading astonishment on my countenance, asked me what my thoughts were so busy about. "How is it," I answered, "that the trees are walking?" They all laughed, but my mother, heaving a great sigh, told me, in a tone of deep pity, "The boat is moving, the trees are not. Now dress yourself."

I understood at once the reason of the phenomenon. "Then it may be," said I, "that the sun does not move, and that we, on the contrary, are revolving from west to east." At these words my good mother fairly screamed. M. Crimani pitied my foolishness, and I remained dismayed, grieved, and ready to cry.

That incident that so upset the nine-year-old Casanova de Seingalt took place in 1734, a century after Galileo. It takes a long time for the actions and discoveries of those special verbal communities known as sciences to influence their ambient culture when those within that culture hold strong notions on the issues at stake and when these notions form an operating part of the very institutions, such as law or religion, of that culture. One could almost measure the degree of innovation of an idea by the degree of resistance it encounters. After having heard a differing formulation on the how and why of events, people typically resist change. How they talk about what they encounter feels intuitively obvious; any other way, strange and clumsy, even cold and alienating.

But it is not only the lay public that dislikes being wrenched out of familiar and comfortable grooves. Scientists don't much like it either. Within their own communities, scientists are slow to adopt formulations alternative to those currently accepted. Harvey's description of heart action, McClintock's "jumping gene" hypothesis, Wegener's theory of continental drift—the list is a long one of theories initially unpalatable that then became a common bill-of-fare. There is nothing wrong with such conservatism, of course. It takes a long time and a lot of effort to sort out fact from explanatory fiction, no matter in what kind of theoretical finery

the expositor drapes his propositions. Unfortunately, the emotional dismay of those established in their established disciplines often undercuts the usefulness of such conservatism.

But scientific verbal communities do change. Typically they change slowly; the public, and that includes scientists outside of the science communities involved, catches only a glimpse of the struggles over what appear to be, at least from a distance, esoteric niceties. Sometimes the change occurs so slowly that those involved do not at first realize the implication of what they have said. Later, when enough change has accumulated, labels can be attached to what is now apparent. Such explicit discrimination helps further progress—though perhaps only momentum—in the direction taken. Renaming also takes place to the members of that science community in whom the change has had its most powerful effect. As they address the formulations they now hold in common, such specialty and disciplinary designation helps those members organize more effectively.

Behaviorism: A “School” of Psychology

In the early part of the twentieth century John Broadus Watson proclaimed a manifesto. From here on in, psychology would not be the study of consciousness but of behavior. He labeled his movement “behaviorism.” As he later trenchantly put it,

Behaviorism ... holds that the subject matter of human psychology is the behavior or activities of the human being. Behaviorism claims that “consciousness” is neither a definable nor a usable concept; that it is merely another word for the “soul” of more ancient times.

Watson’s emphasis on public observables as the data of psychology did not exclude stimulation arising from the inside of the body. But he cast all his analysis and interpretation within a strict stimulus-response formulation. This stimulus-response straitjacket of analysis became a problem that fettered a later generation of behaviorists and learning theorists; the primary ones being Guthrie, Hull, Skinner, and Tolman. Each solved the problem in his own way.

The problem is the lack of correlation between values of the stimulus variable and those of the response variable. The occurrence of a specific stimulus of a given value can result in a variety of responses of differing values. Conversely, given a specific response of a given value, any of a number of stimuli could have given rise to it. The stimulus-response “formula,” as attractive as it was with its Occam-like simplicity, could not contain all the divergent complexity of observed behavior.

Such a discrepancy between antecedent stimuli and subsequent responses has been noticed for some time. Thus, all sorts of states—perceptual, motivational, and intellectual—have been hypothesized to account for why the same physical stimulus results in different responses, and why the same response may be made to different stimuli. An “O” (for organism) is introduced between the “S” and the “R” of the S>R relation, so that S>R becomes S>O>R. For

many scientists, especially those designating themselves as “cognitive,” that “O” is now the repository of processes and structures that mediate between the physical world and the performance of the organism, human or infrahuman. Some psychologists, for example, propose that these processes and structures transform physical events, such as the energies of light and sound, into events of meaning for the organism, and that this significance now determines the organism’s performance. These processes and structures “explain” (the “explanans” as philosophers might put it) why the organism interprets the world as it does and why it then behaves as it does (the “explanandum”). Each theorist emphasizes different structures and processes. Some stress physiological mechanisms, particularly brain operations, others mental mechanisms, particularly the rules by which these mechanisms operate, and some a mixture of both. The so-called “cognitive revolution” merely updates this age-old formulation of transforming mechanisms and extends the behavioristic S>O>R formulation.

Skinner’s solution was the most radical. He stepped outside the problem. His point of emphasis was not the prior stimulus and its inevitable effect on an organism who produces a response. In his first book *The Behavior of Organisms* Skinner put it cogently, “The attempt to force behavior into the simple stimulus-response formula has delayed the adequate treatment of that large part of behavior which cannot be shown to be under the control of eliciting stimuli.” He emphasized, instead, the organism’s action and its effect on an immediate environment. Such an effect produced changes—the ensuing consequences of the action. These consequences then affected the probability of that type of action occurring again. With Skinner’s formulation, a fundamental shift occurred in the basic framework of interpretation of behavioral phenomena. Though apparent, its significance was not easily noticed.

Skinner himself at first did not see the shift. He did not specifically mention “selection by consequences” in his 1938 magnum opus, *The Behavior of Organisms*. He stressed instead his experimental analysis, and indeed, the book is subtitled, *An Experimental Analysis*. He did argue forcefully that operant behavior (actions and their consequences) should be the focus of analysis for the field of psychology. But he primarily accentuated the operant’s utility for analyzing behavior “as a subject matter in its own right,” that is, not to be understood only as an outcome of the activity of the nervous system, or as a means of investigating the mental world. Nor is there a mention of “selection by consequences” in his popular 1953 textbook, *Science and Human Behavior*. Though there is a beginning sensitivity to what his system of analysis implies—for his chapter on operant behavior, starts out with a paragraph called “The Consequences of Behavior”—again he emphasizes the importance of an experimental analysis of the process. At the end of the chapter he compares “operant conditioning and the evolutionary selection of behavioral characteristics,” but the term “selection” is restricted to its biological context. In Skinner’s great theoretical contribution, his analysis of verbal behavior in *Verbal Behavior*, 1957, the book’s index contains neither the word “consequence” nor “selection,” much less the phrase “selection by consequences.” It was not

until 1981, with the publication of his article, "Selection by Consequences" in the journal *Science*, that Skinner first made clearly explicit, and systematically described, the nature of his quite different paradigm, for that was what it was.

Varieties of "Behaviorism"

Ambiguity in how to approach and explain a subject matter, and even more, in how to define that subject matter, will of course create a confusion in the communities of professionals who study that subject matter. Three verbal communities of scientists have emerged from Skinner's reformulation of the behaviorist position: (1) psychologists within the discipline of psychology who define themselves as "radical behaviorists"—that is, psychologists who adhere to Skinner's definition of his philosophy of science; (2) behavior analysts who may designate themselves as radical behaviorists but who also define themselves as paradigmatic behaviorists or interbehaviorists or cognitivists or perhaps otherwise, such as selectionists, and who practice within a variety of disciplines—behaviorology, education, psychology, social work, and so on; (3) behaviorologists who are ... behaviorologists, i.e., an independent discipline of scientists working within the framework originated by Skinner and earlier by Darwin. The distinction between these three communities resides not only in the subject matter they address and in what to call it, but also in the political and social actions taken—in what these communities believe is the best way to preserve, promote, and advance the science that Skinner started.

Radical behaviorists in psychology still hope to fulfill Watson's turn-of-the-twentieth-century manifesto and to change psychology. They still anticipate success in convincing other psychologists that Skinner's formulation is the best one for their discipline. They still struggle to maintain some credibility to the notion that psychology is a science of behavior rather than that of mind, a mind revealed through its cognitive processes. Their struggle is compounded by the fact that they must also advance the primacy of scientific issues over guild ones; a division of opinion sufficiently strenuous between psychologists so that now there are two organizations of psychologists—the American Psychological Association, and the American Psychological Society—that represent the discipline of psychology. The flagship journal—the *Journal of the Experimental Analysis of Behavior* (*JEAB*)—of these operant psychologists (sometimes so named) still publishes a lot of first-rate experimental work in the Skinnerian tradition.

The verbal behavior exhibited in this journal is, however, showing the effect of "radical behaviorists" being in another verbal community, that of traditional psychology; so much so that Skinner complained publicly. "Evidently, we have not long to wait for an issue of *JEAB* without a single cumulative record!", and also, he protested privately. The issue, however, is not over cumulative records *per se*, but over the science they represent. Cumulative records portray curves that reveal moment to moment changes in the rate of behavior as it occurs. Three advantages accrue to the investigator. First, these data represent changes in the dependent variable—actions of some sort, that can be specifically related to

changes in the independent variable—physical, biological, and behavioral events of some sort. Second, they portray a universal property of behavioral phenomena, not idiosyncratic traits of a particular animal, whether human or nonhuman. Third, they facilitate comparisons of that behavioral property across and within species, since a given relation of the independent and dependent variable reveal characteristic patterns against which the variability of that property contributed by a particular individual or species can be assessed. But such a drift in methodology and in terms, and therefore in formulation, is not seen with dismay by many active researchers in this group. In fact, it is welcomed, judging by the editorial of its recent editors. It may be, then, that the change they desire in psychology is not to the formulation advanced by Skinner.

Behavioral analysis has one foot in psychology and the other firmly planted in midstride—elsewhere. Its organizational expression, the Association for Behavior Analysis International (ABAI), began with a break from the Midwestern Psychological Association in 1974. But while many of those who designate themselves as behavior analysts are members of a variety of professions, most still identify themselves as psychologists. They work in departments of psychology and run programs of behavior analysis within those departments. Most of these individuals, for obvious and practical reasons, exhibit a certain reluctance to define behavior analysis in such a way that it would fall outside the scope of what departments of psychology do. Yet many in the Skinnerian revolt against traditional psychology separate behavior analysis from psychology, and there is at least one campus, University of North Texas at Denton, that has both a department of behavior analysis and one of psychology, independent of each other and both granting degrees. A lack of a central core of fundamental beliefs as to what may constitute "behavior analysis" further confuses the situation. So while a good proportion, though a minority, of those who call themselves "behavior analysts" would also say they are "radical behaviorists," that is, identify themselves with the central tenets of Skinner's approach to the analysis of behavior, another set who also designate themselves as behavior analysts say they are "interbehaviorists," that is, they advance J. R. Kantor's program for a science of behavior. There are other groups, with members in ABAI, with fundamental differences sufficient enough so that they distinguish themselves with an explicitly different name, such as the group led by Arthur Staats that designates its approach "paradigmatic behaviorism." These latter groups identify themselves with the discipline of psychology.

ABAI appears sensitive to these various concerns as it attempts to sort out the problems of independence and disciplinary identity. A brochure, mailed out in early 1992 under the auspices of the organization, defined, rather mildly and rather broadly, behavior analysis as "a science-based helping profession based on ... basic principles of learning. ..." A number of members raised a fuss over such an ecumenical definition; enough so, that in a subsequent Association newsletter the President of the Association issued a retraction of the definition, claiming it was a clerical mistake. Apparently, a definition that tried to please all

quarters did not succeed in pleasing any. He provided no corrected definition. Given these considerations, it is difficult to predict the future of "behavior analysis." But the state and regional groups that affiliate with the central organization have many members, especially in California and Florida. Most of these members deliver services to the public as clinicians, counselors, therapists, and teachers, and work in a variety of institutional settings where they engineer behavioral changes from the behaviorological and psychological principles they know and accept. It may be, given the variety of basic behavioral science formulations advanced in ABAI through the differing disciplines represented within ABAI, that ABAI will settle into an engineering counterpart to the basic behavioral science organizations, just as aeronautical engineers, chemical engineers, mechanical engineers, petroleum engineers, and so on, apply principles from physics, chemistry, geology, and the other physical sciences, behavior analysts, subdivided into specialties such as clinical behavior analysts, educational behavior analysts, organizational behavior analysts, and so on, apply techniques derived from principles of the various behavioral sciences, such as anthropology, behaviorology, and others. The drive to credential these members in order to protect their practices will promote an independent discipline and profession, however defined. At any rate, as in psychology, though not yet proportionately with so few adherents, the Skinnerian paradigm is now a minority view in the behavior analysis community.

Behaviorology and the Exit from Psychology

A third scientific community emerged from B. F. Skinner's reworking of behaviorism. It became evident to a small number of professionals that a unique subject matter was in place, expressed in the repertoires of a number and variety of scientists, and that this repertoire was governed by Skinner's approach to a science of behavior, a science with its origins primarily in biology. The greatest impact on Skinner's thinking was by W. J. Crozier, an eminent physiologist at Harvard, through the contact with Crozier in his and his students' courses and in the work Skinner did in Crozier's laboratory. Through Crozier, Skinner was influenced by Jacques Loeb, a turn-of-the-twentieth-century biologist, who emphasized the engineering of biological phenomena and the analysis of the behavior of the organism as a whole. Skinner's thinking owed little to what he studied in the psychology department.

It was further evident that this community could be deemed a coherent scientific community, though its members were scattered here and there within other disciplinary settings. It was also evident that lumping these individuals together with other behaviorists confused and misinformed the public and other science professionals, since Skinner's formulation had little to do with traditional behaviorism except in the common interest of a scientific approach to the study of behavior. Such observations led to the conclusion that this community should identify itself by applying a name—*behaviorology*—that designated the collectivity of those holding a common formulation in an independent discipline studying its own special subject

matter.

By identifying the new discipline of behaviorology, a number of advantages would accrue both to those within and outside this community. It would expedite communication among members. It would clarify distinctions and commonalities between this new discipline and other disciplines. It would facilitate getting along with other colleagues and disciplines, since it is quite evident that, when one scientific community is set in the middle of the institutional arrangements meant to foster another scientific community, unnecessary conflict ensues between the members of those differing communities. The explicit recognition of the science would enhance that science in the sense of making it easier for its members to do their work. Behind all the social and institutional efforts to put the new science in place was, and is, the attempt to gain the recognition of the right to pursue *another subject matter*.

Though the subject matter of behaviorology differs from that pursued by other disciplines, of particular concern to at least some members in the behavior analysis and the psychology communities is the conceivable overlap of purpose due to possible commonality of subject matter studied. But, as earlier pointed out, no particular scientific subject matter has been specified for behavior analysis, at least by the association with that name, other than what its name implies—to analyze behavior; a characteristic shared with the other behavioral disciplines. Psychology, as a discipline, presents a more complex case. The overwhelming majority of the 100,000 or so psychologists, whatever else their differences, appear to agree that psychology is the study of the mind and of cognitive processes and structures; so there is intense interest in development and developmental stages as understood by Piaget, Kohlberg, Erickson, Bruner, and others; in psycholinguistics as understood by Chomsky, Brown, and others; in perception as understood by Gregory, Hochberg, and others; and in the underlying neurophysiology of all these psychological phenomena. None of these interpretations or definitions are the subject matter concerns of behaviorologists. They wish neither to study nor to analyze them. Now, as far as this behaviorologist is concerned, there may very well be mental states and mechanisms that transmit knowledge, that perceive the world, and that dictate performance. These psychological phenomena, whatever their veridical merit, are studied by psychologists and best studied by them.

Behaviorologists study another phenomenon altogether.

Effects of Contingencies upon Behavior

The subject matter of behaviorology, and thus the phenomenon studied, is the contingent relations between actions and other events. Actions and their consequences are the focus of concern; not the organism nor its setting per se. The organism is, as it were, a convenient agency by which to explore and discover behavioral properties. Along with its milieu, it is part of the context in which these properties must be understood. This study strategy in the abstracting of behaviorology's subject matter parallels that of the other sciences. For example, biologists study corn kernels and fruit flies to discover principles of genetics that

apply to a variety of organisms over many circumstances. Concepts such as “recessive” or “dominant” alleles do not characterize either fruit flies or corn kernels. They describe certain biochemical relations that exhibit themselves in certain phenotypical properties across a variety of species. Or to take another example: physicists may observe the “falling” of pebbles and planets, but terms such as “acceleration” that describe this movement do not describe a trait of pebbles or planets. They describe a property of a system of relations in which mass may be one component. The last example will illustrate the same scientific strategy in behaviorological science: The pause after reinforcement in a “fixed interval schedule” is not a property of pigeons or persons, but the result of contingencies that causally connect actions to events in a certain way regardless of the organism involved. In focusing on behavioral contingencies, of primary import is the *system* of relations between behavioral events and other events; relations that are reciprocally interdependent and probabilistic. Such a descriptive system will eventually call for terms that explicitly denote these reciprocal interactions and not the bodily states of the organisms involved in them. For example, since “punishment” implies what an organism is feeling and “discrimination” what an organism is perceiving, terms such as these will be replaced by others more accurately descriptive of the interactive relations observed.


In these contingent interactions, the starting unit, and the primary basic unit, of behaviorological analysis is a two-term relation, the operant—a class of actions with similar contingent consequences. The contingent relation of the operant is based upon the fact that all actions have effects, and all actions vary. The effects of actions change the setting in which the actions occur. These changes, in turn, alter one or more of the properties by which the variability of behavior is described. The consequent effects of these postcedent changes increase or decrease the probability of a given operant. All actions occur in time. Given an action as our point of reference, “antecedent” refers to events occurring before that action and “postcedent” refers to events occurring after that action. The terms refer to the time location of events and not to their causal attribution. *A behaviorological analysis, then, does not start with an antecedent stimulus to figure out why the organism behaves as it does.* The analytic unit of the operant starts with the variability of any given set of actions and focuses on how events following those actions affect their variability. Such an interdependent relation defines a minimal behavioral system. With any given behavioral system, the analysis can grow increasingly complex. When the two-term relation of the operant occurs in consistent settings, it becomes paired with prior events that increase the probability of the operant occurring. The contingent interdependent relation becomes a three-term one. Such three-term relations cover a wide arena of everyday behavioral relations. Still, merely a few of the combinations—their synthesis—of the analytic components of such a system of contingent interactions have been described and classified. Only the simpler behavioral relations have been mastered. But more terms can be added to describe any system of contingency interactions, so behaviorological analysis now reaches to four or five

or n-term relations. The analysis adds as many terms as a quantitative description of their functional relations can sustain. And thus the analysis can extend from anthropology to sociobiology, from a pigeon pecking at a key to a novelist pecking at a keyboard.

The Prospects for Selectionism

The rallying cry, “behaviorism,” now sounds in a muted voice. It no longer represents the changes in the different scientific communities that heeded its call. *Behaviorism* as a term descriptive of a particular approach to a subject matter does not capture the distinctive characteristics of a behaviorological analysis of behavior. The label, “behaviorism,” properly belongs to psychology and is applicable to one or more of the schools that make up psychology. “Behaviorism” was the rallying call for those schools that contended that behavior was the proper subject matter of psychology. How that contention is sorted out is best left to the psychologists. *Selectionism* now best represents the assumptions that behaviorologists bring to bear in their analysis and explanation of behavioral phenomena. The term draws attention to the mechanism, selective consequences in given contexts, responsible for both the change and the maintenance of behavioral properties. Selectionism points to the relevant subject matter for behaviorologists: *the contingent relations between actions and events*. Such contingencies are of prime interest, not behavior *per se*, and the effects of natural and cultural selection explain these contingent relations.

“Behaviorism” as a word now presents itself in many guises. Detailed discussion of the term usually must resort to adjectives placed before it to specify the variety of behaviorism discussed: for example, “emergent behaviorism,” “inter-behaviorism,” “methodological behaviorism,” “paradigmatic behaviorism,” and “radical behaviorism.” Each promotes its nuances, defends its differences, and celebrates its distinctions. Perhaps such enthusiasm may be expressive of what Freud would describe as “the narcissism of small differences,” but it may also express the vitality of the variability endemic in American science, a variability that gives great room for innovative breakthroughs to occur. In any case, not all in the behavior analytic community and only a few in the psychology community designate themselves as “behaviorists”—at least of the generic sort, and promote what at best is an ambiguous “behaviorism.” In the behaviorology community the term is also dropping out. “Behaviorism” muddles that group with psychology and misrepresents behaviorology’s basic governing assumptions. The duration of “behaviorism” as a self-applied label may end with this decade; though as a label applied pejoratively by others it may last longer.

The critical issue, however, is not the name. The shift from “behaviorism” to “selectionism” represents the evolution of one scientific community struggling to understand the complexity of the organism’s interaction with its world. The term “behaviorism” may be fading. But the science that Skinner initiated flourishes in a community based upon and continuing that science. 

A Challenge to the Mentalistic Order: Barriers to the Dissemination of a Behavior Analytic Philosophy

Eli Rector, M.Ed., BCBA

I used to be more interested in the question of consciousness. The question of what it was and how it happened seemed fundamental to understanding why humans do what we do. The “problem” of consciousness was key to the question of free will, which all broader questions of social politics seemed to hinge on. It was a decades-long, rambling trip which ultimately — quite by chance — led me to behaviorism, the actual science of behavior, which generally puts this question to bed. Or at least tucks it in nicely. Not that the explanation is complete, but there is plenty of basic science from which to derive a solid foundation on the matter.

Of course, this understanding is far from mainstream, for a variety of reasons. In the main, it is an unintuitive understanding: “I” plainly choose my behavior, do I not? Free will seems self-evident. But as is often the case with “common-sense” intuition, this evidence is a cultural construct. We live in a world in which the individual is assumed to be the master of his own destiny. In the majority of Judeo-Christian religions, common interpretation views man as a free actor in a morality play, choosing between the temptations of the devil and religious teaching, each moment the crux of an epic, metaphysical struggle. Our legal system follows suit, as it has tended to since its founding. The “guilty” is he who could have acted differently but *chose* not to. Our economic system also follows, assuming the profit of man’s economic actions to be his own responsibility — whether leaving him destitute or in gilded chambers.

The intuition-based concept of the Free man is thusly reinforced everywhere through social institutions at every level. But the meat of the intuition, fundamental in these larger structures, is a philosophical game we have all learned to play. Behaviorists call it “mentalism”, and it is as essential to our early formation as the milk in our baby bottles. In his paper [*Behavior Analysis, Mentalism, and the Path to Social Justice*](#), Jay Moore writes:

...Mentalism may be defined as an approach to the study of behavior which assumes that a mental or “inner” dimension exists that differs from a behavioral dimension. This dimension is ordinarily referred to in terms of its neural, psychic, spiritual, subjective, conceptual, or hypothetical properties. Mentalism further assumes that phenomena in this dimension either directly cause or at least mediate some forms of behavior, if not all.

Examples of mentalism are rife in our language. People get into fights because they are “angry”. People don’t do their work because they are “lazy”. People do great things because they are “driven”. The list of adjectives supposedly describing causative inner states is endless. People act because they are: smart, dumb, ambitious, shy, calculating, cruel, evil, compassionate, kind, generous, stingy, clever, funny, quiet, rambunctious, etc.

Yet what are these words actually describing? People certainly behave in ways that have these characteristics. However, this is not an explanation but rather a description of past behavior, and an educated guess as



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to how they might behave in the future given similar circumstances. The problem with mentalisms is that they can easily become circular: a person acts a certain way, is described with a mentalistic term, and the term is then purported to be the cause of the behavior.

The so-called “cognitive revolution” in the social sciences, heralded in by Noam Chomsky’s famously vicious critique of Skinner’s landmark work, *Verbal Behavior*, was predicated on the notion that mental events are indeed causative. To this day, cognitivists use the architectural language of the personal computer to seek out causation, hypothesizing mental events using computational terms like memory, processing, and algorithms. However to Skinner, all of this is merely further description. Even if one were to develop a precise cataloging of every possible rotation of the smallest molecular particle involved in the process of say, my daydreaming about fishing for trout, it would still have nothing to say about what actually causes my thinking behavior.

Here, the behaviorist has the advantage of being informed by science, more specifically the science of behavior. A core principle of radical behaviorism is that a science of behavior is possible. That is, behavior is a deterministic process which can be understood without appealing to non-physical events. To the behaviorist, the *structure* of the moving parts - while certainly an honorable and interesting subject phenomenologically - is secondary to the larger truth of causation: that behavior is a product of an environment acting upon the genetic make-up of an organism over time. Behaviorists design experiments to manipulate environmental variables, in order to find controlling relationships with variables that are dependent on the manipulation.

However, society is still firmly in the camp of the structuralist. While I realize there is an element of simplicity to the notion that to completely understand a thing is to account for all of its parts, I’ve long been suspicious that the zealous embrace of Chomsky’s attack on Skinner was ultimately more about a cultural zeitgeist than anything else. In 1971, Chomsky showed his cards a bit when he wrote a statement so absurd it offers a clue to his sense of deep ideological resentment: “At the moment we have virtually no scientific evidence and not even the germs of an interesting hypothesis about how human behavior is determined.”

America was entering the 1960’s, and libertarian rebellion was fomenting against the strictures of the past. Nothing less than a quasi-religious awakening was occurring, which sought to bust the shackles of old institutional dogma and paint a road to enlightenment upon the canvas of the expanding mind. In the eyes of the many on the left, institutional knowledge had brought us the atom bomb, Vietnam, sexism, racism, and the suit and tie. To many on the right, scientific knowledge was less suspect, but to the extent that it encroached upon the established order of institutions such as the church, marriage, and capitalism (communism was an existential threat almost nothing ought not be sacrificed to prevent), it was dangerous for different reasons.

Skinner’s *Verbal Behavior* could not have come at a worse time. In it, he laid out the most detailed and cogent argument yet for a radical behaviorism in which all of human behavior—including thought itself—was under the control of

physical contingencies. In his suit and tie, with his cumulative records and operant chambers, he represented everything the left despised. As Camille Paglia argued in her essay *Cults and Cosmic Consciousness: Religious Visions in the 1960’s*, the 1960’s was a time of “spiritual awakening” and “rebellious liberalization”, just one of many religious revivals in American history. She likens the period to Hellenistic Rome, in which “mystery religions” rose up in response to an oppressive institutional order. Dionysianistic practice emphasized “a worshipper’s powerful identification with and emotional connection” to God. She goes on to note the context in which a certain long-haired man in sandals rose to prominence:

The American sixties, I submit, had a climate of spiritual crisis and political unrest similar to that of ancient Palestine, then under Roman occupation. In the 20th century, the culture moment was projected through popular media icons such as Frank Sinatra, Elvis, Jim Morrison and the Beatles: each embodied the generation’s desire for personal emotional liberation and sexual independence.

Describing a strange episode in which rumors circulated of Paul McCartney’s premature death:

The hapless McCartney had become Adonis, the dying god of fertility myth who was the epicene prototype for the deified Antinous: after Antinous drowned in the Nile in 130 ad, the grief-stricken Hadrian had him memorialized in shrines all over the Mediterranean, where ravishing cult statues often showed the pensive youth crowned with the grapes and vines of Dionysus.

Burrhus Frederick Skinner, with his measured demeanor and supremely rationalistic style of communication, was the very opposite of Adonis.

On the right, his argument was often viewed as nothing less than paving the way for godless totalitarianism. Indeed, in his 1971 *Beyond Freedom and Dignity*, he writes:

A free economy does not mean the absence of economic control, because no economy is free as long as goods and money remain reinforcing. When we refuse to impose controls over wages, prices, and the use of natural resources in order to not interfere with individual initiative, we leave the individual under the control of unplanned economic contingencies.

The critique, whether or not its fear that radical behaviorism leads to a state controlled economy is quite irrelevant to Skinner’s point: if human behavior is controlled by contingencies, then they will be in effect no matter what type of economic system one chooses.

On campuses across America (Europe had never quite embraced behaviorism to begin with), young students (future professors) of psychology took up the banner of cognitivism and never looked back. Never mind that most of them likely never bothered to read *Verbal Behavior*. Granted, it is a difficult book. Radical behaviorism is a concept which requires a good degree of open-mindedness, and courage to go where the evidence takes you, rather than relying upon the

safety of old cultural intuitions. It no more paves the way to totalitarianism than does Darwin's theory of evolution pave the way for eugenics. But like evolution, radical behaviorism is rather unintuitive. Both are selectionist. In evolution, the organism is the product of a biological shaping process extending back through time, with each generation. There is nothing in the structure of the organism, per se, that "is" evolution. The only way to understand evolution is by examining the relationships between organisms - which have been *selected* - over long periods of time. Similarly, radical behaviorism says there is no thing in the organism that «is» behavior. Rather, the behavior is selected for over the course of the organism's lifespan.

Just as the genetic configuration is selected that most suits the organism to its environment, the organism's patterns of behavior are selected which have been most reinforcing. Just as the genes for a white coat have been selected as most beneficial for polar bears hunting in the arctic ice, the behavior of speaking the phrase "Where is the restroom?" has been selected as most beneficial in English verbal communities. Once familiar enough with the basic science of evolution, the concept isn't too difficult to grasp. I think the same can be said for radical behaviorism.

Most people never have to fully grasp the complexities of the science of evolution—radiocarbon dating, genetic drift, sedimentary rock, random mutation, etc.—in order to embrace it. Instead, they can rely upon a social environment in which the "settled" science immerses them from grade school to instill in them an intuitive grasp of geologic time and the notion of natural selection. The science of behaviorism has no such mainstream acceptance. Therefore concepts such as discriminative stimuli, schedules of reinforcement, the matching law, respondent versus operant, extinction bursts, establishing operations, etc. are not considered "settled" outside of the field and no such intuition is able to be built.

Rather, mentalistic accounts of behavior rule the day with nearly the degree of vigor that they did a hundred or even a thousand years ago. In this sense, society operates with a basic psychological outlook that could quite easily be considered medieval. Indeed, one only need look towards subjects such as criminal justice or income disparity to see where such thinking leads—in which "driven" men claim moral right to mansions, and "evil" men are delivered to concrete cells of solitary confinement. So too in our daily lives do we encounter the suffering and anxiety caused by confusion over the basic principles of behavior. Intuiting the actions of others as being *caused* by them, we become resentful and intolerant, blinded to the reality that their actions result from contingencies in their lives.

Further still, we turn this false mentalism upon ourselves, believing falsely that there is something *in us* that is responsible for our actions, as opposed to the contingencies by which we are shaped. Just as we develop toxic emotions as a response to others, we develop them in response to our own «self». We imagine this entity as responsible for actions we would rather not have occur. This leads us down the fruitless path of «becoming better people», and looking only into our own thoughts and feelings, rather than examining the func-

tional relationships between our environment and our history of reacting within it. We have been sold on the notion that there is something wrong with how we "process" the environment, rather than our behavior being a perfectly natural, learned response to environmental contingencies.

The cognitive revolution did not represent a shift from a centuries-old deterministic, mechanistic view of behavior in which Free man did not exist, to a new view in which Free man existed as a function of a "self" which processed information and chose to act based upon some emergent, metaphysical system. Rather, for hundreds or even thousands of years, Free man was commonly assumed to exist as an independent actor responsible for his own lot in life, and it was only for a brief period—a few decades—that behaviorism developed and held sway in psychological study. Aside from it being a mature, complex field of study with numerous insights into human behavior, to the extent that cognitivism rejects a behavior analytic approach in favor of appeals to mentalism, the cognitive revolution would better be described as a "cognitive reversion" to the old, intuitive conception of "self" that has always been foundational to religious, economic, and civic institutions.

However, as fitting for a revolution, cognitivist mentalism indeed led to a widespread purging of behaviorism as a respectable science. In *The Structure of Scientific Revolutions*, Thomas Kuhn writes of this process:

When it repudiates a past paradigm, a scientific community simultaneously renounces, as a fit subject for professional scrutiny, most of the books and articles in which that paradigm had been embodied. Scientific education makes use of no equivalent for the art museum or the library of classics, and the result is a sometimes drastic distortion in the scientist's perception of his discipline's past. More than the practitioners of other creative fields, he comes to see it as leading in a straight line to the discipline's present vantage. In short, he comes to see it as progress. No alternative is available to him while he remains in the field.

To the hapless psychology student, there is simply no point in engaging with behaviorism beyond the most primitive level. While describing an important part of human behavior, textbooks routinely dismiss Skinner's work as antiquated when it comes to dealing with the true complexity of human behavior. While it is sometimes suggested that cognitive science hasn't *abandoned* behaviorism, but rather quietly subsumed it, David Palmer [argues the contrary](#):

....Such examples suggest that, instead of building principles of behavior into its foundation, cognitive science has cut itself loose from them. Cognitive psychology textbooks neither exploit nor review reinforcement, discrimination, generalization, blocking, or other behavioral phenomena. By implication, general learning principles are peripheral to an understanding of cognitive phenomena. Even those researchers who have rediscovered the power of reinforcement and stimulus control

hasten to distance themselves from Skinner and the behaviorists. For example, the authors of a book that helped to pioneer the era of research on neural networks were embarrassed by the compatibility of their models with behavioral interpretations: "A claim that some people have made is that our models appear to share much in common with behaviorist accounts of behavior ... [but they] must be seen as completely antithetical to the radical behaviorist program and strongly committed to the study of representations and process."

I routinely encounter Psychology graduates who possess little more than a rudimentary understanding of behavioral principles. If the general education teachers I worked with in public schools were consciously applying behavioral principles in their classrooms, they certainly never spoke of it.

In my own training, as an undergraduate in the Social Sciences, and as a graduate in Elementary Education, Skinner's work received at most a total of one lecture in an undergraduate course, and a paragraph or two in graduate school. His work on operant conditioning, while acknowledged as important to understanding learning at rudimentary levels, is quickly passed over in favor of the work of cognitive theorists such as Vygotsky (zone of proximal development, scaffolding), Piaget (schema), Bandura (social learning) and Erickson (psychosocial development), who are commonly viewed as offering something more than would be possible through adherence to behaviorism alone. Their work is commonly viewed as refuting behaviorism, and thought of as taking our understanding of learning further, in ways that would be impossible under a behavior analytic approach, and thus more critical to learning and social development. While their insights are indeed valid and useful, to view them as in any way a refutation of behavioral principles would be a serious error. Each of these theorists' work can easily be accounted for via the application of behavior analytic principles. Ironically, to the extent that these cognitive theories fail to engage with the scientific, behavioral principles underlying their existence, they are in their own way reductionist; to properly understand the concepts of *zones of proximal development* or *schema* without taking into consideration principles such as *establishing operations*, *generalization*, *learning histories* or *schedules of reinforcement* is to reduce these phenomena to vague simplifications. Yet simplification, especially when presented in the context of a compatible reinforcement history, is itself highly reinforcing. To an individual raised to believe in an all-powerful God who is communicated in an inerrant bible, the notion of divine creation of man in a short period of time is much easier to embrace than a chaotic process of natural selection over hundreds of millions of years.

The first edition of *On the Origin of Species* was published in 1859, but the theory of evolution wasn't widely accepted until decades later. Widespread public acceptance wasn't gained until perhaps the 1940's, with the Catholic church in 1950 eventually allowing that evolution is at least compatible with the bible. Still, to this day evolution remains

a controversial theory accepted by only 60% of the populations in the U.S. and Latin America, according to Pew Research (2015). In many respects, the evidence for evolution is more clear-cut, in that developments in multiple areas of science—from biology to geology to particle physics—have played a key role in its understanding. The structure of DNA was not even understood until a century later. In many respects, our understanding of the brain is much less far along. For behavior skeptics, an emphasis on structuralism combined with mentalistic bias, points toward an almost unfathomable complexity. Indeed, consciousness has famously been coined as "the hard problem"—a rather mythical designation. Behaviorists who question whether the problem is all that hard are often labeled as "reductionists"—too easily seduced by a naively simplistic account of a complex phenomena.

But the radical behaviorist does not deny the complexity of the moving parts (environmental stimuli, biological factors, and past history). Rather, he merely insists that at its core there is a deterministic, functional relationship at work. I'm often struck by the similarity with the "Intelligent Design" argument put forth by evolution skeptics. Biological organisms are claimed to be "irreducibly complex", so as to never have been able to originate without an intelligent designer. Yet this argument also chooses to misdirect attention to the structure of the organism, to seek an understanding of it removed from the context of history. And just as evolution can only be understood as a function of geologic time and the interplay between genes and environment, so too can behavior only be understood as the interplay between the phylogeny (genetic history) and ontogeny (environmental, life history) of an organism.

Compared with Darwinian evolution, the rate of acceptance of radical behaviorism over cognitivist mentalism may not be in terrible shape. Maybe by the 2040's we'll have seen a steady shift towards a behavior analytic approach. However, I have my doubts. Evolution's largest direct social implication might have been a sound refutation of biblical literalism. But that was never so central to our institutions. Religious freedom, after all, had long been enshrined in our constitution.

The threat from the radical behavioral perspective to the established institutional order is in my view much greater, in that it provides scientific justification for the moral claim that as social products, ultimate accountability lies in the system we build for man, not for man's actions within that system. How to redraw our institutions so as to align with this truth is the real challenge. But we must begin with the premise that, to the extent that it is founded in mentalistic notions of human behavior, the current system is not only unjust, but misguided and philosophically corrupt. There are a great many aspects to the current order that are reinforcing to behavior that preserves it, not the least of which is simple human greed (the tendency to accumulate wealth in a manner that is unjust). But the opposite of greed is generosity, and generous acts are simple to argue for. What is more difficult is the untangling of the mentalistic rationale for systems that allow the behaviors of human greed. 🦋

William Parker, PhD: How I Met Skinner, and What His Courses Were Like



history
of
behavior
analysis

Interview by David Roth

In 1959, you were enrolled at Harvard in Skinner's famous Natural Sciences 114 course. Is that correct?

That's right. I had entered Harvard in the fall of 1958. I was in the graduating class of 1962. I had what was called a regular Navy ROTC appointment, and as part of the Navy requirements for my undergraduate studies I was supposed to take a course that had a bearing on the general subject of *leadership*. Skinner's course was accepted as being something that would fit that requirement. I had also done some general reading in Psychology, although I had never read anything before by Skinner. So I enrolled in his course because I was interested in it, but also because it was accepted as part of the Navy program.

For me that would be a complete dream course to have taken with Skinner, and I imagine the same is true for many of our readers, so would you mind sharing with us the details of what that course was like? What was it like in the classroom? What was Skinner's lecture style? Anything you would like to share with us to give us an idea of Skinner in the classroom.

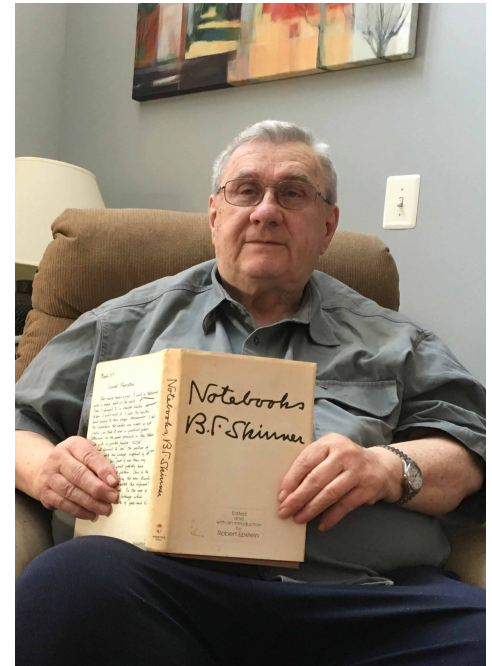
Well, I think Skinner had more or less a conventional style of lecture. He used quite a few visual aids and, I think he generally tried to be friendly, non-threatening, and good-humored toward his students. I use the phrase "non-threatening" because we are talking about 1959, and university lecturers back in those days, at Harvard and other schools, didn't necessarily assume they had to be non-threatening toward their students. I saw lecturers in other courses at Harvard where the lecturers would sometimes become rather belligerent toward the students if they felt that they weren't doing the assignments well enough or weren't paying attention well enough, but Skinner, in general, used a positive and encouraging approach to the students, and used humor as part of his teaching techniques. So even at that early stage, Skinner's teaching style reflected his own general philosophy of education and learning. He didn't try to threaten or bribe these people to try and get them to learn.

Skinner used this class as a sort of venue to experiment with his teaching machines—is this correct?

That's right. The main points of the course material had been converted into programmed instruction form on paper tapes. In another room from where the lectures were given there were some wooden teaching machines where the material was presented on paper tapes, and also the students' responses were recorded on paper tapes. That seems quaint by today's standards where everybody is more or less familiar with computerized data systems, but in those days there weren't very many personal computers. There were not many computers in general around, but those would have been main-frame computers. And so Skinner was experimenting with his instructional technique and collecting data using paper tapes.

Did you enjoy working with these teaching machines?

I didn't mind it, but I was at first puzzled as to what the whole thing was about. I think it was effective using the step-by-step method



In the late 1950s, Bill Parker was an undergraduate student at Harvard and took two classes from B. F. Skinner, the famous Natural Sciences 114 and an advanced seminar on topics in behavior. Upon graduation in 1962, he entered the navy just in time to participate in the blockade at the heart of the Cuban missile crisis, but he was later assigned to the navy's Behavioral Sciences Group at China Lake, California. Because of his connection with cetacean research, he met Karen Pryor, who was then using behavioral procedures to shape the behavior of porpoises and other marine animals at Sea Life Park in Hawaii. It was Dr. Parker who arranged to introduce her to B. F. Skinner in Cambridge.

When Dr. Parker left the navy in 1966, he entered graduate school in political science at MIT.

Dr. Parker subsequently became a researcher on political behavior and on cross-cultural perception and communication, but he continued to correspond with Skinner and occasionally meet him in person.

with immediate positive reinforcement if you could produce what would appear to be a correct response. So, I wasn't bothered by it. At first I guess you would have kind of a novel stimulus reaction. I hadn't seen that before. I didn't quite know what it was about. But, it appeared to work very well.

How many students were in the class?

I think there were close to 200. So, it was a large lecture.

As far as the assignments, did they tend to be pretty difficult?

They were difficult in the sense that I wasn't familiar with Skinner's terminology and whole approach. I think they weren't difficult other than that. He used his textbook *Science and Human Behavior* as a standard text, and we had to read our way through that. I think it was mainly a problem of getting acquainted with Skinner's terminology. What did he mean by reinforcement? What was variable-interval reinforcement? What was fixed-ratio reinforcement? Why did he use the particular definitions that he did? Why did he consider that negative reinforcement was not the same thing as punishment? Skinner had his own set of careful definitions, which sometimes even professional psychologists from other backgrounds didn't understand. So the assignments weren't especially difficult. It was unfamiliar to me, even though I did have some background reading in psychology. I was interested in the whole subject, but Skinner's approach and formulations were new to me at that time.

Well, he must have been effective enough with you, because in the fall of 1961, you took another course with Skinner, and this was an advanced graduate level seminar on behavior analysis. In what ways was this experience different from your enrollment in his Natural Sciences 114 course?

Well, I had gotten acquainted with Skinner personally, in between the spring of 1959 and the fall of 1961. I had undertaken to talk with him personally on a few occasions—not very often, but we had gotten acquainted. The advanced analysis of behavior course was much smaller and, as I recall, there were only around six or seven students in it. Skinner would conduct it as a more informal discussion. He would usually suggest something, but he wouldn't give a lecture as such in that course. He would sometimes give a reading. We had a couple of books that we were looking at and he would make a few observations on that and invite our discussion of it.

Did he use his own books as textbooks in this course?

Not that I can recall. He used some other books, in particular the one on the Summerhill education experiment, which was done by other people. It was not Skinner's work,

but it was a very famous project at that time.

Since you became personally acquainted with him during this time, can you share a little bit about what Skinner was like in person when you met with him face-to-face?

Well, he was in general reserved and private. I wouldn't say he was cold. Some people had described him as cold and like an automaton dedicated to his principles or his way of looking at the world. But I found him reserved and private, which I probably am myself most of the time. We would discuss some point having to do with his work, or behaviorism, or discuss current affairs, or some event that was going on, and then he would give his way of looking at it. But, I was interested—one time when talking with him personally, I mentioned that in one of my government lectures, which is a basic course in the Government Department, an old and senior professor there named William Yandell Elliott had engaged in an outburst at Skinner. Elliott, as I remember him, was one of those kind of old-style professors who weren't slow to be belligerent toward the students or anyone else that they took issue with, but Elliott said something like, "Walden One, Walden Two, Walden Three—let him play with his

rats in a maze and find his way out if he can." So, I was kind of startled at that ... you know I had been on the verge of going to sleep before that during Elliott's lecture, but why did he engage in this outburst against Skinner? I told Skinner about that in his office, and Skinner later referred to it also in one of his memoirs,

A Matter of Consequences. Skinner seemed to be sad that a colleague—even though he was in a different field and not someone he was personally involved with, but a colleague at Harvard—would have such a misunderstanding of him and his work. Skinner had never worked with rats in a maze. I think when he began to study psychology after having been in physiology, he had immediately concluded that the whole methodology of using mazes was too complicated, and he didn't use it to develop what became famous as the Skinner box, which is much simpler and a more controllable environment than the idea of the maze. But, he appeared to me to be genuinely sad when I told him that Professor Elliott had had this outburst about rats in a maze. Skinner kind of shook his head and looked a little bit saddened by it as he said, "Well, he probably does think I do work with rats in a maze," and that was a fundamental misconception. But, I think that even though Skinner was very goal-oriented and would keep on with his own work and his own purposes, whatever they were at the time, he was also sensitive to what other people thought of him and his work. He was sorry if there was a serious misunderstanding, but he said at other times, "Well, you can't spend all your time correcting other people's misunderstandings. You have to do your own work, and eventually people who really care about it will

Skinner was very goal-oriented and would keep on with his own work and his own purposes.

understand it correctly, but you can't just waste your time endlessly collecting misconceptions and misunderstandings that people have." I thought his sensitivity was illustrated another time when I was watching him in a lecture, again with a large audience, and he told a little joke or a funny story, and the students who were there laughed. Skinner kind of leaned forward and he said, "Oh, thank you for laughing." I thought that was a little bit plaintive, but again that appeared to me to indicate that he was genuinely appreciative. But he was also sensitive, wondering *will they respond to me in a positive sense?*

In that advanced seminar on behavior analysis, there was an assignment that was required at the end of it. He had noted your interest in government, particularly, and he had an idea for an assignment for you. He asked you to write on sovereignty, am I right?

Well, yes, each person in that little seminar was supposed to do a research paper or a concept paper suggesting how the behavioral analysis would apply to his own field. I don't recall what the other people were in. Maybe some of them were psychology students. Maybe some of them were education students. As far as I know, I was the only one there in government or political science, and I was majoring in political theory. That was my specialization in the field of government. I was having trouble coming up with a proposal for a paper that Skinner would recognize as being related to his field, but that I could also deal with. At one point he was talking to me and he said, "Maybe you could take sovereignty and treat that from a behavioral viewpoint." Well, I didn't quite see how I could do that. I don't think that it could not be done, but it's kind of a narrow legal concept, which is related to political theory. But I didn't see immediately how to relate that to the analysis of behavior, and so I did something else instead.

Do you want to share a little bit about what you did instead?

If you'd like. I was in the field of political theory and it appeared to me that the whole issue of conflict, conflict management, and conflict studies was very basic to any definition of politics. Political scientists and political theorists of that time were not in much agreement, and they couldn't come up with a good definition. But I had come across Thomas Schelling's book called *Strategy of Conflict* and it had come out just the year before, in 1960. By the way, it had been rated by one group as one of the 100 most influential books in the West since 1945. If you consider all the thousands of books on serious subjects that had been written since 1945, one group rated Schelling's book as one of the 100 most influential in that time period. And I wouldn't be surprised if they were correct, although it may have had a narrow audience. But, anyway, Schelling was an economist at Harvard, but he was also a game theorist and a strategic analyst, and later on he became a professor of political economy at Harvard. So, he was lecturing on political theory and international relations and strategies, not only on pure economics. He did that for years later on, and later on he shared a Nobel Prize. But, anyway, I

was very interested in his book and his use of game theory concepts in situations in the book, which was relatively new at that time, so I did the research paper for Skinner's seminar on that. I think that Skinner was a little surprised by that, but he was willing to go along with the gag, so to speak. I was suggesting how some of the situations that Schelling described from a game theory viewpoint might be treated from a behavioral analysis and reinforcement viewpoint. It was a somewhat different interpretation than the straight game theory interpretation. A few months later I met Schelling. I didn't know him before, but he had read my paper through the good offices of another professor who had given him my paper. He said to me, "I read your paper and I felt a bit defensive about it." So, I enjoyed that and I enjoyed getting to know Schelling, but the reason I had written that paper was that I was wracking my brain for something to write from political science, but that would connect with Skinner's seminar on the Advanced Analysis of Behavior.

After your time at Harvard, you ended up becoming acquainted with Karen Pryor. During this time you and Skinner maintained contact with each other, and you actually played a significant role in introducing Karen to Skinner. In fact Skinner, in his autobiography Matter of Consequences, mentioned how this came about. He wrote:

William Parker ... occasionally dropped in to talk political science and the experimental analysis of behavior. He knew Karen Pryor, who directed Sea Life Park in Hawaii, and through Parker I invited her to come and show us some of her films, in which porpoises displayed their talents thanks to operant conditioning.

Would you mind sharing with us how you became acquainted with Karen Pryor, and additionally, how it was that you ended up introducing her to Skinner?

That was in 1966, and this is 2016, over 50 years later, so I'm probably a little fuzzy on some of the details, but I had graduated from Harvard in 1962. I had a four-year Navy active duty obligation, and of that I spent about two years on ships. I was in the Cuban missile blockade, a significant crisis, which was interesting. Then, I was assigned to a Navy behavioral sciences group at the Navy laboratory at China Lake, California – one of the very important and very successful Navy laboratories. The behavioral sciences group was mainly concerned with the current studies, including crisis behavior, and we did a lot of research on the history of international crises and behavior interactional crises. Also, we had a partial supervisory role over the cetacean, or dolphin, research program operated by China Lake, which they did on the coast of California, and also in Hawaii. In the fall of 1964, when I was new to the behavioral sciences group, we took a trip to Hawaii, and I met Karen Pryor and her husband and her colleagues at a place called Sea Life Park and Oceanic Institute of Hawaii. That was a relatively new place—I think it was three or four years old at that time, and it was getting a lot of publicity. There was an extensive *National Geographic* article at that time. In general

there was a lot of interest in ocean research, and also in dolphins. So I went there with a Navy group from China Lake and received a tour and got acquainted with some of the things they were doing there. I met Karen Pryor and her husband and some of her other colleagues, including the famous anthropologist, Gregory Bateson. Karen Pryor had already been using Skinnerian operant methods in her training of porpoises and whales, or *Pseudorca*, the false killer whale, but also horses and dogs. She was a great animal lover and animal trainer, and so I got acquainted with some of that. Although I was not the main person in those discussions—there were people there that were much more senior than I was at that time—I did get acquainted with her and Gregory Bateson, and I was able to make some suggestions, which were followed through. I did find that Karen Pryor was constantly using Skinnerian operant conditioning techniques in her work there with a number of animals for the show business purposes for the public, and also in her experimental work. I became a little bit acquainted with her work. As far as I know, at that time, she hadn't had any direct personal contact with Skinner, but she knew very well who he was and had found his work very valuable, and came to openly rely on it in much of her animal training activities. I made a couple more trips with Navy groups to the Sea Life Park after that—one in the fall of 1964—and at some point in my corresponding with Professor Skinner I think I must have mentioned Karen Pryor to him. Otherwise, I don't know how he became acquainted with her work. But, we had some exchanges of notes back and forth, so in early 1966 we arranged for Karen Pryor, who was going to be touring the US mainland, to go to Boston. I went from California to Boston to meet her, and then we went over to meet Skinner at his offices at Harvard. Karen gives a description of that in one of her books, and that worked out very well. I think that was the beginning of a beautiful friendship between her group and

the Skinner team.

Absolutely. Eventually your interest in political science led you to enroll in a PhD program at MIT, where Noam Chomsky was actually a professor of linguistics at the time, correct?

That's right. Chomsky was well known, but he was a professor in a different department. MIT is a fairly large school and if it hadn't been for a political event, I'd never had anything to do with him, but we were in a sense at least on the same campus.

*And this was seven years after Chomsky's infamous review of Skinner's book **Verbal Behavior**, which at Harvard you had read on your own. And you actually talked to Skinner about this; is that correct?*

I think I had at that point talked to Skinner in passing about it, and I recall at one point Skinner had said to me that we (being the intellectual community) don't yet have the instrumentation to do the kind of research that Chomsky and his supporters were calling for, which involved the idea of a built-in transformational grammar structure in the brain. I think Skinner was quite right about that. If there is such a thing that would be interesting, but we don't yet have—speaking in the mid 60's—we don't yet have instrumentation to see something like that. And of course Skinner's approach was based on careful observation of what you could observe about behavior and making records of that, but not going in circles chasing things which you cannot measure or find any objective trace of. So, I was somewhat aware of that but I spent more time on Chomsky's criticism of Skinner later on. 🦋

This concludes Part I of David Roth's interview with Dr. William Parker. Part II will take up the story of Parker's challenge to Noam Chomsky and his later interactions with Skinner. It is scheduled to be published in Issue III, 2017 of Operants.

About the Interviewer:



David Roth is currently a behavior analyst consultant for the Pennsylvania Training and Technical Assistance Network (PATTAN) Autism Initiative supporting public school classrooms throughout the state of Pennsylvania. He received his master's degree in Behavior Analysis at California State University, Stanislaus. For over a decade, David has been a passionate student of B. F. Skinner's works, specifically his analysis of verbal behavior. His current interests in the field range from the application of behavioral programming for individuals with verbal deficits to the behavioral interpretations of complex issues that are currently on the fringes of our science.

Dr. Robert Ross: The Importance of Science in Modern and Developing Behavior Analysis



Interview by Katelyn Prue

How did you get interested in the field of behavior analysis?

When I was just starting my master's program at Northeastern I went to a master's thesis defense by a graduate student. I didn't quite understand all of the language at that point because I had not even started the program's first class yet and had never heard of many of the terms. At the very end of the proceedings, once her thesis was accepted, Murry Sidman walked over to student, shook her hand, and said "Congratulations, today you are a scientist." And I remember at that moment, that phrase hitting me: How different it was from my undergraduate degree in psychology! In this program, the Masters in Applied Behavior Analysis, there is a difference between mumbo-jumbo and science. And it was at that moment that I became absolutely certain that I had made the right decision to be in an ABA program — that's who I am, a scientist. Not a psychologist, but a scientist. And to me, that means so much more. It's not just psychology; it's fundamentally a science.

In what ways do you think experimental analysis of behavior (EAB) and applied behavior analysis (ABA) intersect?

Quality application of ABA is predicated on a deep understanding of the basic science. Graduate programs training practitioners need to emphasize the fundamental science behind the application of behavior analysis. All graduate training programs need to emphasize a scientific understanding of the field in order to translate this to the application in the field. Training people in interventions and procedures without giving them a strong understanding of the basic science behind those interventions is not productive, and we need to focus on making sure that the science is fundamentally understood by those we are training to apply it.

In what ways has Skinner influenced your work both in the field, and experimentally?

Selection by consequences, the notion that topographies of behavior occur not as a function of antecedent conditions, but as a function of consequent events. I think, to me, this idea defines the people who understand our science well and those who don't. That fundamental three term contingency really helps us understand human behavior and learning. Selection by consequences and natural selection by Darwin, both show the way that you can mesh how the environment selects, for good or ill. The idea that we can know why people do what they do, and we can have an impact on improving the quality of life for people: We can build skills, help kids learn, and we can change behavior because we can understand why things happen. I'm a relentless optimist. I believe that we can change and fix anything that we want to. And if you understand the science, you'll know that we really can. So, how do you not feel good about doing this stuff? If you know our science, there's no way you cannot be optimistic. If you want to be pessimistic about the society, that's fine, but if you understand the science, you can't help but be optimistic. I guess Skinner is responsible for my relentless optimism.

What questions would you ask Skinner now, if you had the chance?



Dr. Ross is the Senior Vice President of Treatment Efficacy and Graduate Education at Beacon ABA Services of Massachusetts and Connecticut. He received his Master's in Applied Behavior Analysis from Northeastern University and his Doctorate from Nova Southeastern University. Dr. Ross oversees all research activity at Beacon. He also provides direct and consultation services to families, schools and educational programs throughout the U.S. and Canada. He is a founding member and current Past President of the Massachusetts Association for Applied Behavior Analysis. Dr. Ross is also the President of the Autism Special Interest Group (SIG) of the Association for Behavior Analysis International (ABAI), and has served three terms on the ABAI Practice Board.

I look at the current culture. With regard to short-term reinforcement and the seeming need for so many people and, in particular, politicians who appear to focus on access to short term reinforcers, what would he think about that? The emphasis on Wall Street and this quarter's stock prices gets people not to think about long-term outcomes. Immediate reinforcement, with cell phone and Internet access, is emphasized in our culture and it is moving toward immediate short-term access to reinforcement and I think that is to the detriment of our culture and our species. Things like global warming (a distant impact) and other long-term outcomes are less important to us, because in the short term, having cheap gas is better. Skinner was thinking about population issues and sustainability way before it was popular to look at that, so I'd love to hear what he would think about that now.

The other question I'd ask him is a bit more of a personal point and a technical point as well. I was having a conversation with someone recently about a section in *Verbal Behavior*, where there's a wavering on the MO and discrimination. I would love to hear Skinner's thoughts on whether he thinks the MO is a discriminated operant behavior. Does the organism have to be able to detect that they are hungry in order to behave in ways to get food? Why would someone initiate a behavior in order to get some reinforcement if they are utterly unaware of the fact that they are deprived of it? So, an MO has to be discriminated by the organism or its sensory apparatus. So, if I'm discriminating that the condition has changed in some way, and I am responding differentially (as a function of previous history in that or similar conditions), how is that antecedent condition not an SD? How is it an MO if it has a history of differential consequences? I would love to hear his thoughts on that, because that is not a topic that is commonly discussed in conversations of the MO.

My third question for Skinner would be learning how he would feel about the widespread adoption of his science in the application of autism treatment. I think there are lots of people who have a range of opinions about that. He could be very excited that, at least in some fields, people are trying to apply the science extensively and with good effect. But is it to the detriment of its application in other places, or is starting here and moving there a good direction? I think he would have some interesting things to say with regard to that.

Can you tell me about your work within the field on an international scope? In what ways have you seen behavior analysis carried out in these other cultures — is it carried out the same ways here, or differently?

People come from a range of different cultures and all sorts of backgrounds. I had the pleasure of going to Saudi Arabia, and working with children and families there. I do not speak Arabic, yet I was there working with a family to teach their kid to ask for something. Even though I don't speak the language I was able to do imitation training to teach the child sounds that the family taught me. We have different religions and come from different cultures, but we shared a common goal, we were all sitting there trying to get this kid to learn to do something (ask for a preferred item). We're trying to apply the science to get that to happen.

I don't need to speak the language to be able to do that, I just need to be effective and focus on the science. What I've found is that, all throughout the world, there are a ton of people who are trying to learn our science to help other people. It's amazing how many friends I've made based on a shared commitment to helping others. That is a legacy that Dr. Skinner would be very pleased to know that he fostered.

Has your work abroad affected how you carry out ABA here?

It has made me much more acutely aware of how well we have it here, in the US in general, and in Massachusetts in particular. We have resources, systems and structure, funding, and access to quality of people and training, which just isn't available to so many people around the world.

They're trying to get that in other countries, but it is so much harder as they often have fewer resources. It is a challenge trying to start and maintain programs to help support people with disabilities and the autism spectrum disorders. People are starting in other countries with few resources and, often, with no trained personnel. We just don't always recognize how good we have it over here. It's one of those things where going away makes you appreciate being home.

Given that there are so many people with varied notions of behavior analysis, do you think that it is a proper label for Skinnerian science?

This is a tough question on many levels. Labels often separate us rather than unite us. I don't think that there is a great label for the field, in the sense that you can believe a lot of different things and fall into separate categories of belief. My bias has always been that if you claim to be a behavior analyst, you subscribe to the methods of science and lots of people can live under that tab. When people get together in a meeting, you can either start off in a place you disagree, or you can start off with the places in which you agree. I'm the type of person who likes to start off where we agree, because you can't really get anywhere if you start with an argument.

Sometimes, we argue over the philosophy rather than focusing on the science. I consider myself a behavior analyst because I came into the field at a time when that was what we called ourselves. It's a tricky thing, and I think the better bet is to focus on the discussion of how we're going to solve the problems in front of us.

Where do you see the field going both short term, and in the future? What differences in development, if any, do you see happening in the future between our country and on an international scope?

It's important to talk about "the field" in terms of what is happening with the increasing number of people getting a Board Certified Behavior Analyst (BCBA) certificate. That is going to increase exponentially over the next few years. When certification started, most of those people had many years of expertise and also obtained their certification. Now certification typically means that you finished a two-year program with 6 courses and 1,500 hours. This is a lot less experience than most of the original BCBAs. The downside of this change is that the depth of experience and quality of a BCBA is not the same as it used to be. However, given the overwhelming need for people

in this field to support the children and families in need of services, this may be the best evolutionary outcome we can have. The Behavior Analyst Certification Board (BACB) has progressively increased the standards over the years and continues to do so. It is my expectation that, within a few years, the BACB will require a full master's degree in Behavior Analysis in order to be a BCBA. The fact that they are evolving to a more stringent process and standard is a good thing. There is no field that didn't start at one place and in time did not move to a more stringent training and education standard. I understand that some people are critical of where we are now, but I am pragmatic and feel that while the process may not have been as pretty as some would like, it is still moving in the right direction. Yes, there is a flood of people right now who have their certificate but don't have as much depth and training in our science as I would like. But they are providing a lot of help to children and families, probably to more of their advantage than their disadvantage. I think one of the best compliments I would give to Jerry Shook, who started the BACB, is that this is one of the best shaping programs you'll ever see, starting out with three courses to a full master's in Behavior Analysis. In the short run, while there are going to be growing pains, I think that the number of training programs and opportunities and acceptance of our science is great for our field, and I would argue, great for our culture. We need more people who know who we are and what we do. We didn't have a lot of them worldwide, but we are getting closer and closer to that. With all of downsides of growth, one of the upsides is that our science is now available to a lot more people in a lot more places. I think that there are universal things that I see between all countries. Parents want their kids to learn and be successful. When people find out that there are these people who can do stuff to help kids, they tend to go for that.

The broad acceptance and awareness of our efficacy leads to that. Parents in Russia love their kids, parents in Africa love their kids, and you see programs all throughout the world because, fundamentally, people want to do things that work. Our science is more accepted in places where typical things that parents do for typically developing kids don't work. Broad acceptance of efficacy happens when you do it well. Increasing acceptance of efficacy worldwide is spectacular and can be pretty impressive. The growth in behavior analysis is not just here in the US, it's all over the world.

Let's talk about your work with The Massachusetts Association of Applied Behavior Analysis (MassABA).

I was one of the founding members of MassABA. In the early years, our organization's primary focus was in getting insurance for children with autism. We spent several years going to the legislature, meeting with them, and eventually getting the bill passed. Massachusetts Autism Insurance Law (aka ARICA Bill) was unlike any other similar law passed at that time: It has no caps and no age limits, which is huge. We also got a licensing bill passed.

We spent a lot of time meeting at the State House, reviewing bills, doing research, and so on. Most recently, we have gotten Blue Cross Blue Shield to agree to fund "treatment planning" as part of ABA home services, which

is very important. Recently, MassABA provided edits to two new bills in the state legislature. The first was to create a commission on behavior support plans, and the second was a draft bill to develop a separate licensing board here in Massachusetts. There's a lot going on behind the scenes, and we have to pay attention. Sometimes, I think that we need to do a better job at MassABA to help people realize all the behind-the-scenes stuff that we do and that can affect people who work in the field on a daily basis. We have a BCBA Committee that meets monthly, so school-based BCBAs are able to collaborate and share resources. We also have a University Chairs Committee, and a very active Conference Committee. We strive to ensure that we provide support for practitioners.

What do you think about the role that regional and state ABA associations have now? What type of role do you think these associations should play now or in the future?

MassABA does deal with bills and legalities, often behind the scenes, as previously mentioned. If there are conversations going on at the insurance level about what's going to be funded and provided, MassABA is going to be a part of these conversations. That is critical because if we aren't a player in these conversations, the impact could be potentially devastating. There are states where psychologists who do not practice behavior analysis have to supervise and sign off on the services done by behavior analysts. Ethically they should not be able to do that because they don't know who we are and what we do. There are a few states in which that is the case because the psychology board is stronger than the behavior analysis organizations.

What is going on in Massachusetts that you think might be of interest to Operants readers?

The Blue Cross Blue Shield Treatment Planning funding piece is an important action that impacts all of those providing insurance-funded services. The proposed legislation regarding behavior support plans is also a potentially important item, as is the licensing board piece. These are three areas that a behavior analyst in Massachusetts might want to be aware of.

With regard to the behavior support plan, different groups have their own versions. Agencies do, and schools do. If you're a consumer, how do you know if the behavior support plan handed to you is a good one? Are you going to know that it's conceptually systematic or not? Probably not. If there are no guidelines, you likely won't know these things. If the content is dictated by a state agency rather than behavior analysts, we could find philosophy-driven guidelines that hamstring effective treatment. This is not a trivial problem.

Finally, what is your advice for young people interested in the science started by Skinner? As they consider a career path, what they should be aware of, and what should they be looking forward to?

Learn the science. Find somebody who knows it really well. Work under someone who will teach you and who will make you better. Don't just get a certificate; learn the science. Ultimately, if you're going to be good at wherever you choose to apply it, you need to understand the science. Whether it be autism or any other field, you can't do it well if you don't learn the underlying principles. The

only reason I think I'm any good at what I do, is because I had people who cared enough to make sure that I learned the science when I was young. They made me be right, they made me be technical, and they corrected me when I was wrong. While I don't think I always appreciated it at the time, it made me a better clinician. I think sometimes we are so busy trying to help people get a certificate, that we aren't helping them to learn. And to me, there's nothing more important.

You can't be good unless you know the science. And when you are good, you love your job. If you are crappy at it, you will be frustrated. It is a really hard job when you're not good at the science, because you don't know how to fix a problem. When you do know the science, you know what to look at and what steps to take. It's not magic. Theoretically, the process of a functional analysis works like this: You collect some data and develop a hypothesis, test the hypothesis, and then implement treatment based on the outcome of that test. Unfortunately, often people collect some subjective data about function, develop a hypothesis, and implement a treatment based on the hypothesis, without ever testing the hypothesis in the first place. Well, that's a critical step. If I just make up what I think the function is without knowing for sure that I'm right, my treatment might not be effective. If I test the hypothesis, and demonstrate empirically that the thing I think is a reinforcer to that individual, actually is a reinforcer, my treatment is more likely to be successful. I think that requirement of being scientific is what's missing for a lot of people.

Do you think that the BACB does a good job of making sure we learn the science?

I'm going to sound like a BACB apologist here, but the BACB does not do that. What it does is certify course sequences. Universities develop a curriculum to teach people. Some do it better than others. The other piece is that BCBA

supervisors mentor and train people and then sign off that they are competent. Some people take that quite seriously, and some people don't. The BCBA administers a test of minimum competence and basic assessment of knowledge. They don't test experience. I was talking to Stephanie Peterson of Western Michigan she told me that once students pass the exam, she walks up to them, shakes their hand, and says, "Congratulations on achieving minimum 28 Operants competence in our field. Please don't think that you have expertise. You do not. You might in ten years, if you work under a mentor who really trains and develops you. But for now, you have minimum competence in our field." I think that is a brilliant statement. Because there are inappropriate expectations in which passing the test means you are a master in the field, when really it is a minimum competence test of an entry-level person. It is a good start, but it isn't mastery and expertise. So when we tell consumers it means more than it does, we are misleading them. The BACB tries really hard to have people understand this, and, given the circumstances, I think that they have done a pretty good job of making sure that continuous improvement occurs.

Is there anything else you'd like to add?

I want to emphasize again the importance of learning the science. We, as *Operants* readers, and people who practice our science, need to recognize that we are on the mission. We dedicate ourselves to the training of newcomers in the field. There is a legitimate reason to be concerned about the fact that growth of the number of people "doing behavior analysis" is not necessarily an improvement of the quality of treatment, in autism or any other field. Getting back to the basics and reading Skinner, and working with people who help to apply this knowledge well — that's what is needed. You need to understand the science. Not the procedures, but the science. 🌊

About the Interviewer:



Katelyn "Katie" Prue has spent the last two years as a 1:1 ABA teacher in a private school for students with Autism and other developmental disabilities in Beverly, MA. During her two years at Hopeful Journeys Educational Center in Beverly, she worked with a variety of students on individualized programming across disciplines and environments. She received her Master's degree in Behavior Analysis from Salem State University in May 2017. Throughout her coursework at Salem State University, she studied the relationship between variables such as time constraints and internet use on impulsivity through delay discounting, which is a commonly researched topic in experimental behavior analysis. She is relocating to Alexandria, VA in August 2017 to accept a behavior analysis position at Avail Outreach; a private agency which provides services to clients with developmental disabilities across schools, homes, and clinics in the Northern Virginia area. She looks forward to the many experiences ahead within the field of behavior analysis and hopes to expand her horizons while practicing ABA in a new part of the country. 🌊

Skinner's Science, Applied Behavior Analysis and Autism Spectrum Disorders



Alice Shillingsburg, PhD, BCBA-D
Vice President of Applied Verbal Behavior
May Institute
Interview by Yeşim Güleç-Aslan, PhD

This interview took place in 2016 in Atlanta, Georgia at Marcus Autism Center, where Alice Shillingsburg was the Program Director of the Language and Learning Clinic.

I want to talk to you about behaviorism, applied behavior analysis, and autism spectrum disorders. Hopefully, it would be of interest not only to professionals in the field but also to readers who are interested in autism treatments, but are not familiar with applied behavior analysis. But first, I would like you to tell us a little about yourself.

I have my PhD in clinical child psychology. And, I also have my board certification in behavior analysis. My clinical work and my research use these two areas of expertise. I try to integrate what I know about child development and child psychopathology, and child clinical work with my background in behavior analysis to design interventions for children with autism that blend a child development approach with applied behavior analysis (ABA). My clinical work focuses on skill development in children with autism and related disabilities. Some of the kids that we see do not talk at all, some of the kids are using single words or phrases so you can notice a distinct deficit in their social communication. They are not holding conversations with their peers or adults; they are not asking questions; they are not playing cooperatively or imaginatively in a pretend way with their friends. At Marcus Autism Center we are able to tailor our interventions specifically to a child's needs. We offer intensive one-on-one ABA-based intervention that may entail discrete trial intervention, incidental teaching, natural environment teaching, play-based instructions — whatever suits that particular child's needs. But we also offer group interventions where kids are in small groups of four to six children and they are learning classroom readiness skills, such as sitting in a group and following instructions from the teacher. They are also learning to play and talk with their friends, which is something that is very difficult to learn in a one-on-one setting. Group setting for children with autism spectrum disorders (ASD) really facilitates their ability to have a conversation, ask each other questions, remember things about their friends, and then use this knowledge in play. We are using sound ABA principles. The language learning clinic is not the only applied behavior analytic clinic at our center. The Marcus Autism Center is focusing on the whole child and the whole family. We have diagnostic services, psychiatry for medical management, and two additional large clinics that treat some common features associated



Dr. Shillingsburg is the new Vice President of Applied Verbal Behavior for May Institute, a national nonprofit organization that serves individuals across the lifespan with autism spectrum disorder (ASD) and other developmental disabilities, brain injury and neurobehavioral disorders, and other special needs. She also serves as the Assistant Director of the National Autism Center.

Dr. Shillingsburg was previously the Program Director of the Language and Learning Clinic at Marcus Autism Center. She was also an associate professor in the division of Autism and Related Disorders in the Department of Pediatrics at Emory University. Dr. Shillingsburg is associate editor and editorial board member of The Analysis of Verbal Behavior. Her current research interests include theoretical and practical applications of verbal behavior and the assessment and treatment of language deficits, particularly strategies to promote language acquisition and social development in children with autism.

with autism and development disabilities. We have a feeding disorders program and a severe behavior program. My clinical work also includes parent training. We try to involve parents in what we are doing, because we know how important that is for the success of any intervention. And, my research work really is embedded in my clinical work so my interests are almost predominantly related to clinical outcome. We are always looking ways for to innovate and test interventions to promote specific skills in children and then disseminate that.

How did you decide to work in the field of behavior analysis?

That's a great question. I started as a typical undergraduate who wants to work in psychology. I wanted to help children and I kind of "stumbled" into behavior analysis. I took the special seminar on autism as an undergrad and a large portion of that course was about applied behavior analysis which I had never heard of before. It immediately made sense to me. When I graduated, I got a behaviorally-based internship opportunity working with kids diagnosed with ADHD. I ended up getting an entry-level job working with kids with autism and doing ABA, and I loved it. I knew what I was going to do in a graduate school. I think that's probably the way a lot of people get caught by behavior analysis. It is immediately rewarding. You see the benefits and there is no question as to whether what you are doing is working. You know that it is because you see the change right away. You see the data that support it. I had excellent mentors in my graduate studies and excellent doctoral internship and post-doc opportunities. So, here I am!

Behavior analytic techniques are widely used in autism spectrum disorders field. As a behavior analyst, you used many techniques. What are your thoughts about challenges and advantages of these applications?

The nice thing about behavior analysis is that you do not have only one tool or one option. The field has evidence supporting a variety of choices. So, you don't have to look at a child and say: "OK, you are getting therapies x and z." You can bring into the decision-making process all the related factors. That includes family's preferences and the child's preferences, and also how skilled and experienced your therapists are. You also take into account the challenging behaviors in the child that might occur if you pick this intervention over the other. When you have choices it helps you to reduce the challenges that you might face when picking a technique. Some of the challenges certainly are with parents, whether or not a parent buys in what you are suggesting. Let's say that potentially you want to use an extinction procedure and you know there is going to be an extinction burst that is going to have a very upset child. The situation is going to be emotional and you may have a parent who won't tolerate that. The nice thing is that you can choose something else that might be a better fit for the family. So, some of the challenges are in parent buy-in, whether or not they agree with the suggestions that you are making. There are also child-specific issues. The age of the child and what may be developmentally appro-

priate are challenges. Kids with more challenging behaviors may alter the type of the techniques you may want to choose. Staffing level also determines the best course of treatment. If a particular treatment is going to require two or three staff members and you've only got one, you have to look at other choices. Challenges to treatment fidelity are very important. A family member, a classroom teacher, a therapist, or someone else may deviate from the prescribed protocol because of a reaction from the child. It is better to know about it and integrate that into choices you are going to make than go forward anyway and let the treatment fall apart.

What is the first thing that comes to your mind when I say Skinner?

For me it is verbal behavior. That is my area of interest and the area where I have been the most influenced by Skinner.

Is the analysis of verbal behavior, in your opinion, the most important contribution by Skinner to the field of applied behavior analysis and especially autism treatment?

This is the hardest question! It is hard to pinpoint one most important kind of contribution. His theoretical writings as well as the research that he conducted clearly shaped our field. It is impossible to imagine where we would be without it. I worked with autistic children before I learned much about verbal behavior so I have a sort of *pre-verbal behavior* life and a *post-*. Learning about verbal behavior and the application of theory in autism treatment has dramatically changed what I do for the better. For me, it was an eye-opening turning point.

I learned about verbal behavior a long time ago, when I was still a student. Since then, I worked in clinical and treatment teams with people who were not integrating verbal behavior science into their curricula for children with autism. When I learned about it I could not believe it! For me, the application of the analysis of verbal behavior to the assessment of language skills in children with autism and development of comprehensive treatment programs has been the most important factor.

As a visiting scholar from Turkey, I saw many professionals from other countries as staff members, interns, or visiting scholars in Marcus Autism Center. I think this type of cooperation is very important for dissemination of applied behavior analysis and behaviorism around the world. What are your thoughts on the subject?


You are actually talking about cultural diversity, which is a personal interest of mine. I think that this interest stems partly from my graduate training and my PhD program. I really enjoyed cultural diversity courses where we learned about social psychology and other cultures. Atlanta, a very culturally diverse city, attracts families and individuals from all over the world to study and live here, and to raise a family here. As the result, the kids in our program are diverse, as well as the staff that we have hired, and the students that we train. There is a tremendous value in that.

You are a visiting scholar. When you contacted me to

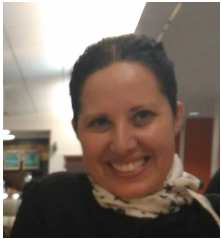
see if you could come I was very interested, partly because I have a family who lived internationally. I know some of the challenges in other countries in accessing psychological services, behavioral services, and even medical services. There are lots of countries that are not as lucky as we are. I think that disseminating the practices for children with autism is absolutely important. We try to get people excited about ABA and autism just like it happened to me as an undergraduate student. But we also work with people on the doctorate level, like you, who are looking for ways to enhance what they are doing and also get some validation of techniques and procedures to share with their colleagues. I think that is absolutely vital.

Is there anything else you would like to share with Operants readers?

It is important to learn as much as you can. One of the things that I've really taken to heart is that there is no one perfect way. What I was doing five years ago is different from

what I am doing now. And I hope that what I am doing now will not be what I am doing in five years. Constant growth and education, learning from other disciplines, and learning how we, the behavior analysts, can explain and analyze what they are doing is very important. Another set of skills for behavior analysts to learn are skills required for talking to other people, not behavior analysts. I can't think of a more important issue. Children with autism are going to have a team of providers: developmental pediatricians, neurologists, occupational therapists, special education teachers. They also have parents. Children are surrounded by a variety of people who don't speak the way that we speak, who don't necessarily understand our terminology. We play such an important role in what children with autism need that we need to engage others, make them excited about our work, and talk with them in ways they can understand and appreciate what we bring to the table. 

About the Interviewer:



Dr. Güleç-Aslan received her PhD in 2008 from the Faculty of Special Education at Anadolu University, in Turkey. She has worked at the Department of Special Education, Sakarya University; and Department of Special Education, Educational Science Faculty, Istanbul Medeniyet University, Turkey. Dr. Güleç-Aslan has also worked as a professional with ASD children and their parents. Her lectures and research focus on autism spectrum disorders, applied behavioral analysis, discrete trial teaching, early intensive behavioral intervention, incidental teaching, and especially qualitative research methods.

From Operant Conditioning to Selection by Consequences

by Julie S. Vargas

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“programmed instruction.” It was selection by consequences of increasingly sophisticated verbal behavior.

Selection requires a sophisticated analysis that is not intuitive. Even today, if you ask why a particular behavior such as a youngster's crying occurs, people look for antecedents. Perhaps they find a skinned knee, or they appeal to the antecedent of pain. Perhaps the child is said to be a “crybaby” or “lacking self-esteem”, both antecedent to the cry. By following a child around, one discovers postcedent controls: the crying occurs when followed by sympathy, but not where it has been ignored. The likelihood of a cry depends upon the history of selection of crying in the past.

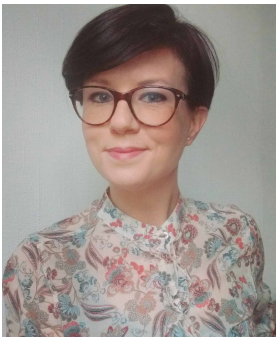
It is not easy to observe the process of selection as it produces change. Darwin described how characteristics of animals arose from selective breeding, but he lacked early evidence for species like man. Skinner established the role of postcedents over the probability of specific actions, but his

early experiments did not address new forms of behavior. It was when Skinner produced novel behavior by reinforcing only some of a pigeon's movements that he began writing about operant conditioning as a selection process. At all of Skinner's three levels, selection by consequences requires a beginning variability from which particular features survive to reoccur in the future. New forms emerge, not from antecedent forces but from the postcedent events that select. Skinner's explanation excluded metaphysical antecedents like “free will” and other hypothetical internal agencies. Novel forms are explained in behavior as well as in biology by a process of selection by consequences.

Note: I would like to thank Ms. Monalisa Leao who, during her internship at the B. F. Skinner Foundation, drew my attention to the delayed appearance of “selection by consequences” in Skinner's publications.

High Levels of Burnout among Early-Career Board-Certified Behavior Analysts with Low Collegial Support in the Work Environment

Camille Plantiveau, Katerina Dounavi
Queen's University Belfast
Javier Virués-Ortega
Auckland University



Camille Plantiveau is a graduate of the MScABA at Queen's University Belfast; during the last seven years, she has been working with children with autism in ABA settings in the United States, Europe, and the Middle East.



Dr. Katerina Dounavi (Psychologist, BCBA-D) is a Lecturer in Applied Behavior Analysis and Autism at Queen's University Belfast (Northern Ireland), where she also serves as the Deputy Director of the Centre for Behavior Analysis and Coordinator of the MSc in ABA. Additionally, she is the Clinical Director and founder of Magiko Sympan Centre in Greece, the first to be directed by a BCBA-D in that country.



Dr. Javier Virués-Ortega is a senior lecturer and director of the Applied Behaviour Analysis program at the University of Auckland (New Zealand) and a member of the board of directors of the BACB. His research focuses on the neural, emotional, and behavioral factors of problem behavior, particularly among individuals with developmental disabilities. He is author of over eighty publications.

Known as burnout, occupational stress can lead to physical, mental, and emotional illness. The main contributors of burnout are emotional exhaustion, feelings of depersonalization, and a lack of accomplishment. In the field of applied behavior analysis (ABA), burnout is an under-researched topic, even though treatment quality heavily relies on “ABA therapists/tutors”, responsible for the delivery of most if not all components of ABA-based interventions to children with autism and other developmental or learning disorders. We explored the occurrence of burnout in professionals working in the field of Applied Behavior Analysis (ABA) through a systematic literature review and an applied research project.

A systematic literature review led to identifying burnout risk factors for professionals working in health or educational settings. We also identified variables that contribute to its prevention and that lead to an increase in job satisfaction. Higher levels of supervisor support led to lower emotional exhaustion and higher feelings of personal accomplishment. With high levels of supervisor support, high work demands did not have a negative burnout effect on participants. Participants included in the systematic literature review showed overall low levels of burnout and reported a satisfactory level of wellbeing in their professional setting. However, ABA tutors with negative bias towards children with autism showed increased levels of depression and burnout.

Following the systematic literature review, we distributed a survey capturing demographic data and two questionnaires measuring burnout and job satisfaction. The survey was distributed to professionals across the globe, capturing differing cultural practices. Burnout results for the survey were ascertained by participants scoring high in emotional exhaustion and depersonalization and low in lack of

accomplishment. Results suggest that a large number of participants experience burnout (with 63% reporting moderate to high emotional exhaustion, 66% experiencing moderate to high levels of depersonalization, and 78% reporting low levels of personal accomplishment). The level of job satisfaction also posed concerns, with the majority of participants reporting satisfied only slightly (38%) to moderately (18%) with their job. Only 5% of participants reported feeling very satisfied with their job, while 39% reported feeling slightly or moderately unsatisfied.

Regarding supervision, 66% of all participants claimed to work directly under a Board Certified Behavior Analyst (BCBA), though only 2% appeared to receive daily supervision from a BCBA and 20% weekly. Of all participants, 16% said they received distant supervision. For students and Registered Behavior Technicians (RBT), a pattern in line with other authors’ findings was observed, with the determining factor for the prevention of burnout being that more frequent supervision leads to a decreased likelihood of burnout. Social support at work place is a significant factor for BCBA and Board Certified Assistant Behavior Analysts (BCaBA), since it increases job satisfaction and reduces the risk for suffering burnout. In line with previous research, older professionals are less likely to suffer from burnout in comparison with younger colleagues.

In sum, this research provides a basis for reflection and possibly direction for regulation changes (e.g., in Behavior Analyst Certification Board requirements for supervision). Of our participants, only 16% reported receiving distant supervision which is surprising given current technological advancements. Distant supervision and support groups could be an important element in the prevention of burnout among ABA professionals for being a cost effective manner of increasing supervision frequency. 🌊

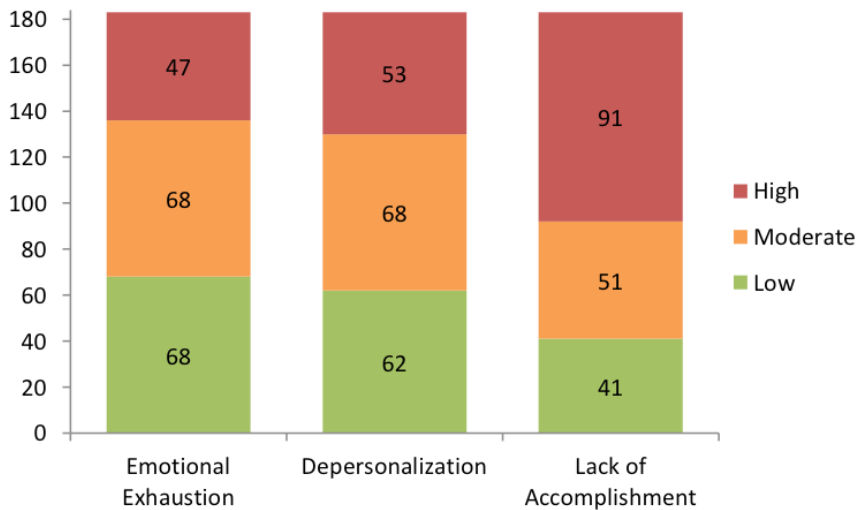


Figure 1. Burnout among ABA professionals

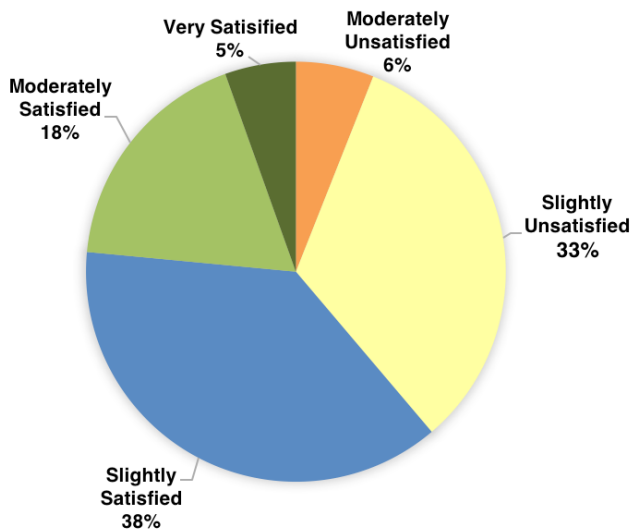


Figure 2. Job satisfaction among ABA professionals Note: The sixth sector is not shown in the graph as none of the participants scored within the score range of “Very Unsatisfied”.

It Comes in Threes: On Secular Humanism and Behaviorism

Darlene E. Crone-Todd, PhD
Salem State University
Salem, MA



Dr. Darlene Crone-Todd is a professor of psychology at Salem State University. She serves as the coordinator for behavior analysis graduate programs, and as co-coordinator of the Theoretical, Philosophical, and Conceptual Issues area for the Association for Behavior Analysis International (ABAI).

At the meeting of the Association for Behavior Analysis International (ABAI) in Chicago, Dr. Phil Zuckerman was an invited B. F. Skinner presenter for the Theoretical, Philosophical, and Conceptual program area. He was one of several secular humanists considered for the invitation by Dr. Ed Morris (senior co-program chair) and me (junior co-program chair). Dr. Zuckerman graciously agreed to give an invited talk at the conference.

Some of you may know that B. F. Skinner was a secular humanist, and in fact was recognized as The Humanist of the Year in 1972 by the American Humanist Association, of which he was a member. This recognition is reserved for individuals who have earned "...national or international reputation who, through the application of humanist values, have made a significant contribution to the improvement of the human condition."

For readers not familiar with secular humanism, this is a philosophical and ethical approach to understanding the world from a non-religious perspective. According to the *American Humanist*, it arose out of the 18th century enlightenment. The free thinking and rationalism that defined that period gave rise to modern secular humanism.

Zuckerman gave a presentation that was warmly received by the audience. This is not only because members of the audience shared similar views, however; instead, it was his engaging way of speaking, sharing anecdotes, and putting the audience at ease. He was able, in his presentation, to provide people with new ways to think about how we talk about religiosity and secularization, and for many of us in the audience this resonated with the philosophical underpinnings of behaviorism. This, then, is the goal of the B. F. Skinner invited lectures: To invite speakers from other disciplines that are amenable to our discipline so that we may interchange ideas and learn from each other.

I will now turn to a summary of two main areas that Zuckerman addressed in his talk: Identification of components of religiosity from a sociological perspective, and types of secularization. In this summary, an attempt will be made to provide an analysis and synthesis with behaviorism.

Components of Religiosity: The Three Bs

According to Zuckerman, sociologists classify the extent of religiosity according to these three components: (a) Belief; (b) Behavior; and (c) Belonging. Let me suggest that we think about these in terms of rule-governed behavior, physical actions, and social reinforcement, respectively.

Rule-Governed: *Belief* is defined as the kind of statements that one makes regarding her or his religion, such as the characteristics of the deity, that s/he exists, whether or not there is a heaven and hell, etc. So, the collection of such statements that one makes and the extent to which they believe them is one determinant of how religious a person may be.

Physical Actions: A second determinant is the extent to which they engage in non-verbal religious *behavior*: such as going to a place of worship (e.g., church, synagogue, mosque, etc.), engaging in ritual performance, giving money to their religion, praying, and the many other

actions that designate fealty to a religion from the small such as lighting of candles to the large such as a pilgrimage. Let us take a moment to consider these first two components as potentially being exhibited to a greater or lesser extent, and that each individual within a culture exhibits behavioral excesses or deficits in each of these categories. It is rare that what we say (our beliefs) and what we do (our actions) always match. In fact, the statement of beliefs and what we actually do come under different sets of immediate and delayed consequences. People may espouse that “doing good work” is important, but when faced with a choice of helping out a homeless street person versus going to class, it is possible that they may choose the latter rather than the former. As John Darley and his student C. Daniel Batson of Princeton University showed in their research at Princeton, the immediate circumstances (e.g., being in a hurry) greatly affected whether or not one would stop to help, even if one were on their way to talk about being a Good Samaritan. The important thing here is to understand that when people make religious statements about their beliefs, these statements often come under the control of listeners who reinforce their verbal behavior. Having these statements reinforced by others can lead to those statements becoming conditioned reinforcers on their own, such that the statement of belief to oneself can operate as reinforcement when the speaker and the listener are in one body (i.e., self-talk, prayer, etc). However, as we know what we say and what we do are often two different things (the road to hell is paved with good intentions as well as empty verbalizations) and the actual actions at the time come under immediate contingencies that operate on our behavior in the given instance.

Social Reinforcement: In the above paragraph, I have already alluded to the observation that listeners reinforce a speaker’s verbal behavior so that the statements of belief are reinforced in the presence of a verbal community. This is what we might view as part of what Zuckerman means by the third component, *Belonging*. A religious community often provides not only reinforcement for verbal behavior, but also provides both positive and aversive consequences for attending or skipping religious events, and acting in other ways that may or may not correspond to the behaviors emphasized in the religious community. These, then, are the ways in which religious behavior is differentially reinforced by the religious community. To the extent that the religious community emphasizes positive outcomes versus aversive control, religious belief and behavior can produce feelings of happiness, joy, anxiety, fear, and so forth.


Over time, as populations have increased and become more educated and more successful, there has been a decline in the consequential power of religious communities to exert as much social control over the behavior of people living in their realms. As such, many cultures and countries have become less religious, and more secularized. I will now turn to the different types of secularization that Zuckerman presented, two of which will likely be familiar, and the third may be new, to readers.

Secularization: The Three A’s

Zuckerman classified three types, or degrees, of secular thought: (a) atheism; (b) agnosticism; and (c) apatheism.

Readers may be most familiar with the terms *atheism* and *agnosticism*, while *apatheism* may be a new term for many. *Atheism* is essentially to lack of belief in a god or to think there is no god. Some atheists are vocal and often speak out against religion, while others are not. *Agnosticism* was recognized as being a kind of “sitting on the fence”, in which the person claims that the existence of a god is unknowable, so they cannot make a decision on the matter. *Apatheism* was explained as a system of thought in which religion and the existence of a god are often never part of the conversation. Zuckerman had, earlier in the talk, related a story about meeting a woman on the train in Denmark, who had grown up in a relatively secularized society. When asked whether or not she thought there was a god, she paused for a few moments to really contemplate the question, as she had never really thought about it. After the uncomfortable silence, she finally just said, “No, I don’t think so”. It struck Zuckerman how interesting this was, to grow up in a culture in which there was almost no conversation about religious belief! So, apatheism, then is the result of a kind of Gladwellian “tipping point” of larger numbers of secular people over several years in a society, such that the larger culture is not as influenced by discussions of religion as other societies’ experiences.

We might think of the movement from atheism and agnosticism to apatheism as a type of evolution over time in which speakers and listeners reinforcing, extinguishing, modeling, and punishing statements of belief, philosophy, and other such positions. Over time, the society as a whole shifts the communal verbal behavior to a new set of statements that are reinforced by the other members of the community. As time progresses, the community not only reinforces the new verbal behavior, and extinguishes belief statements, but as people stop acting in religious ways (e.g., less attendance at church, etc), and if there are no bad consequences as a result, then the behavior of the society is likely to become apatheistic. In other words, people just stop talking about, and engaging in, religion.

In all, Dr. Zuckerman provided an opportunity for us, as behaviorists, to address how our science has an impact far beyond its laboratory expression. By focusing on belief, behavior, and belongingness, it seems to me that this was a good opportunity for us to reflect on how and why religious behavior is acquired and maintained, or not. Such work is surely timely and important in terms of domestic and international relations, as well as providing an opportunity to increase dialogue between disciplines regarding such an important set of topics. 

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B. F. Skinner Virtual Museum: The Foundation Needs Your Support!



B. F. Skinner's study, just as he left it, will become a part of the video tour prepared for the virtual museum.

The B. F. Skinner Foundation receives many inquiries about Skinner. Researchers, students, and members of the general public request information about his study, his apparatuses, his unpublished materials, and his personal life.

With the technology now available, it is possible to show this material in virtual formats, including print, audio, and video as well as 360° views of objects as they are rotated and operated. The Foundation plans to create a virtual museum, showcasing the major aspects of Skinner's career and personal life. Fortunately, many materials are already available for this project: The Foundation has access to a large number of videos, including one showing special adaptations he made in his home study. The Foundation also has photographs, both professional and personal, and digital copies of all of his articles and most of his books, along with the copyrights to many of them.

Through donations, the Foundation has collected teaching machines, operant chambers, cumulative recorders, and films showing Skinner giving lectures, shaping a pigeon, and discussing ethics and cultural design.

The personal side of this scientist will also be included in the virtual museum. The Foundation will

include photos or videos of toys that Skinner made for his children and grandchildren, of his study that has been preserved largely as he left it, of models of apparatuses he made, of artifacts like a mask and props he made for a banquet celebration, and of many other items saved by his family.

The museum will be available online at www.skinnermuseum.org, and is anticipated to be an ongoing endeavor as new materials are found and added to the exposition.

We need your help to get the project off the ground. Our goal is to recruit at least 100 "sustainers" — people or organizations who will commit to monthly donations of at least \$25 through 2018. Of course, all one-time donations, large and small, are appreciated as well. Please contribute as much as you can! To set up your monthly contributions, please go to bfskinner.org and press the *Donate Now* button. If you prefer to send a check, please make it payable to B. F. Skinner Foundation and mail it to:

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B.F. Skinner

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