AGING DESCRIBED BEHAVIORALLY:
STIMULUS CONTROL IS KEY

Operants

2019 - I

ISSN 2476-0293

Visiting a Psychic With a SCIENTIST: Spilled Coffee, Tarot Cards, and Complex VERBAL BEHAVIOR

LAB RESEARCH ON SOCIAL BEHAVIOR

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One time, when my husband and I were visiting my parents we noticed my father, B. F. Skinner, reading a book by Jane Austen. He said it was for his autobiography! When we asked why, he said he wanted to see "how she does it." He wanted to see how Austen could make everyday events so interesting.

A picture of Miss Graves from Skinner's archive

Like Austen, my father described actions more than feelings about them. Yet emotions show anyway. One poignant recollection is quoted in this *Operants*. Another is described in *Shaping of a Behaviorist*. There, he describes his last visit to Mary Graves. She was the elementary teacher to whom he dedicated *The Technology of Teaching*. Miss Graves was dying of tuberculosis. My father went to her house to pay his last respects. He was shown into her dimly lit bedroom and asked to sit away far from her. "Fever had rouged her cheeks, and her eyes shone brightly. Perhaps she knew this… In any case she could have read the truth in my eyes: for once in my life, for a brief moment, I thought she was beautiful."

Dutch Trsanslated by Frans van Haaren

Toen mijn echtgenoot en ik een keer op bezoek waren bij mijn ouders viel het ons op dat mijn vader, B.F. Skinner, een boek van Jane Austen aan het lezen was. Hij zei dat het voor zijn autobiografie was. Toen we vroegen 'waarom?', zei hij dat hij wilde zien 'hoe zij het doet'. Hij wilde zien hoe Austen het voor elkaar kreeg om alledaagse gebeurtenissen zo interessant mogelijk te maken.

Net zoals Austen beschreef mijn vader acties meer dan het gevoel over die acties. Toch kwamen emoties bovendrijven. Een schrijnende herinnering wordt aangehaald in deze Operants. Een andere wordt beschreven in Shaping of a Behaviorist. Daarin beschrijft hij zijn laatste bezoek aan Mary Graves. Zij was de lerares van de lagere school aan wie hij Technology of Teaching had opgedragen. Mevrouw Graves was stervende aan tuberculosis. Mijn vader bezocht haar thuis om haar de laatste eer te bewijzen. Hij werd binnengelaten in haar nauwelijks verlichte slaapkamer en hem werd gevraagd om niet te dichtbij bij haar te gaan zitten . "Koorts had haar wangen rood gemaakt, en haar ogen schenen helder. Misschien wist zij dit wel…in ieder geval had zij de waarheid in mijn ogen kunnen lezen: voor eens in mijn leven, voor een kort moment, dacht ik dat zij heel mooi was."

French Translated by MarieCéline Clemenceau

Une fois, alors que mon mari et moi rendions visite à mes parents, nous avons remarqué que mon père, B. F. Skinner, lisait un livre de Jane Austen. Il avait dit que c'était pour son autobiographie! Quand nous avions demandé pourquoi, il avait dit qu'il voulait voir «comment elle fait». Il voulait voir comment Austen pouvait rendre les événements quotidiens si intéressants.

Comme Austen, mon père décrivait les actions plus que les sentiments les concernant. Les émotions restent apparentes malgré tout. Un souvenir poignant est cité dans cette édition de Opérants. Un autre est décrit dans Shaping of a Behaviorist. Il y décrit sa dernière visite à Mary Graves. Elle était l'enseignante du primaire à qui il a dédicacé The Technology of Teaching. Miss Graves était en train de mourir de la tuberculose. Mon père est allé chez elle pour lui rendre ses derniers respects. On l'avait fait venir dans sa chambre faiblement éclairée et on lui avait demandé de s'asseoir loin d'elle. «La fièvre avait rougi ses joues et ses yeux brillaient. Peut-être qu'elle le savait… En tout cas, elle aurait pu lire la vérité dans mes yeux: pour une fois dans ma vie, pendant un bref instant, j'ai pensé qu'elle était belle.

Greek Translated by Katerina Dounavi

Μια φορά, ενώ επισκεπτόμασταν τους γονείς μου με τον σύζυγό μου παρατηρήσαμε ότι ο πατέρας μου, B. F. Skinner, διάβαζε ένα βιβλίο της Jane Austen. Είπε ότι ήταν για την αυτοβιογραφία του! Όταν ρωτήσαμε γιατί, είπε ότι ήθελε να δει "πώς το κάνει". Ήθελε να δει πώς η Austen κατάφερνε να κάνει καθημερινά γεγονότα τόσο ενδιαφέροντα.

Σαν την Austen, ο πατέρας μου περιέγραφε περισσότερο πράξεις παρά τα συναισθήματα γύρω από αυτές. Ωστόσο, τα συναισθήματα φαίνονται ούτως ή άλλως. Μία έντονη ανάμνηση παρατίθεται σε αυτό το τεύχος των Operants. Μία άλλη περιγράφεται στο Η Διαμόρφωση ενός Συμπεριφοριστή (Shaping of a Behaviorist). Εκεί, περιγράφει την τελευταία φορά που επισκέφθηκε την Mary Graves. Ήταν η δασκάλα δημοτικού στην οποία αφιέρωσε το Η Τεχνολογία της Διδασκαλίας (The Technology of Teaching). Η Δεσποινίς Graves πέθαινε από φυματίωση. Ο πατέρας μου πήγε στο σπίτι της να εκφράσει τα τελευταία σέβη του. Τον οδήγησαν στο αμυδρά φωτισμένο υπνοδωμάτιό της και του ζήτησαν να κάτσει μακριά της. "Ο πυρετός είχε κοκκινίσει τα μάγουλά της και τα μάτια της έλαμπαν ζωηρά. Ίσως το ήξερε… Σε κάθε περίπτωση θα είχε διαβάσει την αλήθεια στα μάτια μου: για πρώτη φορά στη ζωή μου, για μια στιγμή μόνο, σκέφτηκα ότι ήταν όμορφη."

Hebrew Translated by Shiri Ayvazo

פעם אחת כשבעלי ואני ביקרנו את הורי, הבחנו באבי, ב. פ. סקינר, קורא ספר של ג'יין אוסטין. הוא אמר שזה עבור האוטוביוגרפיה שלו! כששאלנו מדוע, הוא אמר שהוא רצה לראות "איך היא עושה את זה." הוא רצה לראות כיצד אוסטין יכולה להפוך את אירועי היומיום לכל כך מעניינים.

כמו אוסטין, אבי תיאר פעולות יותר מאשר את הרגשות לגביהם. אולם רגשות מופיעים בכל אופן. זכרון עז מצוטט בגיליון הנוכחי של אופרנטס. זכרון נוסף מתואר בעיצוב ביהביוריסט. שם הוא מתאר את הביקור האחרון שלו את מארי גרייבס. היא הייתה מורת בית הספר היסודי אשר לה הוא הקדיש את הטכנולוגיה של ההוראה. גברת גרייבס גססה ממחלת השחפת. אבי הלך לביתה כדי לחלוק לה כבוד אחרון. הוא הוכנס אל חדר השינה שלה, המואר באור עמום והתבקש לשבת הרחק ממנה. " החום האדים את לחייה, ועינייה נצצו בבהירות. אולי היא ידעה זאת.... בכל מקרה היא יכלה לקרוא את האמת בעיניי: זו פעם יחידה בחיי, שלרגע קצר, חשבתי שהיא יפיפיה."

Italian Translated by Anna Luzi

Una volta, mentre io e mio marito stavamo visitando i miei genitori, abbiamo notato mio padre, B.F. Skinner, che leggeva un libro di Jane Austen. Ha detto che era per la sua autobiografia! Quando abbiamo chiesto il perché, ha detto che voleva vedere "come lo fa". Voleva vedere come Jane Austen potesse rendere la narrazione degli eventi quotidiani così interessante.

Anche mio padre, come fece Jane Austen, ha sempre descritto le azioni più che i sentimenti ad esse collegati. Tanto le emozioni si sarebbero manifestate da sole. Un aneddoto, che per me è un prezioso ricordo, è citato in questo numero di Operants. Un altro è descritto in Shaping of a Behaviorist, in cui racconta della sua ultima visita a Mary Graves, l'insegnante elementare a cui ha dedicato The Technology of Teaching. La signorina Graves stava morendo di tubercolosi. Mio padre andò a casa sua a pagare le sue ultime spettanze. Fu introdotto nella sua camera scarsamente illuminata e chiese di sedersi lontano da lei. "La febbre le aveva arrossato le guance e i suoi occhi brillavano intensamente. Forse lo sapeva ... In ogni caso avrebbe potuto leggere la verità nei miei occhi: per una volta nella mia vita, per un breve momento, ho pensato che fosse bella."

Japanese Translated by Naoki Yamagishi

かつて夫と私が私の両親を訪ねたとき、父B. F. SkinnerがJane Austenの著書を読んでいるのに気づきました。自分の自叙伝のためだと言っていました！　なぜかと聞くと、「Austenがどのように書いたのか」を知りたかったからとのことでした。父はAustinがいかにして日々の出来事を興味深く書くことができたのかを知りたかったのです。

Austenのように、父は行為についての気持ちよりも、行為について記述しました。いずれにしろ情動は立ち現れるわけですが。今号のOperantsでは、ある感動的な回想が引用されています。そして別の引用は「Shaping of a Behaviorist」からでした。そこでは彼がMary Graves先生を最後に訪ねたときのことが記述されていました。彼女は小学校の先生であり、父は「The Technology of Teaching」において彼女に献辞を記しています。彼女は結核で亡くなりそうでした。父は最後の敬意を伝えるために彼女の家に行きました。父は薄明りのついた彼女の寝室に通され、彼女から離れて座るように言われました。「熱が彼女の頬を赤らめ、目は明るく輝いていました。おそらく彼女はそれを知っていました。とにかく、彼女は私の目から真実を読み取っているようでした。私の人生の中で一度、つかの間、私は彼女が美しいと思いました。」

Korean Translated by Theresa Yunhee Shin

내 남편과 내가 부모님 댁에 갔을 때였습니다. 제 아버지 B.F. Skinner는 제인 오스틴(Jane Austen)의 책을 읽고 계셨습니다. 그는 자신의 자서전을 위한 것이라고 이야기했습니다. 우리가 무슨 말씀이냐고 묻자, 그는 “그녀가 어떻게 그렇게 하는지” 알고 싶었다고 말씀하셨습니다.

그는 ‘어떻게 오스틴(Austen)이 그렇게도 매일 흥미로운 일들을 만들어내는지 알고 싶다’고 하셨습니다. 오스틴(Austen)처럼, 저의 아버지도 감정보다 행동을 묘사했습니다. 어쨌든, 감정은 어떤 방식으로든 나타나기 마련입니다. 하나는 가슴 아픈 기억이 여기 Operants에 인용되었다는 것이고, 다른 하나는 Shaping of a Behaviorist에 기술되어있습니다. 거기에는 Mary Graves를 마지막으로 방문한 내용이 있는데, 그녀는 초등학교 교사로 제 아버지의 저서인 ‘The Technology of Teaching’에 헌정되셨던 분이셨습니다. 제 아버지가 그녀에게 경의를 표하기 위해 그녀의 집에 찾아갔을 때 Graves는 결핵으로 죽어가고 있었습니다. 그녀는 불빛이 어둑한 그녀의 침실에서 제 아버지를 보았고, 그녀에게서 멀리 떨어져 앉으라고 제 아버지에게 부탁했습니다. “발열로 인해 그녀의 뺨이 붉었고, 그녀의 눈은 밝게 빛났습니다. 아마도 그녀는 알았을 껍니다…. 어쨌든 내 눈에서 그 진실을 읽었을 수도 있었을 테지만: 내 인생에 한 순간, 그 짧은 순간에, 나는 그녀가 아름답다고 생각했던 것을 말입니다.”

Norwegian Translated by Karoline Giæver Helgesen

En gang da min mann og jeg besøkte foreldrene mine, la vi merke til at min far, B. F. Skinner, leste en bok av Jane Austen. Han sa at det var for hans selvbiografi! Da vi spurte hvorfor, svarte han at det var for å se “hvordan hun gjør det.” Han ønsket å se hvordan Austen klarte å gjøre hverdagslige hendelser så interessante.

Som Austen beskrev min far i større grad handlinger enn følelser knyttet til dem. Følelsene kommer allikevel godt frem. En gripende erindring er sitert i denne utgaven av Operants. En annen er beskrevet i Shaping of a Behaviorist. Der beskriver han sitt siste besøk til Mary Graves. Hun var grunnskolelæreren han dedikerte The Technology of Teaching til. Frøken Graves var døende av tuberkulose. Min far dro på besøk for å ta et siste farvel. Han ble vist inn på hennes svakt opplyste soverom og bedt om å sitte langt unna henne. “Kinnene hennes rødmet av feber, og øynene hennes skinte sterkt. Kanskje visste hun det... Hun kunne uansett ha lest det i øynene mine: For første gang i mitt liv, i et lite øyeblikk, syntes jeg hun var vakker.”

Polish Translated by Monika Suchowierska-Stephany

Pewnego dnia, gdy odwiedziliśmy z mężem moich rodziców, zauważyłam, że mój ojciec, B.F. Skinner, czyta książkę Jane Austen. Powiedział nam, że ta lektura przyda mu się przy pisaniu autobiografii. Kiedy zapytaliśmy dlaczego, odpowiedział, że chciał zobaczyć, „jak ona to robi”. Pragnął dowiedzieć się, jak Austen opisuje wydarzenia z życia codziennego w tak interesujący sposób.

Podobnie jak Jane Austen, mój ojciec opisywał raczej zachowania, a nie odczucia związane z zachowaniem. Jednakże, emocje tak czy inaczej się uwidaczniają. Jedno z takich poruszających wspomnień zostało przedstawione w niniejszym numerze Operants. Inne zostało opisane w książce Shaping of a behaviorist. Tam też mój ojciec opisuje swoje ostatnie spotkanie z Mary Graves. Była to jego nauczycielka ze szkoły podstawowej i to właśnie jej zadedykował książkę Technology of teaching. Pani Graves umierała na gruźlicę. Ojciec pojechał do niej, aby złożyć nauczycielce ostatni hołd. Został zaproszony do słabo oświetlonej sypialni i poproszony, aby usiąść z dala od chorej. „Gorączka rozpaliła jej policzki i spowodowała, że oczy błyszczały. Możliwe, że wiedziała... W każdym bądź razie, mogła odczytać prawdę w moich oczach: w tym momencie, pierwszy raz w życiu, była dla mnie piękna”.

Portuguese Translated by Monalisa Leão

Uma vez, quando meu marido e eu estávamos visitando meus pais, notamos meu pai, B. F. Skinner, lendo um livro de Jane Austen. Ele disse que era para sua autobiografia! Quando perguntamos por que, ele disse que queria ver “como ela faz isso”. Ele queria ver como Austen poderia tornar os eventos cotidianos tão interessantes.

Como Austen, meu pai descreveu mais sobre ações do que sentimentos. No entanto, as emoções aparecem de qualquer maneira. Uma recordação comovente é citada neste Operants. Outra é descrita em Shaping of a Behaviorist. Lá, ele descreve sua última visita a Mary Graves. Ela foi a professora primária a quem ele dedicou o livro The Technology of Teaching. Miss Graves estava morrendo de tuberculose. Meu pai foi até a casa dela para prestar suas últimas homenagens. Ele se apresentou em seu quarto mal iluminado e pediu para se sentar longe dela. “A febre tinha roçado suas bochechas e seus olhos brilhavam intensamente. Talvez ela soubesse disso ... De qualquer forma, ela poderia ter lido a verdade em meus olhos: pela primeira vez na minha vida, por um breve momento, achei que ela estava linda”.

Russian Translated by Alexander Fedorov

Однажды, когда мы с мужем навещали моих родителей, мы заметили, как мой отец, Б.Ф. Скиннер, читает книгу, написанную Джейн Остин. Он сказал, что читает ее ради своей автобиографии! Когда мы спросили зачем, он сказал, что хочет понять, «как она это делает». Он хотел понять, как Остин могла делать повседневные события такими интересными.

Как и Остин, мой отец чаще описывал действия, а не чувства по их поводу. И все равно везде видны эмоции. Одно трогательное воспоминание цитируется в этих «Оперантах». Другое описано в книге «Формирование бихевиориста» (Shaping of a Behaviorist). Там он описывает свой последний визит к Мэри Грэйвс. Она была учительницей начальных классов, которой он посвятил книгу «Технология обучения» (The Technology of Teaching). Мой отец пришел в её дом, чтобы проститься с ней. Его провели в тускло освещенную спальню и попросили сесть подальше от неё. «Лихорадка окрасила её щеки румянцем, а её глаза ясно сияли. Возможно, она знала это… В любом случае она могла прочитать правду в моих глазах: первый раз в своей жизни, на краткое мгновенье, я подумал, что она прекрасна».

Spanish Translated by Kenneth Madrigal and Gonzalo Fernández

En una ocasión cuando mi esposo y yo visitábamos a mis padres, notamos que mi padre, B.F. Skinner, leía un libro de Jane Austen. ¡Nos dijo que era para su autobiografía! Cuando preguntamos "¿por qué?" dijo que quería ver "cómo lo hace ella". Él quería ver cómo Austen es capaz de convertir eventos cotidianos en algo sumamente interesante.

Al igual que Austen, mi padre describía acciones más que sentimientos sobre éstas acciones. Sin embargo, las emociones afloran igualmente. Un recuerdo conmovedor se cita en este número de Operants; y un segundo es descrito en Shaping of a Behaviorist. En este último él describe su última visita a Mary Graves, quien fue la maestra a la cual dedicó The Technology of Teaching. La señorita Graves sufría de tuberculosis, y mi padre la visitó en su casa para despedirse de ella por última vez. Una vez en su casa, mi padre fue llevado a su habitación, la cual se encontraba ligeramente iluminada, y le solicitaron que se sentara lejos de ella. Mi padre describe, "la fiebre enrojeció sus mejillas, y sus ojos brillaban intensamente. Quizás ella misma sabía porque estaba ahí… En cualquier caso, ella pudo haber leído la verdad en mis ojos: por una vez en mi vida, por un momento, pensé que ella era hermosa".

Swedish Translated by Dag Strömberg

Jen gång när jag och min make besökte mina föräldrar märkte vi att min far, B. F. Skinner, läste en bok av Jane Austen. Han sade att det var för sin självbiografi! När vi frågade varför, sade han att det var för att se "hur hon gör det". Han ville se hur Austen kunde göra vardagshändelser så intressanta.

Liksom Austen beskrev min far handlingar mer än känslor om dem. Men känslor visar sig ändå. En gripande hågkomst citeras i denna Operants. En annan beskrivs i Shaping of a Behaviorist. Där beskriver han sitt sista besök hos Mary Graves. Hon var den grundskolelärare som han dedicerade The Technology of Teaching till. Fröken Graves var döende i tuberkulos. Min far gick till hennes hus för att ge henne en sista hälsning. Han visades in till hennes dunkelt belysta sovrum och ombads sitta långt ifrån henne. "Febern hade lagt rouge på hennes kinder och hennes ögon lyste klart. Kanske visste hon detta... Hur som helst kunde hon ha läst sanningen i mina ögon: en enda gång mitt liv, under ett kort ögonblick, tyckte jag att hon var vacker. "

Thai Translated by Sirima Na Nakorn

วันหนึ่งดิฉันและสามีเดินทางไปเยี่ยมคุณแม่และคุณพ่อของดิฉัน (ดร. บี เอฟ สกินเนอร์, Dr B.F. Skinner) ที่บ้าน คุณพ่อกำลังอ่านหนังสือของ เจน ออสติน (Jane Austen) อยู่ ท่านบอกดิฉันว่า อ่านหนังสือเล่มนี้เพื่อศึกษาการเขียน อัตชีวประวัติของตนเอง เราสองคนจึงถามท่านว่า "ทำไมต้องเป็นหนังสือของ เจน ออสติน" คุณพ่อบอกว่าเพื่อดูแนวทางการเขียนของเธอ เจน ออสตินสามารถเขียนเกี่ยวกับ เหตุการณ์ประจำวันให้ดูน่าสนใจและน่าอ่าน ท่านเล่าต่อไปว่า ท่านเองก็เขียนแนวเดียวกับ เจน ออสติน คือ มักบรรยายพฤติกรรมการกระทำ มากกว่าจะบรรยายความรู้สึก แต่ไม่ว่าจะเขียนเก่งแค่ไหน ก็อดที่จะพูดถึงความรู้สึกไม่ได้ เช่น ในนิตยสาร "Operants" และ "Shaping of a Behaviorist" ซึ่งท่านได้เล่าถึงเหตุการณ์ที่ท่านไปเยี่ยม คุณครูแมรี่ เกรฟส์ (Mary Graves) ที่เป็น ครูสอนนักเรียนชั้นประถมต้น ซึ่งได้รับการยกย่องไว้ในหนังสือ "The Technology of Teaching" คุณครูแมรี่ เกรฟส์ป่วยหนัก เป็นวัณโรค คุณพ่อไปเยี่ยมเธอเพื่อแสดงความอาลัยครั้งสุดท้าย เมื่อไปถึงผู้ดูแลพาคุณพ่อเข้าไปในห้องนอนของเธอ ที่เปิดไฟสลัวๆ และให้ท่านนั่งอยู่ห่าง ๆ คุณพ่อบรรยายไว้ว่า "คุณครูมีไข้สูง จนแก้มของเธอเป็นสีแดงเรื่อย ตาของเธอส่องประกายแวววาว เธอคงอ่านความรู้สึกจากสายตาของข้าพเจ้าออก และในห่วงเวลาสั้นๆ นั้น ข้าพเจ้าคิดในใจว่า เธอช่างดูงดงามเหลือเกิน"

Turkish Translated by Yeşim Güleç-Aslan

Bir keresinde eşim ve ben ailemi ziyaret ederken, babam B.F. Skinner'ı Jane Austen'in bir kitabını okurken gördük. Bunun, kendi otobiyografisi için olduğunu söyledi! Neden olduğunu sorduğumuzda, "nasıl yaptığını" görmek istediğini söyledi. O, Austen'in günlük olayları nasıl bu kadar ilginç hale getirebileceğini görmek istedi.

Austen gibi, babam da eylemleri onları hissetmekten daha fazla tarif etti. Buna rağmen duygular yine de kendini gösteriyor. Bu Operants'da dokunaklı bir anı alıntılanmıştır. Diğeri Shaping of a Behaviorist'de tanımlanmıştır. Orada, Mary Graves'e olan son ziyaretini anlatmıştır. Mary Graves The Technology of Teaching kitabını adadığı ilkokul öğretmenidir. Bayan Graves tüberkülozdan ölüyordu. Babam son kez saygılarını sunmak için evine gitti. Loş yatak odası gösterildi ve ondan uzak durmasını istedi. "Ateş yanaklarını kırmızıya boyamıştı ve gözleri parlak parlıyordu. Belki de bunu biliyordu… Her halükarda gözlerimdeki gerçeği okuyabilirdi: hayatımda bir kez, kısa bir an için güzel olduğunu düşünmüştüm. "

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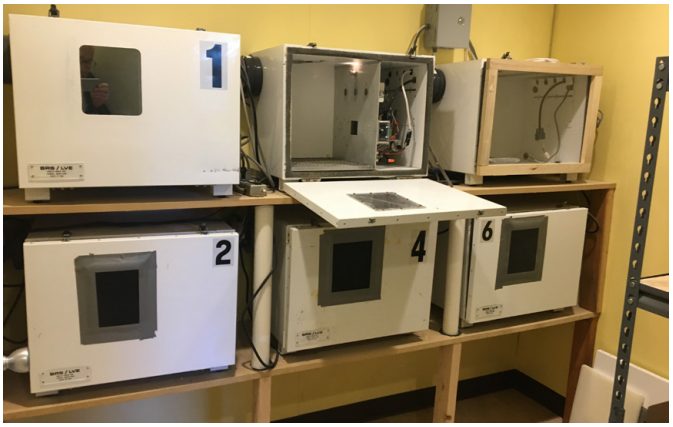


editorial staff

We would like to thank all contributors to this issue. Operants *preserves the intellectual tradition of Skinner's writings — of interest to the field, but also written without heavy use of citations and references. In most articles intellectual credit to others is given, not by citing and referencing specific studies or articles/books, but rather through discussing the "big idea" or "concept", and naming the person/affiliation. In this way, then, the intellectual credit is provided while still writing for a wider audience. Especially today we would like to continue to advance the relationship between basic and applied science, and its theory, and make that available to the public.*

Operants *is produced by the B. F. Skinner Foundation. The opinions reflected in this* Operants *do not necessarily represent the views of the Foundation. We reserve the right to edit all submissions for factual and scientific accuracy, however, as a rule, we preserve the author's grammar and punctuation.*

The year 2019 marks several important decade-anniversaries of the published works of B. F. Skinner, including *Cumulative Record* (60 years), *Contingencies of Reinforcement* (50 years), and, his final published book, *Recent Issues in the Analysis of Behavior* (30 years). The B. F. Skinner Foundation will be celebrating the anniversary of *Recent Issues* by releasing a new edition this year with a foreword written by Per Holth, which *Operants* magazine will be featuring in an upcoming 2019 issue.

Another important celebration this year is the 40th anniversary *The Shaping of a Behaviorist*, the second installment of Skinner's three-part autobiography. This book is an invaluable resource for anyone interested in reading a firsthand account of the history of behavior analysis, as well as personal details of B. F. Skinner as scientist, husband, father, and friend. Within this current issue we have provided a touching excerpt (titled *A Dedication to a Friend*) from the book, which reveals a subtle detail of Skinner the "humanist." The remaining essays within this issue of *Operants* reflect the important influences Skinner's scientific repertoires continue to have on today's behavior analysts.

Two of the contributions discuss life-changing applications of the behavioral principles to individuals whose behavioral needs are a function of variables correlated with their chronological ages. Rebecca Sharp follows the path of Skinner's *Enjoy Old Age* by addressing problems with, and some solutions to, stimulus control barriers to the behavioral needs of individuals suffering from dementia. Kathryn Glodowski provides a functional account of Shaken Baby Syndrome (SBS) and details some of her work in which she and her colleagues have taken important behavioral steps to prevent future victims of this tragic condition.

John Keller has provided a piece in which he tells the fascinating story of building his own experimental pigeon lab behind his house. Keller's essay discusses his innovative steps toward an experimental analysis of social behavior. The reader will find valuable illustrations and links to videos that supplement his personal account of Skinner's experimental principle: "When you run into something interesting, drop everything else and study it."

Skinner's conceptual repertoire is echoed in the essays by Ratkos and Roth. Ratkos provides an elegant molecular interpretation of the behaviors involved in Tarot Card reading. Even readers without a history of this subject matter will walk away with a satisfying explanation of the phenomenon and will likely find themselves analyzing other related examples of "supernatural" content in an analogous way. Roth's essay on "mindfulness" tackles the popular subject matter as a behavioral phenomenon and supports Ratkos's call to "encourage readers to examine the mundane and fantastic around you with Skinner's analysis of verbal behavior."

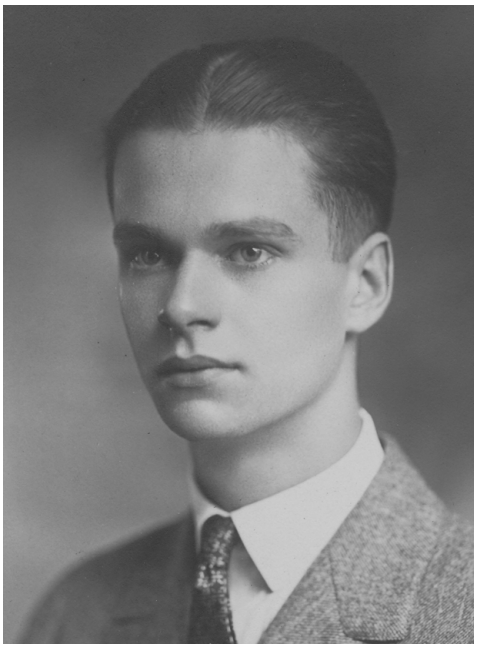
Finally, we are excited to introduce the "Notebooks Corner" as a new feature to *Operants* magazine. In an effort to highlight some of the fascinating personal notes written by Skinner, we are selecting leaders from the field of behavior analysis to share from among their personal favorites. In this first quarterly issue for 2019, Per Holth has shared two selections of Notes with the *Operants* readership.

As the newly appointed editor-in-chief for *Operants* magazine I am proud to continue sharing such important Skinnerian-influenced contributions with the world.

David Roth, MA

A Dedication to a Friend

B. F. Skinner



B. F. Skinner, 1923

After opening the first part of Skinner's three-part autobiography, Particulars of My Life, *one will see the following dedication:*

Remembering
Raphael Miller
1902-1929

The reader of this book will learn a lot about the cherished friendship and adventures shared between Skinner and his "closest boyhood friend," Raphael "Doc" Miller. However, it isn't until the second installment of Skinner's autobiography, The Shaping of a Behaviorist, *which is celebrating its 40th anniversary this year, that one learns about Raphael's early and tragic death after his boat capsized in Saranac Lake. It is also within this book that the reader may discover a subtle detail about the dedication to his friend, which reveals a side of Skinner's humanity, as well as his sensitivity to the troublesome reality of "mental health" issues, seldom discussed in the world at large.*

RAPHAEL MILLER WAS SOMETHING OF A WORRIER about health. I had reached Cambridge with a boil on my wrist, and he was afraid that faint marks running up my arm meant a streptococcus infection. When I complained that I awoke every morning with a bad "catarrh" — I discovered years later that I was allergic to the feathers in my pillow — he sent me to a homeopathist whom he knew in Boston.

And now he began to worry about himself. He was showing a medical student's syndrome: he developed the symptoms of the diseases he was studying. By midwinter it was heart trouble. He told me about the various signs—something about the shape of his fingernails, the fact that a hot bath raised his pulse inordinately, and so on. He was afraid that I too might have a bad heart because as a child I had had what appeared to be a short bout of rheumatic fever. He began to be severely depressed. He became a vegetarian. He missed classes for two weeks, and his father came up to see him.

One Sunday morning I walked over to the Medical School and found his door locked. A student across the hall said that he had got up that morning convinced that he was critically ill and had gone to a cousin's in West Quincy. I made my way there by unfamiliar public transportation and found Doc in the depths of despair. He had awakened with a swollen ankle and was sure that it was due to an embolism. The swelling had gone down, but it was only a matter of time before another embolus would go to his brain or heart and kill him.

I tried to cheer him up and eventually got him to come to my room. I discovered that he wanted to go home but was afraid he might drop dead on the way, and he did not want to cause trouble. When I offered to go with him, he immediately accepted. We could go to New York by sleeper that night and reach Susquehanna by noon the next day. We went to his room and packed some of his things, and I called my parents and asked them to meet me in Susquehanna. They were to bring Doc's fiancée, Dorothy Glidden, who lived not far from Scranton.

Doc continued to talk as if he had only a short time to live. He was concerned mainly for his father, who had already lost his wife and, many years before, another son, and for Dorothy. Dressing in the sleeper at New York the next morning, he put on a blue shirt because, he said, it made him look ruddier and healthier. In the station in Jersey City, waiting for the Erie train to Susquehanna, we talked for a long time. We had often discussed our careers, and his was now, so he thought, at an end. There were so many things he had wanted to do. He was sure that I would go on to great things, and he wanted me to know that he was glad for me. I had steadfastly refused to agree that he was seriously ill and said, "Don't worry, I'll dedicate a book to you and we'll both be famous." I was joking, but he exclaimed, "Would you?"—smiling for the first time since I had found him at his cousin's.

Aging Described Behaviorally: Stimulus Control is Key

Rebecca Sharp, PhD, BCBA-D
Bangor University, Wales, UK

IT COMES WITH THE TERRITORY THAT WE BEHAVIORISTS analyze the contingencies that govern our own behavior. As we age, we reflect on the skills we have gained, contingencies that have shifted, and the social rules that have changed. B. F. Skinner aged with a pragmatic approach that gained a huge amount of interest in mainstream media. In 1982, he gave a talk at the 90th convention of the American Psychological Association entitled '*Intellectual Self-Management in Old Age*'. It was a talk he stated was not based on science, but his own reflections on aging, and how a loss of reinforcement in the physical and social environment can affect a person's repertoire and private events. Skinner gave another talk at the same conference on why behaviorists were not acting to save the world, but it was his personal reflections on aging that gained media attention, including articles on the talk published in the New York Times and in the Washington Post. Subsequently, Skinner co-authored a book with Margaret Vaughan entitled *Enjoy Old Age: A Practical Guide*. Written in lay terms, the book contains wonderfully practical advice for arranging the environment to maximize reinforcement as we age, and contains an appendix in which lay terms are translated into technical terms for any readers who are behaviorally-oriented. It's a nice touch that demonstrates a fluency in translating between technical and lay terms that behavior analysts strive to possess.

One of the things I love about behavior analysis as a field is the ability to apply the science to any individual that engages in behavior. Like many behavior analysts, I started my training working with children with developmental disabilities. An opportunity was offered to me by my PhD supervisor at the University of Auckland, Dr. Oliver Mudford, to work with people with dementia, and lo and behold, a few years later I identify as a behavioral gerontologist. The following describes some of the work done with older people in which I have been privileged to be involved, and the musings of this behavioral gerontologist finding her feet in an exciting subfield of behavior analysis.

Students often ask me for advice on behavioral books to read that are not text books. I always suggest *Enjoy Old Age*. I do this because it demonstrates how articulately Skinner evaluated his experiences with a behavioral eye, but also because the environments he describes are familiar and salient examples of changes we all experience. Perhaps one of the reasons that Skinner attracted such enthusiasm for his talk in 1982 was that we all consider issues of aging to be relevant to us, regardless of how old we are. The comedian Russell Kane talks about 'ledges' in life; that life is an endless pattern of looking forward to and reaching the next level in life (e.g., childhood, adolescence, adulthood, parenthood, middle age, old age), only to wish you were at the previous stage once there. In behavioral terms, we are constantly

Rebecca Sharp is a Board Certified Behavior Analyst (Doctoral level) and New Zealand Registered Psychologist who received her training from the University of Auckland. She is a Senior Lecturer and the Director of the Applied Behaviour Analysis Programme at Bangor University in Wales, where she developed a specialized behavioral gerontology practical training course in which students can accrue their supervised placement hours working with older adults. Rebecca is on the editorial board for the European Journal of Behaviour Analysis. She joined the UK Society for Behaviour Analysis Board of Directors in 2019, and is a Senior Fellow of the Higher Education Authority. Rebecca has been an invited speaker in research and clinical settings around the world, and her research interests include measurement, behavior analytic approaches to working with people with dementia and traumatic brain injury, people with comorbid dementia and developmental disabilities, the translation of clinical and laboratory research to applied settings, and teaching behavior analysis.

adapting to changing discriminative stimuli in our environments; if we define aging as responding to changes in the stimulus conditions associated with our chronological age, aging is relevant to us all.

There is growing evidence that people with dementia (now called major neurocognitive disorder in the DSM-V) might experience deficits in stimulus control; stimuli that once occasioned behavior no longer do so, and behavior occurs in the presence of inappropriate stimuli. For example, a lady in a care home points at a tin of biscuits and asks for a "spaniel", or a man refuses to work with a care staff member who looks like someone who was once unkind to him in his younger years. Faulty stimulus control is the theme that underpins much of the research we are conducting at Bangor University in Wales. One of our major studies is exploring the utility of a method by which people are offered choices between contingencies simultaneously (i.e., how elements of their care is delivered). The simultaneous treatments design is an old design seldom used in applied or translational research. In contrast to an alternating treatments or multi-element design in which each condition is presented successively within or across sessions, the conditions (i.e., contingencies) are presented simultaneously in each session. The number of responses to the discriminative stimulus for each contingency is indicative of choice, and we are using this design to determine whether we can evaluate how people with dementia and vocal verbal difficulties might be able to make selections regarding their care. For example, while gardening, does Mrs Smith prefer someone chatting to her (non-contingent attention), to be left alone, or to be provided with physical assistance? Under this design, the selection between contingencies requires simultaneous discrimination, but not successive (which might be more difficult for people with dementia because it requires remembering behavior and discrimination across time). We are exploring discrimination in a series of translational studies, hoping that we might be able to identify specific faults in stimulus control.

We're also finding that faulty stimulus control is affecting studies that were not originally designed to assess stimulus control specifically, and subsequently evaluating the specific issues we encounter. Skinner referred to this as 'exploratory' research, and it's exciting to conduct. For example, when we conducted a preference assessment study, a resident in the care home refused to speak to our team because she told staff that we were door-to-door salespeople there to bully her into buying something. Another resident stated that we should offer our food items around to the other people in the lounge first before she made a selection because that was the polite thing to do and she would have some if there was some left. Although, there is a risk of interpreting behaviors for which the topography is not reflective of private events (e.g., the resident didn't really 'think' we were salespeople, the behavior was simply escape-maintained), it is also possible that such statements are indicative of stimulus control issues. For example, strangers in your care home dressed in smart casual business wear and carrying bags of food and activities, bear some of the same characteristics of a door-to-door salesperson. Similarly, many adults have a long learning history of the social convention of sharing food with other people in your lounge. Combined with an inability to respond discriminatively to the subtle differences between your previous experiences and a stranger asking you to select a preferred snack in your home lounge, it's not difficult to see how faulty stimulus control might be at play.

In some of our other work, trainee behavioral gerontologists on a supervised clinical placement find themselves most often tinkering with discriminative stimuli. New furniture purchased for a specialized dementia ward provided us with an opportunity to objectively assess furniture layouts that produced the highest rates of communication, engagement, and indices of happiness. We also evaluated whether the use of large, yellow name badges worn by staff affected the frequency of clients calling staff by name (and also whether they affected how often people were called by generic title such as "nurse" or "hey you"). Such simple antecedent interventions appear to have high social validity with our multi-disciplinary colleagues, both with regard to outcomes, but also with regard to the resolution of the data we are able to provide. Our clinical psychology colleagues have told us how much they like the detailed, objective, and informative data we collect, and we have found collaboration with them effortless. Our skills and focus are complementary to theirs. Such interventions also appeal to managers, heads of health boards, and the public, giving us a foot in the door to grow behavioral gerontology in the UK.

In *Enjoy Old Age*, practical methods to enhance and change stimulus control for older people so that they may access as many as reinforcers in their environment as possible are described. For example, Skinner and Vaughan recommended attaching a pill box to a toothbrush as a strategy to ensure twice-daily medication is taken. This strategy is about arranging discriminative stimuli to occasion behavior when the behavior is no longer under the stimulus control of other stimuli (i.e., a person forgets to take their medication). Additionally, aging might mean that the discriminative stimuli that once signaled the availability of reinforcers are no longer present. Skinner and Vaughan describe the loss of reinforcers that might occur when people retire. The availability of social interactions changes (for example, who and the number of people with whom we interact changes). Subsequently, we need to find ways to access social reinforcers in novel ways (e.g., adopting a new hobby). Therefore, whether it be in the research we conduct, the clinical work we do, or application to our own lives, consideration of stimulus control in aging might be key to quality of life. Skinner summed it up far more articulately than I ever could; "If you're old, don't try to change yourself, change your environment".

Saving the World: A Tall Order Requiring Baby Steps

Kathryn Glodowski, PhD

ONE ADMIRABLE ASPECT OF SKINNER'S CAREER includes the breadth of his work, ranging from basic laboratory experiments that helped build the foundation of behavior analysis to theoretical writings about the possibility of a widespread application of the basic principles to all societal problems resulting from human behavior. One example that highlights the latter includes Skinner's paper *Why We are Not Acting to Save the World* in which he comments on contingencies supporting behavior with detrimental (albeit delayed) consequences. Skinner even went so far as to write the book *Walden Two,* a fictional account of a society with contingencies supporting more ideal responses of its inhabitants that promote an overall utopian living condition.

Although *Walden Two* and *Why We are Not Acting to Save the World* were published over 70 and 30 years ago, respectively, one must wonder how well we have addressed this tall order to save the world with behavior analysis. Mass shootings have increased in the last two decades; reports of suicides (especially those of celebrities) scatter the news; sexual harassment and discrimination remain a concern; potential corruption at the highest levels of government cannot be overlooked; scientists predict that climate change could have devastating effects within the next century; the overall quality of the education system is called into question; and some of the youngest members of our society are abused and neglected by those who should be promoting their healthy development. Clearly our world still needs saving.

Luckily, we still have the means to address this challenge. One person's work throughout their career, and the collective work of many people can move us in the right direction. Several behavior analysts have been diligently applying our principles to solve various societal issues. Drs. Pat Friman and Keith Williams exemplify this process by integrating behavior analysis with pediatric primary medical care. An extension of this work could be to address the pre- and postnatal care of the youngest members of our society as well as those providing such care.

Drs. Yukiko Washio and Mara Humphreys recently published an article in *Perspectives on Behavior Science* related to maternal behavioral health during pregnancy and following birth. They provide guidelines for socially valid behavior-analytic interventions and additional research needed to help pregnant and postpartum women reduce tobacco and alcohol use, improve nutritional eating, and increase physical activity. Addressing and improving these areas of maternal behavioral health can produce better outcomes for newborns and infants.

New parents also face challenges surrounding their baby's crying. Several researchers have documented that newborns' total durations of crying increase during the first two months of age, sometimes reaching 2 – 3 total hours a day with one episode of crying lasting pos-

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sibly upwards of 30 minutes. Parents report prolonged crying as a concern and report feeling frustrated with unsuccessful attempts to provide care for their crying baby. Dr. Ronald Barr, a medical doctor and biobehavioral pediatric researcher, has hypothesized that prolonged periods of crying during early infancy may be the likely precursor to Shaken Baby Syndrome (SBS), a traumatic brain injury resulting from violent shaking that causes lifelong disabilities or death. Dr. Barr has further theorized that SBS is primarily due to maladaptive interactions between newborns and caregivers, rather than to maladaptive crying patterns. From a behavior-analytic perspective, SBS may be a result of extinction-induced aggression. That is, caregiver responses contact extinction (i.e., crying persists following attempted caregiving) and in turn, aggression (i.e., shaking the baby) occurs.

I was fortunate to complete my doctoral training at Western New England University with Dr. Rachel Thompson who introduced me to infant caregiving as a behavior-analytic area of study and application. Some of her earlier publications on the topic demonstrate that infant caregiving is sensitive to negative reinforcement contingencies. During periods of inconsolable crying (i.e., extinction of caregiver behavior) caregiving responses with a longer history of negative reinforcement resurge at a greater strength relative to caregiving responses with a more recent history. Thus, it may be possible to arrange a history of negative reinforcement for healthy caregiving responses in expectant parents to potentially prevent the occurrence of violent shaking during developmentally appropriate periods of inconsolable crying.

One of our more recent publications in the *Journal of Applied Behavior Analysis* addressed the recommendation for new parents to place their inconsolable baby in a safe place and engage in a distracting activity for a few minutes before attempting more care. This recommendation is included in nearly all educational materials related to preventing SBS (e.g., The PERIOD of Purple Crying). Our translational evaluation provides some support for this recommendation; human participants tolerated a recorded infant cry longer when distracting materials were available compared to when those materials were not available. Therefore, one healthy caregiving response could be to take a brief break from caregiving during periods of inconsolable crying.

I am continuing translational evaluations during simulated caregiving scenarios and developing work with expectant and new parents. Ultimately this could enhance our understanding of infant caregiving, improve the interactions between new parents and their newborns, help prevent SBS, and potentially save the most vulnerable members of our society from lifelong disability or death. There are other behavior analysts, like Drs. Thompson, Washio, Williams, and Friman working in similar areas to improve our understanding of infant caregiving, improve the health of pregnant and postpartum women, and to improve pediatric primary care. There are others still not mentioned in this article (e.g., Dr. Kenneth Silverman) who have been persistently evaluating and applying behavior-analytic principles and technologies to address broad societal problems that expand beyond pediatric primary care or infant caregiving (e.g., unemployment and drug addiction).

Altogether, yes, the world still does need saving, and behavior analysts still hold the conceptual tools to help; we can and should continue to chip away at this tall order placed before us by Skinner over three decades ago. It will not be accomplished overnight; rather it will be a collective and long-term effort for a multitude of behavior analysts addressing different aspects of the world that need saving.

à propos

In his autobiography* Particulars of My Life*, published in 1976, B. F. Skinner wrote:

"There were two newspapers in Susquehanna at the time, and one reported my birth as follows:

NEW ARRIVAL

Born yesterday morning March 20, 1904 to Attorney William A. Skinner and his wife Grace a handsome boy. The many friends of the overjoyed parents are sending congratulations by the bushel. Long live the youngster, and his papa and mama.

The *Transcript* could not resist a lighter touch: "Susquehanna has a new law firm—Wm. A. Skinner & Son," a theme which I am sure had already occurred to my father. The paper in Montrose, the county seat, carried on the joke: "The Susquehanna Transcript says that town has a new firm—W. A. Skinner & Son. We don't suppose the recently added member can be termed a 'silent partner.'

The supposition was apparently correct. When I was quite small my father and mother took me to Milford, a resort town on the Delaware River, and they were asked to leave the first hotel in which they registered because I cried all night.

I was nevertheless healthy, nursed by my mother, and later fed a kind of breakfast cereal or baby food called, ahead of its time, Force. When I was able to move around the house, it was discovered that I was eating dirt from the potted plants, and I once pushed a bean up my nose and it was not discovered until it had swelled enormously and had to be extracted by a doctor, but these were minor complaints."

B. F. Skinner, K-pulses, and the Development of Paradigms of Social Behavior

John V. Keller, PhD
GerBL – The Geriatric Behavior Laboratory

I HAD REACHED A POINT IN LIFE'S REINFORCEMENT schedule that most of us reach at one time or another: a time when the pellets just aren't coming with sufficient frequency. It was 2015. Five years earlier I had closed my Charlotte-based management consulting practice and my wife Dawn and I had moved to an old house that we'd bought in the mountains of Western North Carolina. I'd run out of remodeling projects and I was thinking about what to do next. More existentially, I was wondering what to do with the rest of my life. Volunteer work perhaps? Join the model train club? Woodworking? Somehow I couldn't see myself getting passionate about any of these options.

But I recalled there had been one thing that had probably been more enjoyable and more engaging than anything I've ever done before or since. That was operant research, a field that I'd left back in 1978. I asked myself, "So what's stopping you from building your own lab?" There's a big under-used utility building behind the house. It really shouldn't cost all that much to convert it. I certainly have no shortage of time. Dawn says she doesn't have a problem with it. And so that's what I did.

Entrance to GerBL

It took about a year to fix up the building and equip the lab. I got back in touch with a handful of old friends in the field. Some helped me with equipment from their labs. They also helped me with advice and encouragement. And today they help me still.

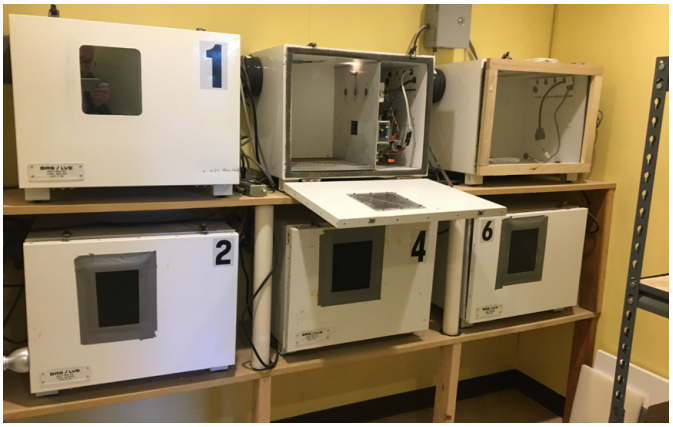
I called the lab GerBL, standing for the Geriatric Behavior Lab. That was my little joke. The only "geriatric" in the lab is me!

John Keller studied experimental psychology at Columbia University and at the University of Maryland. At Maryland he received his Ph.D. in 1974, working under Lew Gollub. He went on to teach and to conduct operant animal research for four years at Tilburg University in the Netherlands. Marriage brought him back to the States. It led also to a new job -- applied work with disturbed adolescents. John made another major shift in 1985 when he took a position as a management consultant. In 2012 John closed his Charlotte-based consulting practice and moved to the mountains of Western North Carolina. It is there that John built the lab and conducted the quite novel research that is reported here.

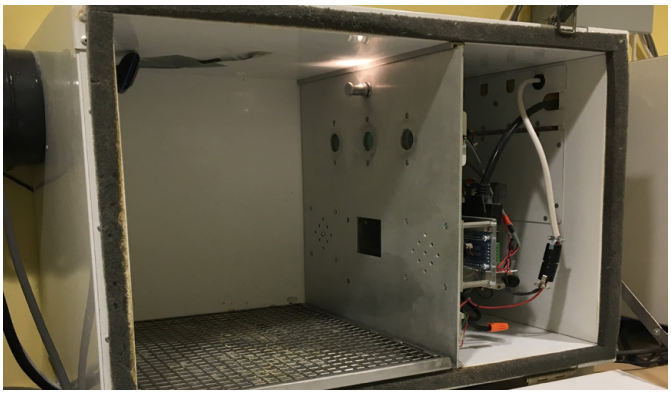
John is the son of Fred Keller, pioneer in basic and applied operant research and close friend and colleague of B. F. Skinner. He lives with his wife Dawn in Hendersonville, NC. They have three grown children and four grandchildren.

Main control room and shop

Home to six pigeons (with room for 16)



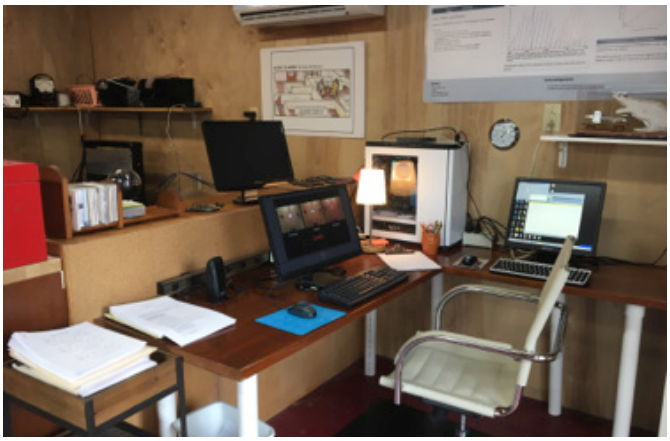
Room containing six LVE/BRS 3-key pigeon chambers



Three-key response panel

A webcam is mounted on the wall opposite the response panel in each chamber

Electronics bench and Med-Associates interface connecting chambers to computer



Main control area

The Origin of an Idea

A computer controls all the events in the pigeon chambers: recording the pigeons' responses (key-pecks) and arranging for the display of discriminative stimuli (e.g., different colored lights projected on the translucent plastic response keys) as well as the delivery of reinforcement (operation of a solenoid that raises a tray of mixed grains to which the pigeon can briefly gain access through a rectangular opening below the response keys). The pigeon chambers are each separately controlled by a program that is written in the Med-PC computer language (a language akin to the SKED language of my day).

An important feature of this software is something called a "Z-pulse." The Z-pulse is like a trigger that communicates between different parts of the program. For example, a pigeon's tenth key-peck might

trigger a Z-pulse. In other parts of the program this pulse might then operate the feeder, add to a counter or turn off the key light.

There is another function very similar to the Z-pulse. It is called a "K-pulse." Whereas Z-pulses operate within a single program, K-pulses operate between programs. The K-pulse receives scant attention in the programmer's handbook. Its chief use seems to be in experiments that employ a "yoked-control" design. For example, when a subject in one box earns reinforcement, this might create a K-pulse that then operates the feeder non-contingently in another chamber.

When I first read about the K-pulse I thought, "That's very cool. With a K-pulse, one bird's response can make a stimulus go on in another bird's box. It's like a telegraph wire!"

But then, like Köhler's chimpanzee, I had a second, even bigger "Ah-ha Experience": There's no reason this can't go both ways! It should be possible for the birds to send signals back and forth to each other!

So from this came my insight -- my epiphany if you will: We can study social behavior using just this simple exchange of stimuli between our subjects.

But even a dyed-in-the-wool behaviorist like me can find himself asking some very non-behavioral questions: "How does the pigeon know there's another pigeon causing these events to happen? How can you possibly consider the study of competition, cooperation and so forth without, at least, the organisms being able to see one another? Where's the richness of social behavior: the cooing of nest-mates, the aggressive display of rivals?"

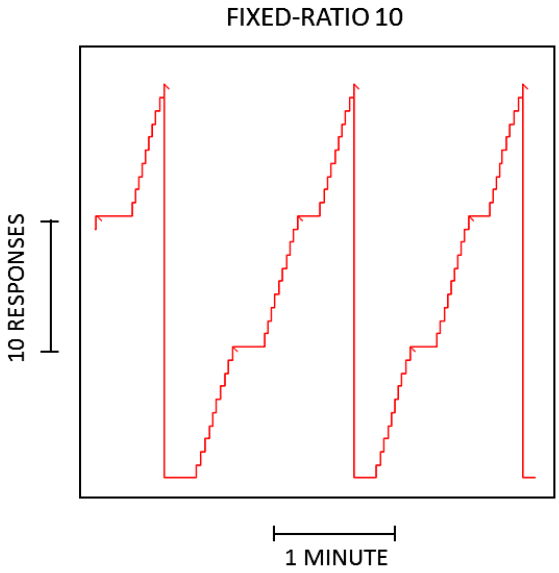
But I quickly realized that it is just this primitiveness -- the simplicity of the relationships -- that makes it an ideal way to get at the essential elements of social behavior. This way of studying the social behavior of multiple organisms is fundamentally no different from and potentially no less useful than Skinner›s operant conditioning chamber was for the study of individual behavior.

The Cumulative Response Record

Once upon a time, operant conditioning was all about behavior change: the acquisition of new behaviors, the extinction of old behaviors and the patterns of response generated by different schedules of reinforcement. There was no better way to describe these changes than with the cumulative-response record. Every lab had recorders for this purpose and virtually every volume of *JEAB* featured the graphs they produced. But, over time, basic operant research shifted from behavior in transition to studies of behavior in the steady state and to research that might require hundreds of hours to produce just a few points on a curve. With this shift the cumulative recorder went to the storage closet. Sadly, for the applied behavior analyst this newer, model-driven animal research was probably of less relevance and interest than the basic research of the past.

But in this paper we're going to be looking at studies some of which are only a few hours in length and in which the behavior is changing before our eyes. For this purpose we're going to have to bring back our old friend the cumulative response record. For those readers who haven't encountered cumulative records before or who've long forgotten them, I offer a quick overview of how they are generated and what they show:

Fixed Ratio (FR)

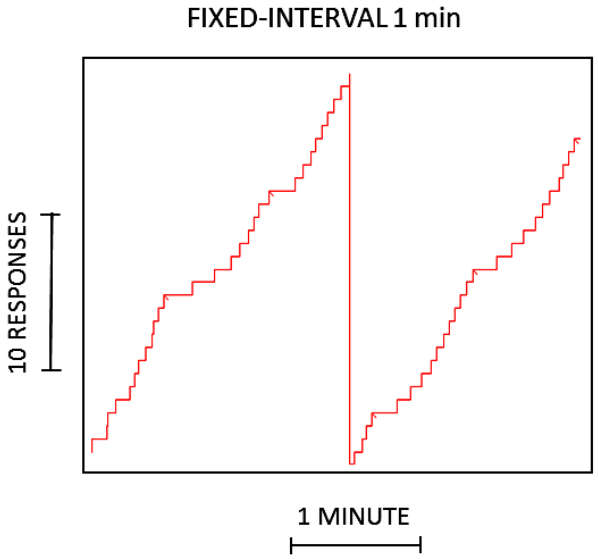


This idealized blow-up of a cumulative record illustrates responding on a Fixed-Ratio (FR) 10 schedule. Each of our imaginary bird's key-pecks moves the pen a short distance upward. The bird's 10th response produces reinforcement – a 3 sec period during which food is made available and the recorder stops. The delivery of this reinforcement is denoted by the small lateral dash or 'pip' on the record. Then the bird begins its next ratio.

With the passage of time, the pen moves from left to right. When the pen reaches the top of the record, it resets to baseline and begins anew. Changes in the pigeon's rate of response are indicated by changes in the slope of the curve.

In this record we see a step-like pattern of response typical of the FR schedule: reinforcement is followed by a pause in responding (the flat part of the curve) which is then followed by a steady succession of responses until the next reinforcement.

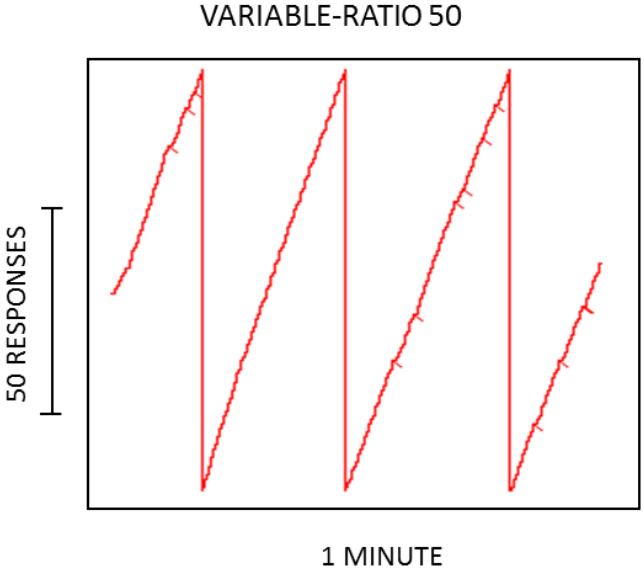
Fixed Interval (FI)



In the fixed-Interval (FI) schedule, reinforcement is provided for the first response after a fixed period of time has elapsed since the previous reinforcement. In this case, the interval is 1-min long: the first response after this period produces food.

Note in this idealized record the characteristic curved or 'scalloped' response pattern typical of a pigeon's early FI performance. This pattern is generated when responses come more quickly as the end of the interval approaches.

Variable Ratio (VR)



Our last example is of responding under a Variable Ratio schedule of reinforcement. In this schedule reinforcements come after a randomly varying number of responses (whose average is 30 in this case).

Note the characteristic high, very steady rate of response. This is typical of variable ratio schedules. Note, too, that our response scale is compressed to the point that individual responses are no longer detectable. This is how published cumulative records usually appear.

The Research

Cooperation

Wikipedia tells us that cooperation is the process of groups of organisms working or acting together for mutual benefit. Put in more operational terms, cooperation is "a group contingency in which the reinforcement of any member's behavior is also contingent on the behavior of the other members." We can roughly diagram this arrangement as follows:

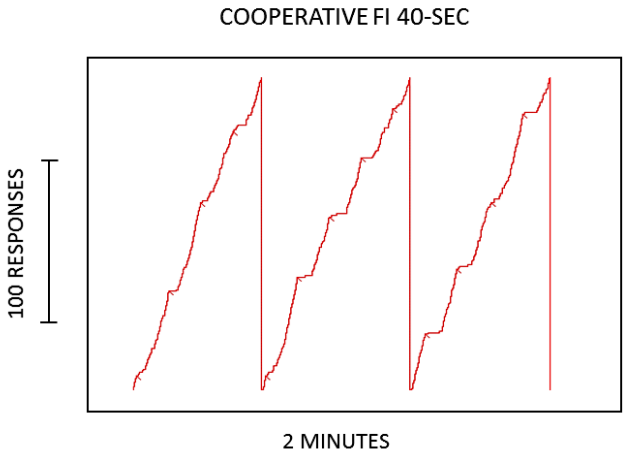
$$R_1 \ (AND) \ R_2 \ (AND) \ldots R_n \ \text{---> } S^R_{all}$$

A response by individual 1 and a response by individual 2 and a response by individual 3, and so on results in them all receiving reinforcement. In the lab we can illustrate cooperation by modifying a schedule of reinforcement in such a way that several birds have to all respond in order that any receive reinforcement. We have modified the three reinforcement schedules just discussed (FI, FR, and VR) in this manner.

Fixed-Interval Cooperation. First, let's look at a cooperative Fixed-Interval schedule. Three male Silver King pigeons -- Homer, Bart and Walter -- work together in sequence. In this demonstration the interval starts with Homer's center key illuminated yellow. When Homer pecks the key it turns off his key-light and turns on the key-light in Bart's box. Then, when Bart pecks the key it turns on the stimulus in Walter's box. And so it goes, around and around until 40 seconds elapses. At this point the next bird to peck receives reinforcement: a brief (3-sec) presentation of grain that is offered inside the lighted rectangular recess below the response keys. When all birds have received reinforcement, the next interval begins anew. Here's a brief film snippet of the birds at work:

Video 1: Cooperative Fixed-Interval

When coupled like this the three birds generate a cumulative record very similar to that produced by a single bird working alone. The record combines the responses of all the birds.

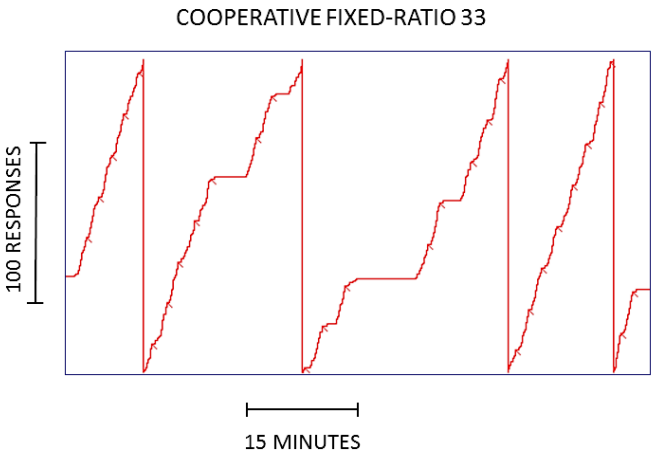


The combined responding of three birds on the cooperative FI schedule

The delivery of the three reinforcements at the end of the 1-min interval is denoted by a single pip of the response pen. Note that the overall scalloped pattern of their collective responding looks very like that of a single pigeon in the early stages of FI training.

Fixed-Ratio Cooperation. A round begins with a 7-sec time-out period during which the key lights are off in all three chambers. Then one of Homer's keys is illuminated. When Homer pecks the lighted key it turns on one of Bart's three key-lights (randomly determined). When Bart pecks it, it turns on one of Walter's. Walter then turns on a key-light for Homer, and so forth, around and around it goes. Each bird's 11th peck produces reinforcement. After the last of these reinforcements, the 7-sec time-out starts and after it the next round begins. This schedule is not unlike an assembly process in a manufacturing plant where each worker on the line adds a piece to the final product. Let's take a look at the birds in action.

Video 2: Cooperative Fixed-Ratio



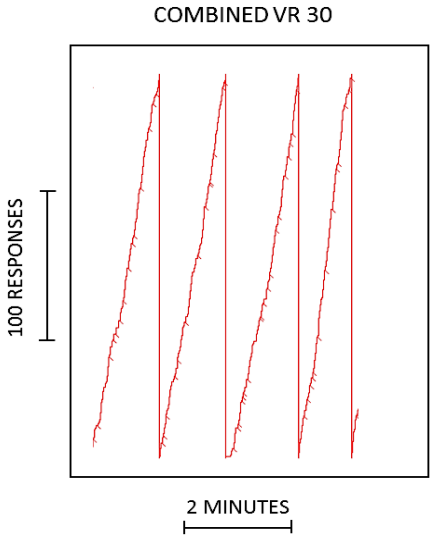
The combined responding of three pigeons on a FR 10 schedule

The combined cumulative record of the three pigeons again is very like what one might see from a single bird. There are occasional lengthy pauses near the beginning of the ratio but the general step-like response curve is quite similar to what we might expect from a single bird early on in its exposure to an FR schedule.

Variable-Ratio Cooperation. This little demonstration involves the same three birds. As before, each bird's peck of a lighted key produces the key-light for the next bird. Unlike the previous demonstration, all birds are not reinforced at once. Their reinforcement schedules are independent Variable-Ratio schedules (or, more precisely, Random-Ratio schedules) that reinforce, on average 1 response in every 10. Here's how the birds behave when coupled in this manner:

Video 3: Cooperative Variable-Ratio

It looks a bit like a game of "hot potato" or "musical chairs," doesn't it? The stimulus passes from one player to the next. But when the "music stops" it is not to remove a player from the game but to reinforce one. The cumulative record of the birds' collective responding is indistinguishable from that generated by a single bird working on a VR schedule: a very high steady rate (average of 1.2 responses/sec) uninterrupted by any appreciable pauses.



The combined responding of three pigeons on a VR 30 schedule

Competition

Wiki tells us that competition arises whenever at least two parties strive for a goal that cannot be shared: where one's gain is the other's loss. In the language of reinforcement theory we can define competition as "a group contingency in which the reinforcement of any member's behavior precludes the reinforcement of any other member." Roughly, we can

diagram this relationship as follows:

$$R_1 \ (OR) \ R_2 \ (OR) \ldots R_n \ \text{---> } S^R_{one}$$

A response by individual 1 or a response by individual 2 or a response by individual 3, and so on results in one of them receiving reinforcement.

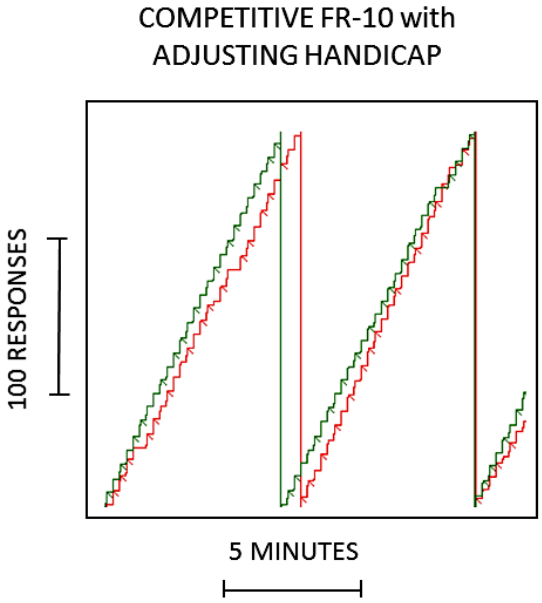
Fixed-Ratio Competition with Adjusting Handicap. The schedule I arranged pitted two birds against each other to see which of them could complete a fixed-ratio first. In my first experiment with this schedule I saw quickly that it wasn't going to work. One pigeon (Bart), although he was only slightly faster, was winning virtually every bout. Homer was rapidly tailing out into extinction.

I probably shouldn't have been surprised by this result. Pure competition often has the effect of producing permanent losers and winners in the game of life. Just ask any economist about *laissez faire* capitalism! So, I attempted to give my loser a hand up, to level the playing field by introducing a handicap for the winner. It's sort of like what the National Football League does when it arranges for losing teams to have first pick in the selection of new players at the start of each season.

The handicap, in this case, was an adjusting one. When a bird won a bout (i.e., received reinforcement at the end of an FR 10), its next ratio was increased by one, whereas its opponent's ratio was lowered by one. *Voila!* This worked like a charm as you can see in the film clip.

Video 4: Competitive Fixed-Ratios with Handicap

In the cumulative records, Homer's responses are in red and Bart's are in green. Reinforcements are shown as pips on the record and the flat period following them indicates the 10-sec time-out period that followed reinforcement and during which the recorder was allowed to run.



Responses for two pigeons: Homer in red and Bart in green on the Competitive FR schedules with an adjusting handicap

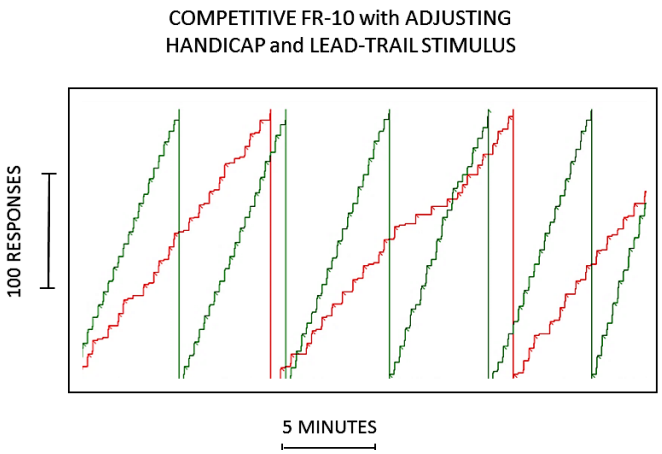
It's clear that both birds competed on every trial with great vigor. Their individual rates approached three responses per sec and rarely did the winner's handicap grow to more than a response or two.

Fixed-Ratio Competition with Adjusting Handicap as well as a Lead-Trail Stimulus. The competition schedule just discussed is like horses racing blind. During a run the bird can't tell whether it's ahead or behind. So, in the next study I provided that information to the birds. The schedules were again Fixed-Ratios whose values were adjusted up or down depending on the bird's success on the previous trial. But now a stimulus was added to indicate whether the pigeon had more or fewer responses remaining in its ratio than did its opponent (a lead-trail stimulus). When the bird's remaining ratio was lower than its opponent's ratio then its key-light was green; when its ratio was more its key-light was red. Here's what competition looked like then:

Video 5: Competitive Fixed-Ratios with Handicap and Lead-Trail Stimulus

A bird with a lead in this competition seldom loses. Even a small difference in the size of the birds' ratios generally determines the winner. It isn't too surprising, then, that the red ("you're behind") stimulus soon acquires the properties of an S-. When the bird sees that it's behind it often stops responding. It's not unlike a sprinter who gets a late jump off the blocks. With no chance to win, place, or show he may drop out of the race.

This tendency was most typical of Homer. Although the video clip shows both birds quitting this way, it was more typical that Bart competed on most bouts whether ahead or behind. This is evident in the cumulative record below where Bart's record is shown in green and Homer's in red.



Two birds, Homer in red and Bart in green, on the competitive FR schedules with an adjusting handicap as well as the lead-trail discriminative stimuli

Territoriality

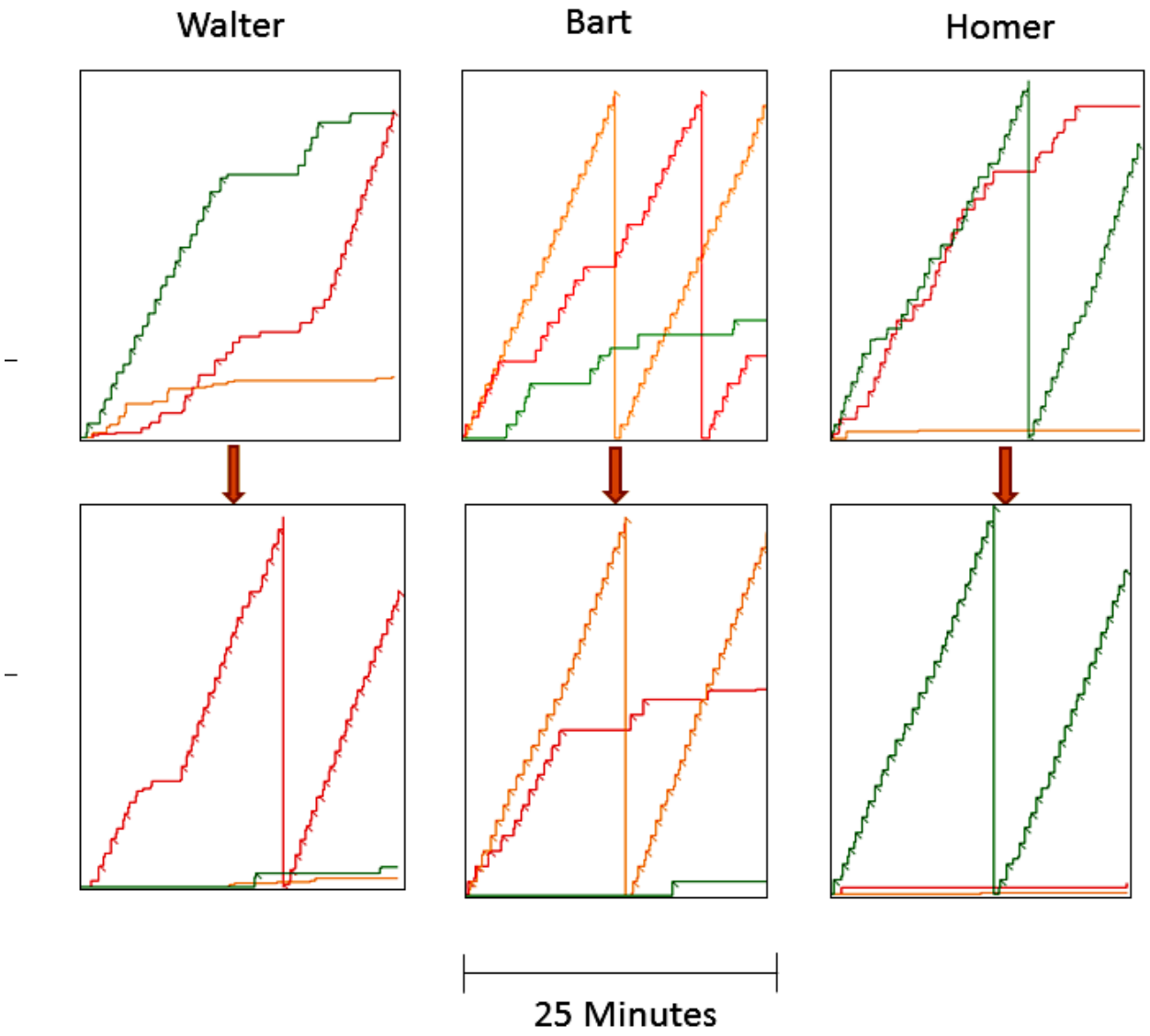
Territoriality, *role*, maybe even *personality* -- at first blush these concepts seem quite different but functionally they are close relatives. All are behaviors that enable a group member to reduce competition for reinforcement. When an individual stakes claim to a certain area, when he acquires a talent no one else has, or when he fills a position no one else can he has increased his odds of reinforcement. It's not unlike Darwin's concept of Natural Selection -- by becoming unique, by finding some niche, whether through genes or consequences, an individual's odds of success and for survival go up.

As diagramed below, when the individuals (1, 2, …n) each make a different response (a,b, …x) they can all receive reinforcement without fighting one another for it:

$$R_1^a \ (AND) \ R_2^b \ (AND) \ \ldots R_n^x \ \text{---> } S_{all}^R$$

The situation I set up to illustrate territoriality involved our usual suspects: Homer, Bart and Walter. In each box the three response keys were illuminated by a different color (red, yellow and green, respectively). All three keys were available to peck at the same time. A bird's responses on any one of the keys were reinforced on a Fixed-Ratio 10 schedule. If the bird got to 10 before any of the others, it received reinforcement. At this point that key light was turned off both in the box of the reinforced bird as well as in the other two boxes. The lights on the other two keys remained on until one of the birds had made the required 10 responses. When reinforcements had been delivered on all three keys, the trial ended. All of the key lights remained out for 10 sec. Then the next trial began.

So, put yourself in "the bird's shoes." If you peck a key that another bird is also pecking you stand a chance of losing out. The other bird might get to 10 before you do. If you lose, your only option is to start

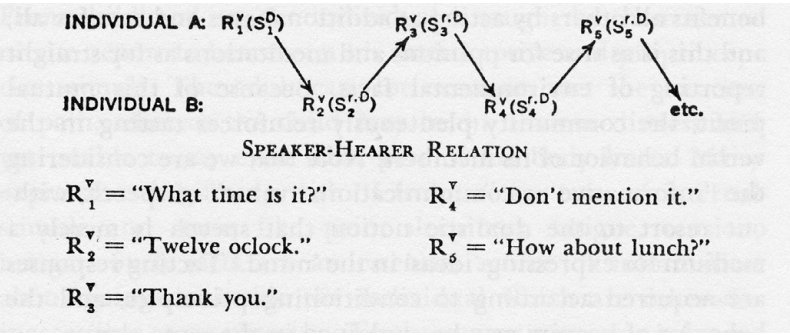


The records of three pigeons are shown. The top row is from early in training and the bottom row of records is from later in training. Each colored response curve represents pecks on one of the three keys: red is the left red key, orange is the center yellow key, and green is the right green key.

responding on one the two remaining keys. But what if the third bird has also chosen that key? Chances are you'll lose again since that other bird got an earlier start. If that happens then you're really out of luck. The bird that beat you the first time is probably now responding on the last remaining key! Chances are good you're going to end the trial on empty. The music will stop and you'll be left without a chair! Let's see how the birds resolve this dilemma.

Video 6: Territoriality

We see in this video that each bird has acquired a preference for a different key (and key color). Homer pecks green, Bart pecks yellow and Walter pecks red. But it wasn't always this way. These preferences were acquired over the course of a few hours of exposure to the schedule. The cumulative records shown below are from when the birds were first exposed to these contingencies and then again about two hours later in training.



From Keller, F. S. and Schoenfeld, W. N. (*1950*) *Principles of Psychology*. Appleton-Century-Crofts, p.387.

The colors of the records correspond to the keys: red for the left-hand red key, orange for the yellow center key, and green for the right-hand green key. At first Homer responded on the green and yellow keys. Later he responded exclusively on green. Bart was active on all three keys. Later on, he responded to red and yellow and finally to yellow almost exclusively. Walter began on green and red but eventually settled for just red. The birds have each learned to minimize the chance of lost reinforcement by responding on a different key. They've clearly each staked out their own territory and stand ready to defend it from poachers!

Discussion

Do these brief studies demonstrate social behavior? What do you think? For me, there's no question. I think they most certainly do and I think Fred Skinner and Fred Keller would too. Here's what I found in Keller and Schoenfeld's classic text, *Principles of Psychology* in their discussion of communication and social behavior.

Ask yourself these questions. "Would the people in this little exchange have had to see each other for this to qualify as social behavior? Is a key-peck functionally different from a verbal response? Is a key-light functionally different from a question?"

If you answer "no" to all then we can agree. However, there is another question, perhaps lurking below the surface. "Isn't there more to everyday social behavior than what you've shown?" To this question, the answer is most certainly "yes."

Ethologists will decry our separation of birds: "You aren't looking at, nor even allowing, the species-typical behaviors – the courtship displays, the preening, the aggressive wing-flaps and the like — with which birds communicate in nature." And they're right to complain. After all, these behaviors are the heart and soul of their discipline.

Social psychologists, I expect, will likewise complain that we've shorn off too much. Where is the subtlety of emotional expression, of language, of gesture? For them, I expect, a 'thumbs-up' emoji stretches the meaning of "praise" and a texter's WTF is a shallow representation of shock. Our substitution of key-pecks for human speech is just over the top!

However, for the behavior analyst who is seeking to understand social behavior, to control and predict it, the K-pulse just might hold the key. I believe that this simple tool can help us identify critical functional relationships and acquire a more systematic understanding of social behavior across species.

This paper is adapted from a talk given at the annual meeting of the North Carolina Association of Behavior Analysis in February of 2019.

The pigeons used in this research were maintained in sanitary and humane conditions, equivalent in all relevant respects to those of any university or institution and following the guidelines set forth by the N.I.H. Guide for the Care and Use of Laboratory Animals. The birds were not maintained at a fixed percentage (e.g., 80%) of their ad libitum weights as is customary in this type of research. Instead, the sessions were simply run right before the birds' regular daily feedings. This was found to be sufficient to assure a high level of motivation without any reduction in weight.

Complex Verbal Behavior: Spilled Coffee and Tarot Cards

Thom Ratkos, PhD, BCBA-D

MOST OF US, AT ONE TIME IN OUR LIVES, BELIEVED IN the supernatural. Stuart Vyse and others have examined magical thinking and its adherents, and have found children to be most susceptible. At a certain point (or never, for some) we put away childish things. Behavior analysts may continue putting things away, considering the unconscious battle between id and superego to be one more childish thing, and further still any dualistic understanding of the 'mind' as another bit of magical thinking, to be put away. So, for most readers of this publication, it is likely you have not recently given much thought to psychics or their activities. I would argue, however, that we should be able to turn our analytic framework on all behavior, and that the verbal behavior of psychics is especially ripe for a closer look and can tell us a lot about how verbal behavior is determined. Stranger still, in many ways this analysis parallels a behavior analytic understanding of projective tests in psychology.

Before diving in, I would like to take a brief aside to relate a personal anecdote that I believe was my first step toward the present topic. I was in a busy breakfast restaurant with my wife several years ago, and a waiter with two pots of coffee was going from table to table, asking each if they needed a refill, and pouring from the large carafes. This mundane task ran its mundane course, and I only happened to be watching him because I was remembering the stress of a rush as a waiter and how lucky I was to be sitting enjoying myself rather than dodging around crowded tables. As I watched him pour, he missed a mug briefly and spilled some of the coffee. He quickly produced a napkin or towel from his apron, said his perfunctory apologies, and went on with his task. What led me deeper into the verbal behavior rabbit hole was what happened next. Upon reaching the next table, he extended his carafe and asked "splash of coffee?"

Why would this be so interesting a question? There are many things he could have (and had, prior to the spill) said to each table. While the function remained the same, the topography varied. "Anyone want a refill?" "More coffee here?" and "Anyone need a warm up?" All serve the same function. But after the spill, the specific topography was "splash of coffee." Why? My interpretation is this response was selected by way of the supplemental stimulus control from the recent visual stimulus of the spilled coffee, and requires an appreciation for the multiple control of verbal behavior, described in *Verbal Behavior* (Part III) and highlighted in a 2011 paper by Michael, Palmer, and Sundberg. Specifically, one possible tact for spilled liquid is 'splash' which shares its topography for the less-common phrase for a small amount of a drink: "splash of ___."

When many functionally similar but topographically distinct responses are possible, supplemental stimulus control can make one

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topography more probable over others. Many forms of the same functional response were more-or-less equally probable for the waiter, although a history of punishment for repeating oneself likely increased the variety of topographies–it can be grating to say the same thing over and over. While "splash of coffee" was presumably a bit less probable (I had not observed it before the spill), it was increased in strength by the combination with the tact control the spill exerted over "splash." This selectionist, multiple control lens is a powerful one for examining the complex verbal behavior we encounter every day.

Let's turn now to an interaction between psychic and customer. A thoroughgoing radical behaviorist account should have no problem explaining what would otherwise be dismissed as unimportant or attributed to the supernatural. Let me be clear, the sources of control are very 'natural'; when I say "psychics" I am referring to their role, not some powers they possess. Let's look at one interaction in the middle of a hypothetical Tarot Card reading:

The fortuneteller flips over a card on a table with several others, revealing a man looking at a bush full of yellow stars. "Aha," she exclaims, "The Seven of Pentacles in your Crowning position! In the future you may look upon the fruits of your labor with pride, but do not rest long, lest your efforts rot on the vine. Very interesting… look how the pentacles also appear in your Crossing position with the Ace, and in the Outcome position with the King, but nowhere else. Money will be a huge source of conflict for you, but ultimately great success is within your grasp."

The patron looks on, rapt. "Oh yes, don't rest after a victory, that makes perfect sense! Thank you so much, Madam Pickacho."

What's going on here? First, a primer in Tarot Cards (my favorite cold reading device): Tarot Cards exist in many forms, but most contain 78 different cards, each with a painting on one side. The deck has suits, much like playing cards, though the suits are swords, pentagrams, cups, and wands. Each suit has 14 cards: 1-10, the page, knight, queen, and king. Additionally, there are 22 "major arcana" cards with colorful names such as "the sun," "the hierophant," and "the devil." I encourage you to look up some images; the "Universal Waite" set are my favorite but there are many, many varieties.

All cold readings have some common elements.

Before we even see the cards (or crystal ball, tea leaves, etc.), there is an introduction or "set-up." The introduction is important, as the psychic has several goals to accomplish. To speak in behavior analytic terms, first they have to establish themselves as a non-punishing audience. They achieve this by praising any and all verbal behavior of the customer as well as what is commonly called charisma: a warm smile, confident diction, exciting costume and decorations, and so on. Second, they have to establish to the customer that they are not the source of control of their own verbal behavior. This is an autoclitic function: just as when we say "they say it's raining", we let our listener know that, while our primary response appears to be a tact (it's raining), it is merely an echoic. In this case the psychic is trying to convince the listener (*and/or themselves!*) that the source of control is the supernatural, either seeing it in the cards, crystal ball, or hearing it from 'the beyond' in one way or another. Skinner remarked on exactly this phenomenon in his discussion of "self-probes:"

> *A nonverbal probe commonly used by the speaker to encourage his own verbal behavior is a crystal ball or other source of vague visual stimuli. Fortune-tellers use such devices for their effect upon the observer. The fortune-teller is more readily accepted as a "seer" if he is looking at something—perhaps only what he sees with his eyes closed—because this suggests some external variable rather than variables of the sort controlling pure fiction.* (1957, p. 406)

In the same way "they say…" can insulate us from harsh disapproval if it turns out it isn't raining; statements that establish a supernatural source of control direct any scrutiny away from the psychics themselves. The psychic might additionally create an abolishing operation for skeptical or doubtful statements by implicating the customers themselves as a source of control. Statements about negative energy hurting the connection to the other side, or that reading the cards is an act of collaboration (in which the customer must also participate) can reduce the probability that the customer will accuse the psychic of fakery or of making everything up on the spot.

To return to the cards themselves, each has a unique image which typically includes one or more human figures, including every numbered suited card. The 3 of Cups, for example, depicts three women raising cups into the air surrounded by fruits and vegetables. While the 8 of Cups is in the same suit, the image is much different. A man facing away from the viewer uses a walking stick to climb a hill; in the background, mountains raise up out of water as the moon looks on disapprovingly. The titular eight cups are stacked in the foreground. Each card could evoke dozens of tacts just by remarking on the figure(s), their position, their actions, their position on the card, their facial expression, their clothing, the background, the weather, and the list goes on. On top of those, there are the symbolic meanings to consider. There are no shortage of books and websites that will give pages of potential meaning to each card, as well as what each number and suit could mean. The wands, for example, could represent work, inspiration, spirituality, creativity, expansion/growth, original thought, enterprise, masculinity, energy, initiative, renewal, as well as the element fire and the season of spring. With a little practice, one finds oneself with no shortage of things to talk about when looking at a tarot card. And indeed, that is the point. They are ambiguous stimuli that potentiate a huge variety of verbal responses.

The reading itself may be general or may have a specific purpose, question, or goal. One way that readers of Tarot Cards specifically handle this aspect is by having a multitude of different 'spreads', or ways in which the cards are laid out. MacGregor and Vega's book, *Power Tarot,* describes no less than 101 spreads, containing 1 to 24 cards in a huge variety of positions. Many have specific uses such as the 6-card Love Spread (which will tell you something about your romantic past, present, and future) or the 7-card Pet Spread (which will undoubtedly provide valuable insight about why Fido has been digging up the backyard) or the 10-card Celtic Cross Spread (my favorite), for more general use.

The important matter for us to consider about the spread is the exponential way they increase the number of stimuli to potentiate verbal responses. Each part of the spread has a different name, meaning, and relationship to other positions in the spread. In the Celtic Cross, for example, a 3 of Cups could mean very different things if it appeared in the "Foundation" position versus the "Outcome" position. We can talk–not only about the individual card, but also its meaning in relation to its position, as well as its interaction with other cards in the spread. Sources of control for verbal statements are building up! Again, Skinner points out: "the fortune-teller may find the [crystal] ball useful in reducing the labor of verbal invention." However, we are not just concerned with saying *anything*, we need a psychic reading that is personalized, unique, and insightful. And contrary to what hardened skeptics may assume, that is what the psychic's patrons get.

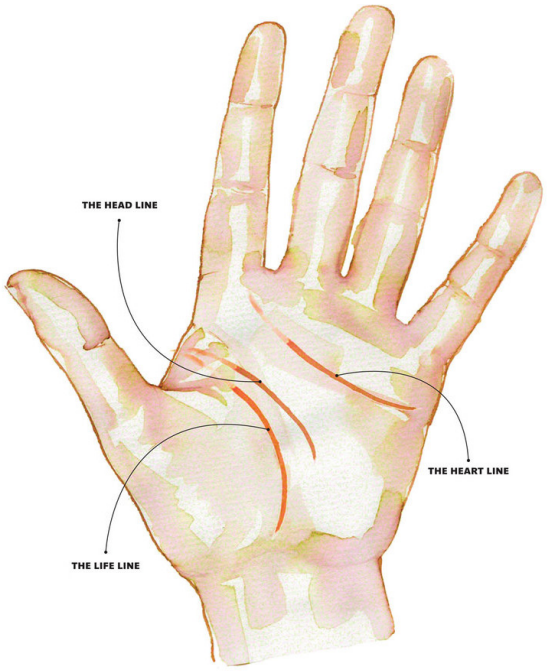
If the cards and spread are potentially evoking so much verbal behavior, what does the psychic actually say? That is where the analogy to the spilled coffee comes in. The part of the environment that potentiates one response over others is the subtle (or not so subtle) properties of the patrons themselves. The stimuli introduced by the patron's physical appearance, all their behavior (both verbal and nonverbal) during the set-up, and their ongoing reactions to the reading all add to the field of stimuli that are adding and subtracting to the response strength of the psychic's verbal behavior. Regardless of whether the psychic is conscious of the specific properties of their customer (i.e. able to talk about the controlling variables), those stimuli are participating in the push and pull of stimulus control over

their behavior. An easy laugh might make them more likely to say something about a recent victory or windfall, a labored breath might make a statement about health problems more probable.

Lest we commit the error of ignoring the listener (an omission of which Skinner is often accused) let us turn to the patron. What is the patron doing, and what makes the psychic reading reinforcing? Admittedly I have no data about a reading's ability to increase behavior upon which it's contingent, but looking at what people spend money on is an easy, if not gross, estimation of something's reinforcing properties. American's spend over 2 billion dollars yearly on psychic visits and related services. Why? Skinner again can direct us toward an answer in his discussion of supplementary stimulation in verbal humor: many instances of humor or wit have their effect because they combine sources of response strength. One way to look at a punchline is as a response that was only weakly controlled up to the point of hearing it, at which the other sources of strength 'occur' to you or are somehow made obvious. Ambiguous statements used in psychic readings can serve the same function.

In the following passage from *Verbal Behavior* (p. 287), I have replaced *speaker* with *psychic*, *listener* with *customer*, and *amusing* with *insightful*: "The psychic emits a very feeble response which supplements an imitative response in the customer which was too weak to appear without aid. If no parallel tendency had existed in the customer's behavior, the results would not have been insightful." The psychic is not only *responding* to ambiguous stimuli, they are also *producing* ambiguous stimuli, and lots of them. As they talk about the relationship between the cards, their position, and what it all means, the customer is listening–that is to say, speaking covertly along with the psychic. Some of the psychic's statements mean little to the customer, but others are statements they might have made about themselves, but in Skinner's words were "too weak to appear without aid." This saltation or jump in response strength is in itself a reinforcing event, an effect that is shared with problem solving, humor, and wit, as Skinner claims.

While I have focused on Tarot Cards, nearly all psychic readings employ similar elements. Palm reading is another with which the reader may be familiar. Each line on the hand has symbolic meaning, each pattern, relationships between lines, etc. All these can provide weak tact control which combines with other sources of strength into intraverbals in the same way as described with tarot cards. Additionally, the analysis of how ambiguous stimuli can lead to insight is in exact parallel to how projective psychological tests operate. Looking at an individual tarot card and saying what it means is nearly identical to the Thematic Apperception Test in which patients are shown a picture of a person and asked to tell a story about them.



While I have focused on Tarot Cards, nearly all psychic readings employ similar elements. Palm reading is another with which the reader may be familiar.

The most commonly known projective test, the Rorschach Inkblot, follows the same pattern of attributing control to something else (the inkblot) which reduces tendencies to self-edit. Weakly controlled tacts evoked by the inkblot can combine with other sources of control, unknown to the therapist, to suggest what the patient is thinking about. Skinner's own projective test, the Verbal Summator, worked in the same way. "Since identifiable sources of strength will not account for the greater part of the forms of responses observed in the verbal-summator experiment, the rest must be attributed to other variables in the history of the subject" (*Verbal Behavior*, p. 263).

To conclude, I would like to encourage readers to examine the mundane and fantastic around you with Skinner's analysis of verbal behavior. Any and all behavior is subject to our analyses, to the betterment of our understanding of the natural world. To dismiss or leave unexamined <u>any</u> behavior (especially some so curious and persistent in our culture) is foolish and invites cognitive or supernatural explanations. As for the tools of psychics and their readings (and projective tests), these stimuli *can* reveal weakly-controlled verbal behavior which can entertain and may even provide insight, though not in a supernatural way.

On Mindfulness: A Skinnerian Account

David Roth, MA

"A finger pointing at the moon is not the moon itself." -The Buddha

"Responding to a stimulus is very different from responding to a response to that stimulus." – David Palmer

One evening last November, while returning to the car after visiting our family, my wife stopped me, pointed into the sky, and said, "Look at the moon." When I followed the direction of her point I was rewarded by the sight of the annually occurring "Beaver Moon" rising above the Susquehanna River; its size was enormous and its hue an unusually bright orange. When it was apparent that she and I were captivated by the same event, she dropped her pointed finger and the two of us stood for several moments observing the moon in what some might describe as "mindful presence." The term *mindfulness* is one that, despite its implicit mentalistic baggage, is gaining increasing popularity in both mainstream society and, more recently, scientific research. A recent article in *The Harvard Gazette*, titled *When Science Meets Mindfulness*, pointed to the growing popularity in scientific communities: published research on the topic increased from a total of 11 randomized controlled studies conducted between 1995 and 1997 to a total of 216 studies conducted between 2013 and 2015. The author, Alvin Powell, also dutifully acknowledged some of the inherent difficulty in treating mindfulness as a scientific subject matter, stating, "Among the challenges researchers face is defining mindfulness itself." Assuming there is no disagreement about "mindfulness" being a behavioral phenomenon, and that all behavior is influenced by environmental variables, the question of definition is one nicely suited for the behavior analytic domain.

To the outside observer the behavior of "mindfully" meditating is quite trivial; it is the events observed only by the meditator that are of most interest. The inescapable privacy of the relevant variables has inspired modern researchers to identify measured brain changes as the most appropriate dependent variable, with its independent variable being the reported mindfulness practices of the participants. But regardless of the magnitude of the observed brain changes, the behavior analyst tends to be left unsatisfied with the outcomes of such studies. What is it that the individual is actually doing when he or she is practicing mindfulness; what are the moment-to-moment effects of such behavior; and what are the reinforcing consequences that select and maintain the relevant repertoires? The present essay is a reflection on my personal investigations into the behavioral reality of "mindfulness," and an interpretation of the private phenomena within the framework of Skinnerian explanatory principles.

David Roth is 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.

Mindfulness Practice

As an initial course of instruction, the novice meditator is taught to become "conscious" of some relatively stable, arbitrary stimulus within his or her immediate environment; this stimulus is usually the conveniently available sensations arising from the behavior of breathing. As Skinner has argued, an individual is "conscious" only in the sense that he or she is verbally responding (overtly or covertly) to events in the environment, including one's own behavior and its controlling variables. This definition of consciousness is consistent with the behavior of the beginning meditator. For example, when sitting comfortably in a relatively distraction-free environment, the individual may verbally respond to the rhythmic properties of his or her own breathing behavior by covertly reciting "in" with each in-breath and "out" with each out-breath. Initially these behaviors function as mands for "attending to one's breathing" as stimuli; the individual's verbal responses rival other currently strong behaviors that may be competing with the observation of the breath. Owing to an eventual history of generalized reinforcement (described later), the verbal responses acquire a tact function to the self as a listener. According to Skinner's analysis of verbal behavior, "The self-tact has an immediate effect in helping the speaker identify or clarify the situation to which it is a response." The tact response, "in," therefore, serves the purpose of increasing the salience of the targeted stimuli by mediating one's observational behavior toward the physical elements of each intake of breath. Although the individual might be described as being "mindful" of his or her breath, the general practice of *mindfulness* tends to extend to a greater range of phenomena, and is not dependent on a contrived meditative environment.

Deeper "States" of Mindfulness

Once the meditator has acquired a proficient repertoire of verbally mediating his or her observational behavior to the stimuli correlated with breathing, he or she successively engages in comparable descriptive behavior to other stimuli in the environment, including other products of the physical environment, the discriminative strength of emitted or unemitted behavior, the topographical properties of emitted overt or covert responses, and the controlling variables contributing to such behaviors. To take one example, while observing the moon with my wife, I might have said to myself, "Observing this large, orange moon I notice a general peacefulness around me." Much like the manner in which my wife dropped her pointer finger, the experienced meditator is said to eventually "drop" his or her mediating verbal behavior while somehow responding to the phenomena of interest with an even "deeper awareness." Yet, while the meditator may cease to respond with descriptive responses of *conventional* form, this should not imply that the observational behavior is sustained in the absence of verbal mediation.

In his descriptions of verbal behaviors between a speaker and listener residing within the same skin, Skinner noted, "in the strictest sense of our definition [of verbal behavior], any behavior which is reinforced because it modifies subsequent behavior in the same individual is necessarily verbal regardless of its dimensions." I am taking the position that when an experienced meditator ceases to mediate observational behavior with conventional forms of verbal behavior that a person has come to control what Skinner referred to as "a special subdivision of his verbal repertoire." This special subdivision has important properties that provide the individual with significant advantages over the descriptive repertoires whose response forms correspond only to those of the speaker's general verbal community.

Advantages of a Fine-Grained Mindfulness Repertoire

An interesting feature of verbal behavior is that the product of a single response (i.e. a word) fails to capture the intrinsic variability of its controlling variables between any two observed instances. As Palmer has said, "words-as-stimuli filter out variability in controlling variables." For example, imagine if my wife had emitted the tact "moon" on some other night after it had returned to a relatively typical size and color. The variability in the physical elements between the two instances of the spoken word "moon" have no correspondence to the vast range of variability in the elements between the two instances of the moon as visual stimuli. When the speaking and listening behaviors reside within the skin of an experienced meditator, however, they acquire such subtle dimensions that there is likely a finer-grained correspondence between the elements of the speaker's responses and the elements of the corresponding controlling variables in each moment. Such elements include the defining properties of established classes (e.g. the common elements that evoke the tact "moon" on two separate occasions) and novel non-defining elements (e.g. properties of size and color which may be unique to a single instance) within the individual's perpetually changing environment.

Another important advantage of the finer-grained speaker-as-listener repertoire is that as it increases in subtlety, its dimensions, as emitted behaviors, appear to be wholly compatible with other emitted verbal behavior. One implication of such compatibility is that the experienced practitioner may eventually develop a self-descriptive repertoire of his or her ongoing vocal or subvocal speech, which, for any individual interested in improving self-management of his or her own behavior, would be skills of immeasurable value. As with many other reported benefits of practicing mindfulness, this is a deferred outcome for the practitioner; despite their importance, benefits arising after such long delays fail to account for the moment-to-moment consequences that select and maintain continued practice.

Reinforcement for Mindfulness Behavior

At a national conference several years back, I attended a symposium in which the primary topic was mindfulness-as-behavior. An audience member asked one of the presenters, "What is the reinforcement for mindfulness behavior?" This is, of course, a critical question for any behavior analyst. However, given the present limitations of our technology, an experimentally validated answer to the question is currently unavailable. It is situations like these where a scientific interpretation is necessary to provide a plausible account until an experimental analysis is possible.

As described earlier, the experienced meditator has a special speaker-as-listener repertoire that can potentially capture a finer grain of stimulus elements within one's rapidly changing current environment, and this is accomplished with minimal effort. Since variability is intrinsic to every class of stimuli, the meditator may have a distinct advantage in his or her ability to respond to some of the more novel elements in any given circumstance. Given the immediately contingent nature of the sudden discriminations of these novel elements, it is plausible that they serve as automatically reinforcing consequences for mindful behavior. As Skinner once put it, "Things turn up which would otherwise be displaced and concealed. One discovers unfamiliar parts of oneself." Additionally, behaving organisms have a tendency to engage in behavior that escapes prolonged discriminations of stimuli correlated with punishment or the unavailability of reinforcement. Thus it would be unsurprising to find that the practitioner of mindfulness, when faced with aversive circumstances, may discover important non-aversive elements, or find that the aversive elements actually dissipate.

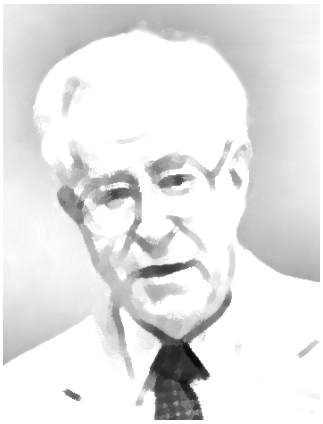
Conclusion

In an entry of his personal notes, titled *Soul-Searching*, Skinner once queried, "Much more needs to be done in analyzing what one does when doing nothing… what is achieved when one practices meditation?" Although benefits and techniques of meditation and mindfulness have been pre-scientifically described over the past 2500 years, a parsimonious analysis of such phenomena has only been made possible within the last century: after Skinner discovered and defined the lawful, molecular principles for a science of behavior. For the behavior analyst, the term "mindfulness" may be understood as a fine-grained self-descriptive repertoire mediating one's observational responses to the constellation of circumstances in his or her immediate environment. One need not be a Buddhist or behaviorist to develop mindfulness repertoires, and perhaps the improvement of a scientific understanding of this phenomenon will lead to more effective techniques for the individual practitioner. I hope the behaviorist reading this essay finds some value and satisfaction in recognizing that the nature of mindfulness can be plausibly interpreted using the tools provided by Skinner's analysis of verbal behavior – and nothing else.

in memoriam

Murray Sidman (1923-2019)

by Per Holth, PhD



Dr. Murray Sidman died peacefully on May 18 after a brief stay in a hospital in Sarasota. Sidman was born in 1923 and had just celebrated his 96th birthday on April 29th. He received a PhD in psychology from Columbia University in 1952, under guidance by Fred Keller and Nat Schoenfeld. When asked in an interview a few years ago about how he came to enter the field of behavior analysis, he replied that he "never entered it, because it did not exist at the time." Sidman was a true research pioneer in behavior analysis. He founded at least three different areas that each, separately, would have earned him an important place in the history of behavior analysis. His work on avoidance even led to his getting a phenomenon named after himself. Thus, unsignaled avoidance is also called "Sidman avoidance." Second, his important work on scientific method, as elaborated in his book *Tactics of Scientific Research* from 1960 is monumental, and humorously referred to as the Bible of the experimental analysis of behavior. Third, his later work on stimulus equivalence clearly laid the groundwork for many recent developments within behavior analysis, including different perspectives on "generative processes." He also contributed to the philosophy of the science of behavior analysis through his *Remarks* in *Behaviorism* in the late 1970s, and he continued contributing through publications until macular degeneration made it impossible for him to use his computer and read and write. However, he stayed intellectually fresh and sharp until the very end.

Wise from his own research on aversive control, he was a very nice and generous person. In their Boston apartment, he and his long-time wife, Rita, were the exceptionally lovely hosts of many visiting behavior analysts, and their hospitality to visitors from all over the world continued after they moved and spent their later years in Sarasota. As a scientist and as a person, Dr. Murray Sidman will be sorely missed.

My Favorite Skinner's Notes

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When *Operants* asked me to pick out one favorite note from all of the interesting ones reproduced in *Notebooks*, B. F. Skinner, the task turned increasingly difficult as I began turning the pages again. There are so many nice ones from this person who clearly made "Behaviorism a Way of Life." While looking through the book again, I was also reminded about how useful it must have been to put down those notes almost as a running comment on behavior as it occurs in daily life. How often have I had one of those brilliant ideas that, when I finally get to the point of writing it down, is all gone? At that point I usually have no idea. Evidently, Skinner had many, and his practice of putting down notes must have been very helpful.

Eventually, I could not resist picking the one titled *Reinforcement of Verbal Behavior*:

> Bill Verplanck, once introduced me to an audience at the University of Maryland by recalling some of his first contacts with me at Indiana. It was a rather difficult introduction to acknowledge, and I said something like this:
>
> "Professor Verplanck must realize how dangerous it is to indulge in reminiscences. When I first met him, I was just starting as a chairman at Indiana University. He was the first psychologist I ever hired. He has told you that I used to trap pigeons for my experiments. It wasn't always necessary to set traps. Once when I was making a telephone call, a pigeon came in the window, landed on my desk, and began to walk about. I reached out slowly and caught it by the feet. I finished the call, took the pigeon upstairs to the laboratory, and eventually taught it to play a kind of piano. Now I realize that that is very much the kind of thing that happened when I hired Professor Verplanck."
>
> There was great laughter and applause, and I was off to a good start—a big reinforcement rather cheaply purchased, partly at Bill's expense. Four hours later, alone for the first time and waiting for sleep, I found myself retelling the story, casting the last line in various forms, perhaps searching for the most effective form but mainly just repeating the remark. I would drop to the last line, and then return to the whole passage again. Before going to sleep I must have said it 25 or 30 times. (p. 315)

My picking out this particular note is certainly the result of multiple causes. Having known Bill Verplanck, I can easily imagine that while being proud to introduce Skinner, he would also take his opportunity to demonstrate that he was not just a proselyte. Verplanck lived his professional life in the stage light surrounding Skinner as well as in Skinner's shadow—as so many others.

More importantly, the note makes the point that Skinner's own verbal behavior was reinforced by the laughter and applause of the audience. As Skinner says in the note, the reinforcement was "rather cheaply purchased, partly at Bill's expense." The same point, that the behavior principles described by the scientist are valid also for the behavior of the scientist, is also made in the very last note in the book, called *Myself and My Subjects*:

> I used to represent the behaviorist's attitude toward himself by describing a lecturer who explains human behavior including the behavior of other lecturers, and leaves the stage. Then he sticks his head out from the wings and says, "And I'm like that too!" (p. 360)

Both notes could be considered as brief versions of what Skinner wrote about in the first of the two personal epilogues toward the end of *Verbal Behavior:* The Validity of the Author's Verbal Behavior. They are also relevant to many of the 20 criticisms of behaviorism or the science of behavior that Skinner objected to in the Introduction to *About Behaviorism*, and particularly to number 15: "If its contentions are valid, they must apply to the behavioral scientist himself, and what he says is therefore only what he has been conditioned to say and cannot be true." I will take this opportunity to encourage everyone to check out Skinner's writings on the subject in *About Behaviorism*.