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Contents

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Candidates are sought for Editor-Elect of *the Behavior Therapist*, Volumes 34 to 36. The official term for the Editor is January 1, 2011, to December 31, 2013, but the Editor-Elect should be prepared to begin handling manuscripts approximately 1 year prior.

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Vision letters will be required by September 1, 2009.

Research Forum

The Dodo Bird, Treatment Technique, and Disseminating Empirically Supported Treatments

Jedidiah Siev, *University of Pennsylvania*, Jonathan D. Huppert, *The Hebrew University of Jerusalem*, and Dianne L. Chambless, *University of Pennsylvania*

In a recent presidential column in *the Behavior Therapist*, Raymond DiGiuseppe observed that efforts to disseminate empirically supported treatments (ESTs), and especially cognitive-behavioral treatments, have been limited by perceptions "that all psychotherapies are equally effective [the Dodo Bird verdict], and . . . that common factors, therapist, and relationship variables account for the majority of the variance in therapy outcome studies" (2007, p. 118). He called for dialogue with proponents of those views, in an effort to understand their perspective and convey the alternative. Ultimately, "either we rebut these conclusions, conduct new research to show they are wrong, or we accept them and change our message" (p. 119). The aim of this article is to provide some historical context in terms of previous attempts to respond to these contentions and to present an update on recent research bearing directly on the Dodo Bird verdict and the assertions regarding variance accounted for by active ingredients (e.g., technique).

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Drew A. Anderson, Ph.D.
SUNY–Albany
Dept. of Psychology/SS369
1400 Washington Ave.
Albany, NY 12222

Aggregation

Evidence for the claim that all psychotherapies are equally efficacious derives from meta-analyses that combine various treatments for various disorders (e.g., Luborsky et al., 2002; Wampold et al., 1997). At most, these meta-analyses yield small effect sizes for average between-condition comparisons (e.g., $d = 0.21$; Wampold et al.), and the authors infer that, overall, no two psychotherapies are differentially efficacious for treating a disorder. Such a conclusion, however, is based on the fallacious reasoning that because all treatments for all disorders do not differ on average, no particular treatment is superior to another for a specific disorder (see Beutler, 2002; Chambless, 2002; Crits-Christoph, 1997; Hunsley & Di Giulio, 2002; and many others who have argued this point). Even operating with this reasoning, most meta-analyses have found differences between treatment orientations (Luborsky et al.; Shapiro & Shapiro, 1982; Smith & Glass, 1977; Wampold et al.), even when taking into account allegiance. Furthermore, in response to Wampold et al.'s meta-analysis, Crits-Christoph suggested that aggregating various populations, disorders, and treatments would likely obscure real differences in treatment outcomes. Moreover, half of the studies examined by Wampold and colleagues evaluated the treatment of anxiety, and nearly 70% compared cognitive to behavioral therapies, characteristics of the studies that may minimize the likelihood of finding substantial treatment differences. Crits-Christoph demonstrated that 14 of the 29 studies that Wampold and colleagues included that compared two treatments for specific disorders grounded in different orientations yielded large effect sizes. Similarly, Beutler, Chambless, and others (Chambless & Ollendick, 2001; Hunsley & Di Giulio, 2002) have cited multiple studies and reviews that question the Dodo Bird verdict.

As a further challenge to the Dodo Bird verdict, Siev and Chambless (2007) recently conducted meta-analyses comparing CBT and relaxation (two bona fide treatments for anxiety disorders) for panic disorder (PD) and generalized anxiety disorder (GAD). In so doing, we compared two specific cognitive-behavioral interventions in the treatment of two anxiety disorders. The results revealed that for PD, CBT outperformed relaxation at posttreatment on all panic-related measures and indices of clinically significant change. In contrast, for GAD, the two treatments were equivalent on all measures. Furthermore, therapists in all studies were crossed with treatment condition, and most authors assessed client expectations and ratings of treatment credibility, which were high and never differed by treatment group. These methodological strengths bolster the likelihood that treatment techniques affected treatment effects.

In addition to combining various treatments and disorders, many meta-analyses in which the Dodo Bird verdict is advanced do not distinguish between primary and secondary outcome measures (Wampold et al., 1997). Rather, they derive a single effect size for each between-condition comparison by averaging all outcome measures. Their logic for doing so is:

> Given the assumption that researchers choose outcome measures that are germane to the psychological functioning of the patients involved in the study, it is the effect of the treatment on the set of outcome mea-

> sures that is important. . . . Focusing on a few of many outcome measures to establish superiority causes fishing and error rate problems (Cook & Campbell, 1979) and distracts the researcher from examining the set of outcome measures, which might have produced a negligible effect size. (Wampold et al., 1997, p. 210)

However, the average of all outcome measures does not accurately capture the efficacy of the treatment for individuals suffering from a specific disorder, and is likely artificially to attenuate the magnitude of the effect size. The extent to which a treatment for a disorder (e.g., PD) affects domains of common comorbidity (e.g., depression) is critical information, but is not of equal import in evaluating the treatment's efficacy as is the extent to which it affects core symptoms of the disorder (e.g., panic symptoms and diagnostic status). Although it is true that researchers should articulate a priori the primary dependent measures, reasonable concerns about post hoc reporting biases (e.g., selectively emphasizing significant findings from a large set of mostly nonsignificant findings) ought not preclude researchers from investigating secondary outcomes. Combining measures of primary and secondary outcomes forces can obscure or mask entirely meaningful differences in treatment effects (see Crits-Christoph, 1997).

Meta-analytic data comparing CBT and relaxation for PD and GAD that were not published in Siev and Chambless (2007) illustrate the importance of considering not only disorders separately, but primary and secondary outcome measures separately, as well. Three graphs are presented in Figure 1 that progressively illustrate why meta-analyses that aggregate effect sizes across domains and outcome measures may be misleading. As depicted in the first graph, the combined effect size comparing CBT and relaxation for PD and GAD across all domains was $d = 0.19, p = .07$, the magnitude of which is consistent with the upper limit of between-treatment differences reported by Wampold et al. (1997), and equal to the effect found by Luborsky et al. (2002) in their review of meta-analyses. The second graph demonstrates that, when considered separately by disorder (albeit aggregated across domains), CBT outperformed relaxation for PD, $d = 0.31, p < .05$. In contrast, the between-treatment effect size in the domain of GAD was small and nonsignificant, $d = 0.08, p = .59$, thereby supporting the notion that treatments may differ depending on the disorder studied. Finally, as evident from the third graph, when effect sizes were derived separately for primary and secondary domains of treatment outcome, CBT outperformed relaxation for primary outcomes of PD with a moderate effect size, $d = 0.49, p < .002$, whereas the treatments did not differ on secondary outcomes (i.e., depression and generalized anxiety), $d = 0.02, p = .89$. There were no differences in primary versus secondary outcomes for GAD (ds < 0.09, ps $> .55$). Hence, the difference between CBT and relaxation for PD in the primary domain of outcome is more than two-and-a-half times as large as one would conclude on the basis of the original, aggregated effect size, whereas there were no differences between the treatments for GAD.

The divergent implications of these results and those of Wampold et al. (1997) reflect basic differences in methodological approaches to treatment outcome data, and neither should be perceived as statistical slight of hand. Rather, in conducting or interpreting these data, one must consider a fundamental issue: What is the question? It is our contention that rarely does the researcher, clinician, or consumer care whether, on average, treatments for all disorders across all domains do not differ. Rather, the consumer (to take one, for example) wishes to know what treatment will best alleviate the distress caused by his or her symptoms (cf. the fundamental psychotherapy question of Paul, who articulated the importance of asking not only whether psychotherapy works, but "What treatment, by whom, is most effective for this individual with that specific problem, and under which set of circumstances?" [1967, p. 111; emphasis in the original]). When the presenting problem is PD, the best answer to that question (if the options are CBT and relaxation) is that CBT is likely to reduce primary panic-related symptoms by approximately half a standard deviation more than is relaxation. Cast as a binomial effect size display,[1] this represents an increase in the rate of success from 38% to 62%. The wise consumer suffering from PD will choose CBT.

Bona Fide Treatments

Even advocates of a common factors approach to psychotherapy acknowledge that not all conceivable interventions are efficacious. Instead, the Dodo Bird verdict extends only to bona fide treatments, meaning those "intended to be therapeutic" (Wampold et al., 1997, p. 205). This distinction between bona fide and sham treatments in evaluating the relative efficacy of different treatments, while having appeal, also introduces a number of theoretical and conceptual difficulties.

Wampold and colleagues (e.g., Ahn & Wampold, 2001; Messer & Wampold, 2002) conclude that treatment outcome studies are futile because comparisons between bona fide treatments yield clinically insignificant differences and those between bona fide treatments and controls yield uninteresting differences. This contention is somewhat circular, however, because categorization as a bona fide treatment is both a criterion for inclusion in, and an implication of, the results of clinical experience and treatment outcome research (and meta-analyses that synthesize multiple such studies). To illustrate, consider the history of behavioral treatments for obsessive-compulsive disorder (OCD). Forty years ago, behavioral therapists treated OCD with relaxation. As exposure and response prevention (ERP) was developed, clinicians discovered that it was far more efficacious than relaxation, which is now considered a placebo in the treatment of OCD. Does the discovery that one treatment outperforms a second render that very comparison invalid? In fact, in a recent survey of psychologists who treat anxiety disorders and who predominantly favor a CBT approach, more clinicians endorsed using relaxation to treat OCD, than endorsed using ERP (Freiheit, Vye, Swan, & Cady, 2004). Surely those clinicians consider relaxation to be a bona fide treatment. How can it then become something other than a bona fide treatment when a researcher uses it? Wampold and colleagues' concern that comparisons between bona fide treatments and shams are rigged and sometimes uninformative is well taken. Certainly treatments should be compared to real treatments and not trimmed down, three-legged horses. At the same time, to conduct component analyses that evaluate particular techniques often presented together as parts of a larger treatment package, certain treatment elements must be excluded. This is part of the bind.

A related complication stems from the study- or disorder-specific classification of a

[1] The binomial effect size display is a means of depicting an effect size as a relative success rate. Based on the assumption that the rate of treatment success is 50% overall, the binomial effect size display is used to translate an association between treatment and outcome into the proportion of successes in one treatment group relative to another.

treatment as bona fide. Although Wampold et al. (1997) formulate an operational definition of bona fide to identify particular studies for inclusion in their meta-analysis, there is little conceptual justification for some resultant distinctions. For example, according to Wampold et al.'s guidelines, whereas relaxation is now considered a placebo for OCD, it is a bona fide treatment for GAD because studies have demonstrated that relaxation works as well as other treatments for GAD (and therefore therapists expect relaxation to be therapeutic), but not for OCD (and therefore [study] therapists now do not expect relaxation to be therapeutic). In other words, researchers expect some treatments to work because they have found them to do so, and others to work less well because they have found them to do so. Herein lies another difficulty with Wampold et al.'s classification of treatments as bona fide: It is circular to discount the superior efficacy of a treatment on the grounds that "I knew it would work better," if that assumption derived from observation of the same superior efficacy. Moreover, if this reasoning is correct, on what other grounds is relaxation a bona fide treatment for one anxiety disorder and not another? Considering that Wampold et al. aggregate across disorders and treatments, this poses a particular theoretical difficulty. Is it reasonable to include comparisons of CBT and relaxation for GAD (as they do), but not for OCD? Wampold et al. use the notion of bona fide treatment to ensure that the patient and the therapist have positive expectancies about outcomes, as expectancies are proposed to be an essential common factor related to outcome. However, if a therapist and a patient expect ERP to work better than relaxation for OCD, for example, then they are correct in their expectation, but it does not mean that expectancy is driving the treatment effect. Are the effects caused by expectancy, or do people expect more from treatments that work better? Finally, Wampold et al.'s criterion of bona fide treatment comparisons creates the potential trap that if consensus were reached that exposure-based CBT is the treatment of choice for OCD, then one could not establish its efficacy, as there could not be a bona fide treatment with which to compare exposure-based CBT.

Relationship and Therapist Variables, Common Factors, and Technique

The notion that the therapeutic relationship, therapist, and/or common factors contribute significantly more to treatment outcomes than do specific techniques has been stated by many (e.g., Levant, 2004; Messer & Wampold, 2002; Wampold, 2001), although with voices of opposition (Beutler, 2004; Huppert, Fabbro, & Barlow, 2006). The claim that technique accounts for approximately 10% to 15% of the variance of therapy outcome, whereas expectancy, relationship factors, and common factors account for closer to 40%, is frequently demonstrated in a pie chart (e.g., Lambert & Barley, 2001; 2002). However, the history of this chart may give the reader pause. Originally published in 1986 by Lambert, Shapiro, and Bergin in the *Handbook of Psychotherapy and Behavior Change* (3rd edition), the pie chart represented a summary of Lambert's reading of the literature from the previous 20+ years; it was not an empirical determination. One would hope that some progress has been made in the 20 years since, especially with regard to understanding mediators, moderators, and processes in therapy, and in CBT in particular. To take one study as exceptional in terms of such progress, Clark et al. (2006) showed that CBT targeting core cognitions and concerns of individuals with social anxiety disorder was more effective than exposure therapy (with a purely behavioral rationale of habituation) plus relaxation. Clark et al. report the effects of technique, alliance, and expectancy (see pie chart in Figure 2). Not only were therapist effects not large or significant, but there were no differences between the two treatment conditions in ratings of alliance (p = .57), credibility (p = .26), or expectancy (p = .22), suggesting that these mechanisms were not responsible for the differential treatment outcome between CBT and exposure. Similar data from another research group suggest that these CBT techniques for social anxiety disorder may be more effective than exposure alone (Huppert, Ledley, & Foa, 2007). At the same time, treatment technique did not account for 70% or 80% of the variance, and it is unlikely that any treatment will reach such a threshold.

How large are technique effects likely to be? Even Lambert's pie chart indicates that up to 15% of treatment effects may be due to technique, whereas Wampold (2001) suggests 8%. Before speculating about their magnitude, one needs to consider how best to determine technique effects. One method may be to compare active therapy to placebo. Overall, CBT for anxiety disorders has in fact shown significant superiority to placebo (cf. Hofmann & Smits, 2008), with an average effect size for the magni-

Figure 1. Between-groups effect sizes comparing CBT and Relaxation (a) combining disorders and all outcome measures, (b) for PD and GAD separately, but combining all outcome measures, and (c) distinguishing between primary and secondary outcome measures for PD

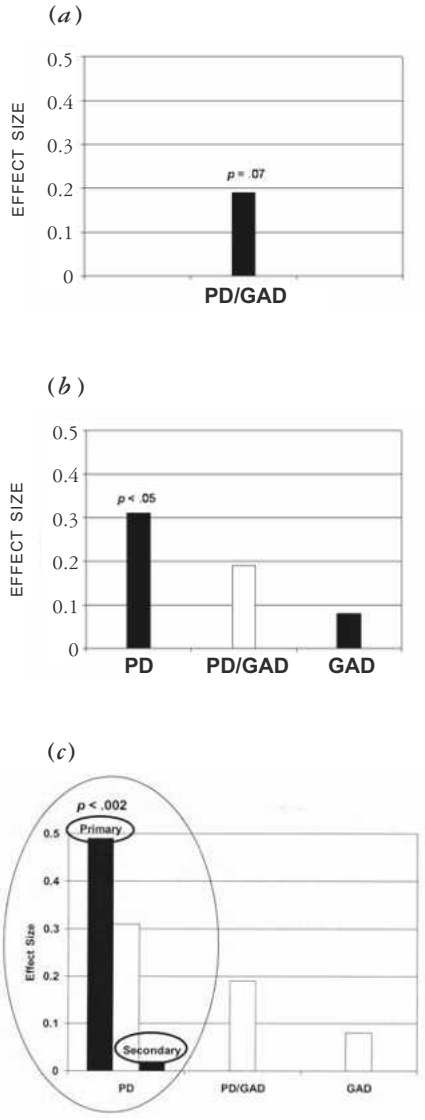
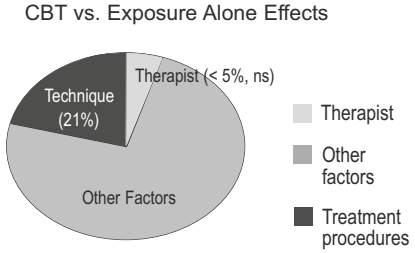


Figure 2. Breakdown of Clark et al.'s (2006) data by technique, therapist effects, and unknown



tude of the difference of 0.33 for intent-to-treat and 0.73 for completer analyses. However, there is variability in these effects, with the strongest evident in the treatment of acute stress disorder and OCD, and the weakest in the treatment of PD. Why might this be? It has been shown previously that OCD is less placebo responsive than is PD or social anxiety disorder (Huppert et al., 2004; Khan et al., 2005), and technique effects are most demonstrable in the disorders that have the smallest placebo effects. In fact, for some disorders (e.g., major depression), significant technique effects are somewhat difficult to demonstrate by comparing placebo to CBT (DeRubeis et al., 2005), although such effects are more prominent when examining follow-up data (e.g., Hollon et al., 2005). Similarly, in the case of PD, for which the magnitude of placebo response also appears to be high (Huppert et al.; Khan et al.), significant between-treatment effects are more evident at long-term follow-up (Barlow, Gorman, Shear, & Woods, 2000). In sum, it is difficult to determine the overall effect of technique without considering disorder and population, a conclusion reinforced by our discussion of the Dodo Bird verdict.

There are other methods by which one may examine technique effects. For example, Ablon and Jones (2002) showed that cognitive therapy techniques accounted for a significant amount of change in depressive symptoms in the NIMH Treatment of Depression Collaborative Research Program in both CBT and interpersonal psychotherapy treatment conditions. In addition, Cukrowicz et al. (2005) reported data suggesting that when a clinic changed its policy to conduct only ESTs, there was significant improvement in patient outcomes. Howard (1999) noted that individuals in a managed care environment who had specialty training in CBT for anxiety disorders were more likely to retain their patients, and those patients were also less likely to receive further treatment 1 year later. It is important to note that studies that simply examine orientation are unlikely to find such effects, as many practitioners who identify their primary orientation as cognitive-behavioral continue to use relaxation as a treatment of choice for OCD and PD (e.g., Freiheit et al., 2004).

But what about the contribution of alliance, common factors, and therapist effects? On average, studies yield a correlation of .22 between measures of alliance and outcome (Martin, Garske, & Davis, 2000), demonstrating that the former accounts for 5% of the variance in the latter. Note that this effect size derives from data aggregated across studies of a range of therapies and treatments, similar to the effect sizes calculated by Wampold and colleagues, and Luborsky and colleagues. Again, looking at specific therapies and specific populations, the verdict is much less clear. For example, Lindsay, Crino, and Andrews (1997) showed that the alliance in ERP and the alliance in relaxation were equal for patients with OCD, but the differences in efficacy were substantial. Similarly, Carroll, Nich, and Rounsaville (1997) showed that alliance was correlated with outcome in a supportive therapy for substance abuse, but not CBT. In CBT for depression, the data from DeRubeis and colleagues' studies have consistently showed that the therapeutic alliance is better for patients whose symptoms and cognitions have already changed for the better (e.g., Tang & DeRubeis, 1999); that is, early improvement in treatment leads to a more positive alliance. However, in Cognitive Behavioral Analysis System of Psychotherapy, where the alliance is an explicit focus of treatment, alliance appears to be predictive of outcome (Klein et al., 2003). Overall, alliance may have the greatest relationship to outcome if the therapist makes it a central focus of treatment. However, in such treatments, the distinction between alliance and technique is blurred. As others have noted (Beutler, 2002; Crits-Christoph et al., 2006), if one addresses alliance directly in treatment sessions, the very focus on alliance becomes a treatment technique. There is only one pilot study to date that attempts to improve alliance by using specific alliance-enhancing techniques (Crits-Christoph et al.), and the results are equivocal. The effects of alliance-enhancing techniques in certain areas (e.g., change in alliance and improvement in quality of life) are large, but the impact on symptoms is small, and the results are difficult to interpret without a comparison group of new trainees who may have learned to improve alliance without additional techniques. However, the study is seminal in its attempt directly to improve alliance, and further such studies are needed to evaluate the causal impact of alliance on outcome.

Therapist effects have been discussed on and off for over 30 years. More recently, some have shown that differences between therapists in treatment outcome may be decreased with manualized treatments (Crits-Christoph et al., 1991), although not eliminated (e.g., Huppert et al., 2001). How large are therapist effects? Overall, they seem to range from 5% to 15% (see also Crits-Christoph & Gallop, 2006; Lutz, Leon, Martinovitch, Lyons, & Stiles, 2007). However, the question of what makes therapists different from each other remains, and one answer may be technique. Some therapists are likely more adept than others at using some techniques, formulating treatment plans, encouraging their patients to do difficult exposures, etc., even within CBT. Of course, therapists also differ on ability to form an alliance, but the therapist who is able to articulate a strong treatment rationale tailored to the patient's specific presentation and to explain why the treatment can help (or the therapist who is able to provide an example of an imaginal exposure that directly taps into an OCD patient's fears) will likely be experienced by the patient as empathic and understanding. Thus, techniques may be part of therapist effects (or vice versa), and not something that can be truly separated from them.

Just as alliance and therapist effects sometimes may be accounted for by technique, so may other putative common factors (consider, for example, how data on outcome provided during psychoeducation probably influence both therapist and patient expectancy). Indeed, the notion of common factors itself has broadened to the point that some would include the technique of exposure as a common factor (Lambert & Ogles, 2004). However, as Weinberger (1995) noted, common factors may not be so common after all. The extent of focus on alliance differs between treatments, and so does the amount, type, or quality of exposure. And if the goal of psychotherapy research is to determine the best ways to relieve suffering for the most people, researchers need to continue to focus on the areas that are most manipulable, such as technique. In fact, Lambert's latest research is an excellent example of high-quality research that integrates the arguments for the importance of technique, alliance, and therapist factors. In brief, Lambert has improved the quality of treatment outcome in therapy by providing therapists with feedback on patient progress and whether therapists are off track with their patients' predicted trajectories (Lambert, 2007). Notably, the feedback includes specific techniques that may help put them back on track. One may wonder aloud whether use of other types of disorder-specific information could further enhance the efficacy of such interventions.

Overall, many researchers—ourselves included—attempt to quantify the relative contributions of technique and other effects. Frequently such data are presented so

as to support the exclusive role of one of the aforementioned effects (e.g., alliance, therapist, common factors, technique) in influencing treatment outcome. It is equally important, however, to demonstrate how such partisan divisions are not reflected in the real world, where all of these effects meet in a complex series of interactions. In fact, the patient's contribution to outcome (including diagnosis, insight, motivation, severity, psychosocial background, etc.) is likely the greatest. One may conclude that effective techniques are likely to positively influence not only treatment outcomes, but also therapy relationships. Few would argue that one should conduct therapy in the context of a hostile or negative therapeutic relationship. However, techniques are ubiquitous and need to be studied in order to determine how to best improve them and, thereby, patient outcomes.

DiGiuseppe (2007) suggested that unless the Dodo Bird verdict and contentions regarding greater effects of therapist, alliance, and common factors are addressed empirically, psychologists who value scientific inquiry must accept the implications of those assertions. In fact, these notions have been argued against for years, and many continue to examine the data. In this review, we have attempted to convey the following. First, the Dodo Bird verdict is predicated on meta-analyses that aggregate data across treatments, disorders, and outcome measures, and such aggregation likely masks or attenuate treatment differences between particular treatments for particular disorders on primary outcomes, even though such differences have the most direct implications for treatment. Second, there are numerous logical difficulties with the classification of treatments as bona fide, a requisite criterion for inclusion in some of the aforementioned meta-analyses. Third, there is empirical evidence that technique effects are sometimes greater than effects of common factors. More generally, the magnitude of technique effects depends on disorder and population, bolstering the assertion that broad judgments about the relative importance of technique and common factors are insufficient and can be misleading. Instead, more nuanced accounts that do not aggregate across moderating variables are necessary to conduct and evaluate psychotherapy outcome research. Finally, putative common factors such as therapist skill, the therapeutic alliance, and treatment expectancy are likely influenced by technique. Hence, their effects are not easily separable from those of active ingredients, but instead are explained by series of complex interactions. Nevertheless, there will always be others who critique the analyses, draw different conclusions, and advocate for those stances, and efforts to disseminate ESTs are limited in part because opponents of ESTs have presented their perspective more aggressively to wide-spread audiences. We must continue to address their arguments with empirically based data and logic and make our voices heard in the broad court of professional opinion.

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Correspondence to Jedidiah Siev, University of Pennsylvania, Dept. of Psychology, 3720 Walnut St., Philadelphia, PA 19104; e-mail: jsiev@psych.upenn.edu

Supervising and Mentoring Undergraduates: A Graduate Student Perspective

Sarah E. Evans, *University of Nebraska-Lincoln,* Andrea R. Perry, *VA Palo Alto Health Care System*, and Amanda Kras, Emily B. Gale, and Christopher Campbell, *University of Nebraska–Lincoln*

Supervising and mentoring both graduate and undergraduate students is a hallmark of most university-based faculty positions, and a body of literature exists aimed at studying and helping academicians effectively navigate this professorial duty (e.g., Johnson & Huwe, 2002; Landrum & Nelsen, 2002; Slattery & Park, 2002). A related body of literature is geared toward helping undergraduate and graduate students seek out and benefit from effective faculty mentoring (Cesa & Fraser, 1989; Cronan-Hillix, Gensheimer, Cronan-Hillix, & Davidson, 1986; Prinstein & Patterson, 2003). However, in many research laboratories, graduate students also find themselves in supervisory and mentoring roles with undergraduate research assistants. In fact, survey data indicate that 75% of psychology graduate students report having at least some interaction with undergraduate students about research (Bettencourt, Bol, & Fraser, 1994). Despite the frequency of this scenario, there are currently no publications or guidebooks specifically geared toward helping graduate students navigate the murky waters of supervision and mentorship.

In order to address this gap in the literature, we, a group of graduate students from a large research lab, pooled our experiences supervising and mentoring undergraduates. Our group consists of five clinical psychology graduate students, including four females and one male ranging from a third-year predoctoral student to a first-year postdoctoral fellow who recently completed internship. We each have between 3 and 7 years of undergraduate supervisory and mentorship experience, and, collectively, we have supervised over 80 undergraduate students. While we acknowledge that the supervisory relationship is triadic in nature, involving direct and indirect interactions between a faculty member, graduate students, and undergraduate research assistants, there is currently a dearth of literature specifically examining the relationship between graduate students and undergraduate research assistants. In focusing on this relationship, we offer anecdotes, suggestions, and tips designed to enhance graduate students' transition into the supervisory role and to maximize mentoring success when working with undergraduates.

Several important aspects unique to the role of graduate student supervisor are discussed, including: (a) developing a supervision and mentorship philosophy, (b) functioning as a midlevel manager between undergraduates and faculty, (c) transitioning to the role of supervisor, (d) building a team of undergraduate research assistants, (e) training and data management, (f) running an effective meeting, (g) reward a job well done, and (h) accountability and the "tough talks." The final section of the paper, "Transitioning From Supervisor to Mentor: Cultivating Skills for Research and Beyond," is aimed at helping the graduate student supervisor navigate the development of mentoring skills. It is important to note that, although similar, the roles, processes, and aims of supervision and mentoring are not identical. According to *Merriam-Webster's Collegiate Dictionary* (10th edition)—and for the purposes of this paper—supervision is defined as "a critical watching and directing (as of activities or a course of action)" (p. 1184), while mentorship/mentoring involves guiding, listening, and coaching (p. 726).

Getting Started

Developing a Supervision and Mentorship Philosophy

Serving as a supervisor and mentor is often as much of an educational experience for the graduate student as the research assistantship is for an undergraduate research assistant. With that in mind, before embarking on the role of supervisor or mentor, it is wise for new graduate student supervisors to consult the aforementioned literature available to faculty to obtain some guidance about practices that are likely to render the supervisory experience successful. Graduate student supervisors may also consider consulting the large body of literature devoted to educating professionals about the benefits of an undergraduate research assistantship (i.e., Grover, 2006; Landrum & Nelsen, 2002). Secondly, it is important for graduate students to be aware of how their own previous and current mentoring experiences will shape the development of their supervisory and mentoring style. Graduate students are encouraged to reflect on their experiences as undergraduate research assistants: What was most helpful? What was not helpful, or downright frustrating? Were structured didactic training sessions, hands-on practice, observational learning, or some combination of these approaches most beneficial? Graduate student supervisors should also consider how they plan to train undergraduates as well as the expectations they will have of undergraduate research assistants. Finally, and perhaps most importantly, it is critical for graduate students to consult with faculty mentors to gain additional perspective on the above issues as they relate to coordinating a new project.

Functioning as a Midlevel Manager Between Undergraduates and Faculty

Whether the graduate student has been charged with managing the day-to-day operations of a professor's research project as part of an assistantship or whether he or she wishes to gain assistance in conducting personal research projects, the graduate student supervisor functions as a midlevel manager between a faculty supervisor and undergraduates. Thus, in tandem with developing their own supervision philosophy, it is imperative that graduate students understand their faculty supervisors' expectations both of themselves and of the undergraduates in the research lab. Graduate students should be certain that they and the faculty mentor reach a consensus on issues such as how often they will meet with one another and with undergraduates, how undergraduate research assistants will be recruited and trained, and, perhaps most importantly, how graduate students will be expected to troubleshoot project-related problems with the undergraduates being supervised. By ironing out issues with the faculty supervisor prior to beginning the assistantship and continuing consultation throughout the experience, graduate students will take a proactive approach to fostering and shaping the devel-

opment of their personal supervision philosophy while simultaneously ensuring that they adhere to their duties as project managers.

Transitioning to the Role of Supervisor

Even with a clear approach to supervision in mind and the support of a faculty mentor, making the transition to a supervisory role can be difficult. In fact, one student in our research lab went from being an undergraduate research assistant to supervising the same undergraduate research assistant team as a first-year graduate student. While this is an unusual case, it illustrates the somewhat difficult psychological transition that must take place when a graduate student supervisor is of a similar age and experience level as the undergraduate supervisees. Thus, as mentioned above, it is critical for a graduate student to begin to embrace this role before beginning to supervise undergraduates through self-education about supervising and consultation with faculty. However, once the graduate student begins to interact with undergraduates, additional steps may make this role-transition easier on both the new graduate student supervisor and the undergraduate research assistants. In order to get everyone off on the right foot, it is critical for senior graduate students and faculty to anticipate these transitions in advance and arrange for the new graduate student supervisor to come to lab meetings and interact with undergraduates a few weeks before the outgoing supervisor leaves. A caveat for the new graduate student supervisor: Simply showing up on the first day of the assistantship and introducing oneself as the person in charge is probably not going to be successful and may be met with skepticism on the part of the research team.

Once the reigns are officially handed over, it is important for the new graduate-level supervisor to spend time interacting with the undergraduates (e.g., graduate students might have the undergraduates lead them through project duties or ask the undergraduates about their career goals and research interests). Graduate students should strive to create a collaborative team environment by seeking input from undergraduates on changes in project protocol and other key decisions. As in any relationship, it is important for graduate students not to demand undergraduates' respect, but rather to earn it by demonstrating genuine interest in their goals and ideas. Finally, bear in mind that expectations vary between supervisors with regard to issues such as the dress code for running participants and the amount of hours an undergraduate is expected to commit to the project each week. Thus, it is critical that changes in these expectations are communicated effectively during a new graduate student supervisor's initial interactions with research assistants.

Laboratory Logistics

Building a Team of Undergraduate Research Assistants

In contrast to the scenario of "adopting" undergraduate research assistants, some graduate student supervisors, particularly those conducting thesis or dissertation studies, will have to recruit an entirely new team of research assistants. So where does one find undergraduate research assistants? Some ideas for potential recruitment forums include meetings of undergraduate organizations like Psi Chi, messages sent out over the undergraduate psychology listserv, or flyers with e-mail contact information posted throughout campus buildings. Whatever the chosen method of recruitment, graduate students at a large institution should bear in mind the possibility of receiving an overwhelming response to recruitment efforts (as many as 30 email inquiries for only one or two positions). To pare down this initial list of prospective research assistants, graduate students may consider replying to each expression of interest with another e-mail containing screener questions. For example, asking potential research assistants for their grade point average and setting the minimum requirement at 3.0 may help to eliminate those students who are unable to juggle coursework effectively and who, therefore, may have difficulty managing research responsibilities. Other screener questions may inquire about why students are interested in gaining research experience and whether the students' hours of availability are conducive to working on the project. Often implementing a few of these questions will save time and effort by screening out those undergraduates who are unlikely to be compatible with the expectations set forth by the graduate student supervisor.

The next step graduate students may wish to include in the recruitment process involves interviewing the remaining applicants. Fifteen- to 20-minute interviews allow the supervisor to gather more in-depth information about each student's knowledge of psychological research processes (i.e., using SPSS, experience with PsycINFO) and career goals. This is also a good time for the graduate student to communicate the purpose of the research study as well as general expectations and responsibilities of the project. Finally, it is important that the supervisor evaluate necessary skills that a successful undergraduate research assistant must possess (e.g., effective communication abilities, multitasking and problem-solving skills). Remember that first impressions are often telling, and showing up late, dressing inappropriately, or being inebriated (yes, this really happened!) for the interview may reflect the student's approach to responsibilities or suggest that he or she is not yet ready for such a large commitment. Once the graduate student supervisor has a few undergraduates who seem to be a good match for the project, it may be helpful for those undergraduates to complete a second interview with the faculty supervisor before final hiring decisions take place.

Training and Data Management

You have worked tirelessly, toiling (perhaps even ruminating) over each minuscule data collection detail and eagerly dreaming of the moment when you can hit the "run" function in SPSS and pour through the results of a project that lasted 15 months and took a team of 10 research assistants to execute. Finally, you open your database to gaze at the perfect data . . . but wait, there are a few missing data points . . . no, wait, there are rows and columns so empty that you could fill them with the tears you suddenly feel coming on. Moreover, someone seems to have gotten confused about what a "1" represents in the database and what a "4" represents . . .

This hypothetical scenario, albeit melodramatic, resounds with many researchers and raises another important consideration for graduate students in a supervisory role: training undergraduates not only to complete their responsibilities but also to value research procedures and the accuracy of the resulting data. While undergraduates will often assist in many tasks during their assistantship, our experience has been that data entry is one task that presents as especially challenging. At the crux of this issue is the difficulty of conveying to research assistants the importance of data entry, which is often experienced as a tedious and menial task. To avoid data entry errors, and other pitfalls, graduate student supervisors should remember that for many undergraduates who are not yet familiar with the research process, it may be difficult to conceive of how one "little" mistake today can translate into a data disaster 8 months

later. These careless mistakes often seem to reflect a lack of understanding of the importance of the task on the part of the research assistant. Another equally important and similarly challenging issue involves conveying to undergraduates the importance of maintaining the confidentiality of the data. Although confidentiality is an issue that weighs heavy on the minds of graduate students and faculty alike, undergraduate research assistants will likely require training as to why confidentiality is important when conducting clinical research. Without instruction in this area, undergraduate research assistants may not hesitate to take participants' self-report measures home and enter information into a database they e-mailed to themselves.

In order to set the stage for compliance with expectations and rules, and to avoid data debacles and breaches of confidentiality, graduate students may find it helpful to provide undergraduates with an actual syllabus during the initial project training meeting (Landrum, 2008a). This syllabus can outline expectations, project responsibilities and commitments, as well as lab policies (e.g., consequences for missed meetings; 20% of all data will be double entered each month for accuracy checks; data should be stored in a locked file cabinet in a locked room; electronic files should be both encrypted and password-protected). Graduate students should also use this meeting as an opportunity to learn more about each student's previous research experience, topical interests, short- and long-term goals, expectations and hopes for the assistantship, and learning preferences. Similar to the practices of many successful undergraduate faculty mentors (Slattery & Park, 2002), this information can then be used to inform training and experiential exercises. Throughout the remainder of the training process, graduate students may consider encompassing four "core" learning methods aimed to enhance understanding for undergraduates, regardless of previous experience and learning style. The first two methods—weekly meetings and homework assignments—provide an overarching structure for the research experience and encourage the students to learn and think about the research process, even when they are away from the lab. At the same time, the latter two methods—experiential exercises and didactic training—are intended to enhance the quality and depth of the undergraduate's learning by, for example, engendering in-the-moment modeling and hands-on practice, in a safe environment in which they will receive immediate, constructive feedback on their performance.

Running an Effective Meeting

GRADUATE STUDENT: How did the research sessions go this week?

RESEARCH ASSISTANT 1: [*checking her watch*] Fine.

RESEARCH ASSISTANT 2: [*yawning after a long night of studying for midterms*] Yep, fine.

GRADUATE STUDENT: Did any problems come up?

RESEARCH ASSISTANTS 1 AND 2: [*enlivened and convincing*] No, everything was good.

GRADUATE STUDENT: [*almost ready to end the meeting*] So . . . hmm . . . were there any glitches with the computerized questionnaires?

RESEARCH ASSISTANT 2: Oh yeah, well, on Monday night the software was down and so none of the participants were able to fill out the Beck Depression Inventory.

Running an effective meeting entails more than simply showing up and checking in. Although ideally undergraduate research assistants would come to team meetings with a list of questions and concerns, it is perhaps more realistic to anticipate interactions similar to the all-too-common one shared above, which highlights the importance of developing a clear, goal-directed communication style. Rather than relying solely on open-ended questions and accepting one-word assurances as a sign that the project is running smoothly, graduate student supervisors should create a deliberate list of questions that focus on the undergraduate's adherence to the research protocol and on potential problems associated with data collection (e.g., What did you do with the consent form after the participant signed it? Did the video equipment work properly?). By asking a series of specific questions each week, the graduate student may cue the team's memory about research sessions, highlight aspects of the study that are most critical, enhance students' compliance with the research protocol, and provide in-the-moment problem-solving about issues that did arise.

Although a central goal of team meetings is to focus on business—to discuss problems and generate solutions—the most effective meetings are likely to also foster broad-based learning and boost team morale. Based on suggestions from our research assistants, a semi-formal didactic component can be incorporated into team meetings. These didactics, which may range from a discussion about graduate school to more formal presentations by the faculty supervisor on current topics in psychology, can break up the monotony of the "business as usual" meeting model and provide undergraduates with a rich opportunity to learn more about timely issues. Additionally, to maintain positive team morale (and to ensure that the undergraduates are not snoozing through meetings), it may also be helpful for graduate students to occasionally incorporate lighthearted icebreakers, as well as formal celebratory activities, such as semester-end potlucks or pizza parties, and award days to recognize undergraduates for their hard work.

Providing Feedback

Reward a Job Well Done!

Every good behaviorist realizes the importance of positive attention and the powerful impact praise can have on levels of productivity and motivation. Yet, this basic principle is often forgotten when supervising and mentoring undergraduate research assistants, despite the fact that these students constitute the backbone of many research projects. It is an easy trap to fall into, as research assistants who are not meeting expectations present a more salient concern. As a result, they are the ones who attract the attention of their faculty and graduate student supervisors, while the others—the dependable ones, the hardworking ones, the "I'm-always-there-when-you-need-me" ones—simply go on doing exactly what was asked of them and then some. Just as it is important for faculty to reward their graduate-level mentees for performance (Cesa & Fraser, 1989), graduate student supervisors should not overlook the efforts of undergraduate research assistants.

Verbal praise can work well as a reward on a day-to-day basis and should be used often to reinforce quality performance. Not only does it boost morale by conveying a general message of appreciation to research assistants for the work they do, it also reminds them that what they are doing is important and how they are doing it matters. If consistently praising 20 research assistants on an individual basis is too unwieldy a task for the graduate student supervisor, team meetings may provide an excellent forum for voicing praise. In cases where a specific research assistant has done something particularly noteworthy (e.g., volunteered to put in extra time, covered a shift for a sick teammate), graduate student supervisors may consider utilizing a more tangible reward such as a certificate of

appreciation presented at the team meeting or a personalized thank-you card in that student's mailbox. Supervisors may also want to keep a copy of these certificates on file as a way of documenting research assistants' performance. Such documentation becomes an excellent resource when it comes time for letters of recommendation. Finally, for those research assistants who consistently surpass expectations, increased responsibility on the research project or advanced research opportunities (e.g., conference presentations, individual projects) represent additional reward options. Such experiences benefit the research assistants by expanding both the breadth and depth of their research backgrounds, which may be particularly helpful for those interested in pursuing graduate studies. Because such experiences require a great deal of added time and effort on the part of the graduate student supervisor and faculty mentor, however, rewards of this nature are likely best reserved for only those research assistants who demonstrate exceptional levels of commitment and dedication.

Accountability and the "Tough Talks"

While incidents deserving of praise or reward may yield a general sense of how undergraduates are doing over time, such impressions—even when bolstered by an occasional certificate of appreciation—may not represent an objective, comprehensive assessment of undergraduates' performance overall. In order to evaluate undergraduates' work more broadly and establish a method for holding these students accountable for their responsibilities, graduate students supervisors are encouraged to implement a standardized performance evaluation protocol that will be completed for each research assistant every 2 to 4 months. This evaluation may include a Likert-type scale of the student's performance in areas deemed by the graduate student and faculty member to be important to completing the assistantship successfully. Examples of categories that may appear on such a performance evaluation include data entry accuracy, quality of interaction with research participants, adherence to study protocol and lab procedures, meeting attendance, and problem-solving ability. Reviewing these performance evaluations with each undergraduate on a one-on-one basis also provides the graduate student supervisor with an opportunity to bestow additional praise as well as to address any areas that need improvement. Similar to certificates of appreciation, keeping these formal performance evaluations on file will come in handy when the student requests a reference or a letter of recommendation.

In addition to periodic performance evaluations, graduate student supervisors may also find it helpful to have a standardized protocol for dealing with specific instances of problematic behavior. Although graduate students will likely have many successes when working with undergraduates, they must also be prepared for how to handle situations when, even after pledging commitment and going through training, a research assistant seems to be struggling (e.g., missing meetings, forgetting to show up to run participants). The answer: document, consult, and take action. Creating an "Incident Report" slip allows the graduate student to document, in writing, any act that violates project protocol and expectations (all of which should be described in the research assistantship syllabus). Graduate students may consider allowing all undergraduates one "freebie" incident report, *sans* penalty, followed by the assignment of consequences for accumulating incident reports (e.g., a grade deduction, suspension, or termination, contingent on the severity of the offense). Once an incident has occurred, however, it is important for the graduate student to consult with the faculty supervisor regarding the severity of the offense as well as the appropriate course of remedial action. Following thorough documentation on the incident report slip, the graduate student should set up an individual meeting with the research assistant to discuss the problematic behavior(s). Rather than making these meetings punitive, particularly for the "freebie" incident report where no grade deduction is implemented, the graduate student supervisor should strive to help the undergraduates develop insight into their behavior and then collaboratively come up with steps that must be taken to remedy the problem. Before being filed away, the finalized incident report should then be signed by the undergraduate research assistant, the graduate student supervisor, and the faculty member overseeing the project.

Our personal experiences suggest that these meetings are likely to go smoothly, with undergraduates apologizing profusely, promising it will not occur again, and agreeing to take action to ensure proper execution of responsibilities. Unfortunately, there are situations where it becomes apparent that the research assistantship simply will not work out due to repeated violations of project responsibilities. Again, after consultation with the faculty mentor, it is important for the graduate student supervisor to provide clear justification and documentation (e.g., the previous incident reports kept on file) for why a person is being terminated and to communicate this to the research assistant in private. This process is certainly easier written about than executed, when the sometimes-tearful student is seated right in the lab. However, graduate students are encouraged to remember that their ultimate responsibility is to the project they are charged with coordinating and that part of their professional development involves learning to effectively troubleshoot problems and provide feedback to supervisees.

Transitioning From Supervisor to Mentor: Cultivating Skills for Research and Beyond

Consulting the literature, carefully screening potential research assistants, and tailoring training across all types of learning styles should result in a graduate student having a team of research assistants so qualified that any one of them is destined to be the next ABCT president. Right? Although a carefully crafted research team is likely comprised of bright, motivated, and "coachable" members, graduate students are encouraged to reflect on their own college days in an effort to establish expectations for undergraduates' independent research in a developmentally sensitive manner (Fromuth et al., 2003). Within a developmental framework, it is important for graduate students to recollect the myriad skills required to design an independent research study, author a conference presentation, or successfully apply for graduate school admission or employment. Given that undergraduate research assistants come with a wide range of experiences and attitudes, skills and expectations, creating a flexible research curriculum may help minimize mentoring pitfalls (e.g., having to deal with potentially critical errors in the data collection process) while maximizing mentoring successes (i.e., striking a balance between providing developmentally appropriate guidance and encouraging independent research).

Our mentoring experiences and the mentoring literature suggest that the broad goals of undergraduate research assistantships are twofold: (a) to provide undergraduates with exposure to the applied scientific research process and cultivate independent research skills; and (b) to assist and prepare undergraduates to enter advanced degree programs or the job market (Landrum & Nelsen, 2002). Thus, in designing a re-

search curriculum aimed to help undergraduates transition from the role of research assistant to novice researcher and critical thinker, graduate student mentors may consider trying to encompass the four core learning methods recommended previously for graduate student supervisors: weekly meetings, homework assignments, experiential exercises, and didactics. These methods will provide an overarching structure for the mentoring experience and foster generalizability of the undergraduate's new skills. Below, we highlight valuable topics and tools, spanning across the core learning methods, which graduate student mentors can utilize to develop a dynamic, individually tailored curriculum that will accomplish the goals of the undergraduate research assistantship.

Fostering Independent Research Skills

The responsibility of a graduate student supervisor is to manage a research project, meaning that many initial interactions between a graduate student and undergraduate research assistants will be devoted to training on project-specific tasks, such as how to debrief participants. However, graduate student mentors are in a position similar to faculty mentors in that the training focus shifts toward educating students on broader issues related to scientific research and the field of psychology. Many undergraduates report that increasing their knowledge of scientific research processes related to their field of interest is one of the primary reasons they seek research experience (Landrum & Nelsen, 2002). Our experience suggests that one such process is that a universal concern among many undergraduates is their limited knowledge of scientific and technical writing. Thus, this may be a good example of one of the first areas where graduate students can begin to mentor undergraduate research assistants. Using the four learning methods, there are numerous ways that a graduate student mentor can cultivate and strengthen undergraduates' writing skills. Examples include assigning homework such as reading "gold standard" writing samples (e.g., empirical studies published in leading psychology journals) and instructional pieces on scientific writing (e.g., Landrum, 2008b; Nicol & Pexman, 1999). Once undergraduates have completed these assignments, it may be helpful for the graduate student to design experiential exercises through which undergraduates can practice their newly learned skills. For example, the graduate student may assign undergraduates the task of writing a short scientific literature review on a topic of their interest. Then, the graduate student can provide continuous feedback over several cycles of revisions. With increased confidence in their research skills and increased curiosity in a topic area, standout research assistants may wish to conduct an independent research project. Mentoring this process involves regular meetings with the student to discuss the process of generating a research idea that is feasible, measurable, and unique (i.e., fills a gap in the literature). Furthermore, graduate students will need to consult with a faculty mentor throughout the mentorship in order to learn how best to guide the undergraduates as they go through the steps required to plan and implement an independent study (e.g., writing an IRB application, collecting valid and reliable data, analyzing and writing up the results).

Assisting With Graduate School and Employment Preparation

Finally, as mentioned previously, undergraduates may also turn to their graduate student mentors for advice on more general professional issues, such as preparing for graduate school, networking within a field, writing a curriculum vita or personal statement, and integrating into the professional world (e.g., What is appropriate professional attire for a job or graduate school interview? What goes on at a psychology conference?). Similar to the tools and tidbits described above, graduate student mentors can provide sample curriculum vitas or résumés and personal statements, give conceptual or editorial feedback on the mentee's application materials, and model professional behavior and attitudes. Graduate students may consider incorporating some didactic sessions into project team meetings in order to formally address topics such as deciding on a career or type of advanced degree, preparing for the Graduate Record Exam, requesting letters of recommendation from faculty, writing personal statements, and preparing for job interviews. Time outside of team meetings may also be invested in reviewing students' personal statements and vitas or engaging in mock interviews. A detailed discussion of the process of mentoring a graduate school or job applicant is beyond the scope of this paper; however, several informative guides are available that may aid the graduate student mentor and the undergraduate applicant (e.g., American Psychological Association, 2007; Keith-Spiegel & Wiederman, 2000). On a final note, while it is important for graduate mentors to support the undergraduates with whom they work during the graduate school or employment application process, it is also important to remember that it is ultimately the undergraduate students' responsibility to get application materials together in a timely fashion and to seek application to appropriate schools or prospective employers. Many graduate students feel some amount of allegiance to the undergraduates whom they have mentored, leading to feelings that the success or failure of an application is a personal mission. However, ultimately, just as a graduate student put forth the effort to be successful in his or her quest to gain admission to an advanced degree program, undergraduate mentees have to want it for themselves more than their mentors want it for them.

Final Thoughts

Serving as a graduate student supervisor and mentor can be a gratifying experience, one that provides a unique opportunity to foster the interest of undergraduate research assistants in the research process in a very hands-on way. Yet, when first placed in this role, it can prove to be a daunting and, at times, anxiety-provoking position. However, because acting in this capacity carries so many varied challenges that are critical to a graduate students' own professional development, it is our hope that we might be able to ease the burden a bit by sharing what we have learned along the way. Surely, there are additional issues to consider, topics not elaborated upon in this article (e.g., mentoring undergraduate students who hope to obtain a specific job; special considerations when mentoring students who are members of a minority group). However, in this initial foray into the otherwise uncharted territory of guidelines for graduate student mentorship, we wanted to focus on what we feel are the most salient issues, with the hope that others will build upon this foundation and share their insights and expertise within this domain. Although acting as an effective graduate supervisor or mentor may never be an easy task, it is likely to remain a prominent part of many graduate student careers and, therefore, is worthy of continued attention and advice.

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Correspondence to Sarah Evans, M.A., 238 Burnett Hall, Lincoln, NE 68588-0308, e-mail: SAEvans6@gmail.com.

Origins

Antecedents to a Paradigm: Ogden Lindsley and B. F. Skinner's Founding of "Behavior Therapy"

Derek D. Reed, *Melmark New England*, and James K. Luiselli, *May Institute*

Behavior therapy is an approach to psychological service delivery that relies heavily upon nonbiological techniques and learning theories (Erwin, 1978). Today, behavior therapy is considered a dominant treatment strategy and has been applied with many clinical disorders in a variety of therapeutic contexts (Masters, Burish, Hollon, & Rimm, 1987; Thorpe & Olson, 1997). Broadly defined, "behavior therapy involves primarily the application of principles derived from research in experimental and social psychology for the alleviation of human suffering and the enhancement of human functioning" (Franks, 2004, p. 109). While many historians have traced the origins of behavior therapy to seminal publications authored by Eysenck (1960) and Wolpe (1958), it may be argued that it was actually the work of B. F. Skinner and Ogden Lindsley that first directly promoted the use of operant techniques to human behavior change (Lindsley, 2001). The purpose of this paper is to highlight the contributions of the Harvard Pigeon Lab to the formation of behavior therapy, and to introduce Ogden Lindsley and B. F. Skinner as the major proponents of this technique.

As psychological folklore contends, behaviorism was spawned the day that J. B. Watson proclaimed that "introspection forms no essential part of its methods, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness" (Watson, 1913, p. 158). Seven years later, Watson and Rayner (1920) would demonstrate that an 11-month-old boy named Albert could have his fear conditioned, in line with Pavlovian theories and offering some validation to the content of his own manifesto, *Psychology as the Behaviorist Views It* (Watson, 1913).

Eight years after Watson published his "Little Albert" experiment (Watson & Rayner, 1920), a young and ambitious B. F. Skinner unpacked his copy of Watson's *Behaviorism* (1930) at 388 Harvard Street in Cambridge, Massachusetts, as he prepared to embark on his graduate training at Harvard University (Skinner, 1979). Inspired by the works of Watson and Pavlov, Skinner had hopes of not only obtaining an advanced degree in psychology, but also of redefining the science of human behavior altogether (Bjork, 1993). While this may seem an ambitious aspiration for a first-year graduate student, the interaction between Skinner's passion for invention and the experimental laboratories within the Harvard Psychology Department opened the door for such a contribution. Notably, while studying the reflex of rats' digestive systems and eating behaviors early in his research career, Skinner found that the kymograph—a revolving drum with a paper surface whereby an attached stylus moved in response to dependent variables—provided a unique depiction of physiological changes (Lattal, 2004). While Skinner's use of the kymograph for physiological research was commonplace during the early 20th century, his adaptation of the kymograph was groundbreaking. In particular, rather than fixing the stylus to capture changes in strictly physiological events, Skinner attached the stylus to a fulcrum that a rat would move, thereby recording the operant behavior of the animal in real time (see Skinner, 1956). Over time, Skinner would

replace the fulcrum with lever presses in an effort to record the rate of the organism's behavior in operant situations—something he saw as the most basic and fundamental dimension of behavior (Lattal, 2004). Specifically, this invention soon became known as the "cumulative recorder," a device that dominated the field of experimental psychology for decades and would later become an iconic representation of Skinner's experimental analysis of behavior. Later in Skinner's career, the apparatus was adapted for other organisms, including humans, as the field of behaviorism progressed from a strictly experimental science to an applied methodology.

As Skinner continued to refine his cumulative recorder, his knack for inventiveness and engineering—undoubtedly shaped and developed from years of tinkering since childhood (see Bjork, 1993)—led him to create an operant chamber he believed would assist in raising an infant child. In this small, climate-controlled environment, Skinner thought that an infant would find "a connection between health and happiness and the surroundings" within this "baby tender" (Skinner, 1945). The baby tender would later be termed the "heir conditioner" and, eventually, the "air crib" when Skinner attempted to market this product to the public (Bjork). In 1945, he published a review of the air crib in the *Ladies' Home Journal*, titled "Baby in a Box." As one might suspect, this publication painted Skinner out to be a quack researcher as many readers interpreted his work to be evidence that he was conducting experiments on his own children (Bjork, 1993). These allegations would significantly delay Skinner's recognition as a valid social activist and would even stir rumors that Skinner's experimentation on his daughter led to her ultimate suicide (Urban Legends Reference Pages, 2004). In fact, Skinner did not experiment on his daughter, she did not commit suicide, nor did he intend the air crib as being a human "Skinner box."

Interestingly, one of the first documented accounts of human operant experimentation comes from Skinner's friend and colleague at Harvard, Fred Keller. Specifically, in Skinner's autobiography, *A Matter of Consequences* (1983), he recalls a letter from Keller which read, "In late summer of 1939, I took my [cumulative recorder] home, to study the lever-pressing in my 17-month-old daughter, under several conditions of reward with bits of chocolate… I had known in advance what would happen, that the child would behave like a rat!" (p. 107). Skinner had always trusted that his operant techniques would translate to humans, but had not yet taken time away from his animal research to validate these assumptions.

As early as the 1930's, Skinner wanted to study people rather than animals (Skinner, 1983). Specifically, he was interested in the behavior of psychotic patients admitted to hospital wards. Skinner even went as far as making connections and planning research projects with David Shakow and Saul Rosenzweig at Worcester State Hospital in Massachusetts. Unfortunately, Skinner was busy with his own work and unable to see through these projects. Thus, the experimental analysis of human behavior would remain in queue until greater opportunity was made available.

Prior to the Second World War, Ogden Lindsley was an engineering student at Brown University. After seeing his fellow students courageously enlisting, Lindsley did the same. Unfortunately, his vision was not good enough to become the fighter pilot he dreamed of being. However, his engineering skills and passion for science and mechanics quickly moved him through the ranks to become a crew chief. When replacements were needed in Europe, Lindsley was finally given the opportunity to fly in a real combat mission. Ironically, on his first flight, Lindsley was shot down in Romania, which resulted in his detention at the Nazi prison camp Luft IV. During his time in capture, Lindsley made a "personal pledge" that if he were allowed to escape, he would devote half of his life to helping the world and the other half to having fun—reasoning that his fallen comrades would have insisted on the latter (Binder, 2005). Ultimately, Lindsley escaped from the Nazi prison camp Luft IV by disguising himself as a French soldier and running through the German frontline (Lindsley, 2001). Thus, when Lindsley finally returned home from duty, he changed his focus from engineering to psychology (Lindsley).

As the war trudged on, the United States became desperate for technological advances to aid in the war effort. During this time, Skinner held a faculty position at Indiana University and had just been elected President of the Midwestern Psychological Association (Skinner, 1983). The Office of Naval Research ultimately solicited him to become involved in a research project examining the feasibility of training pigeons to guide missiles. While Project Pigeon never resulted in the actual use of pigeons in combat, it did shift Skinner's research away from rats and towards pigeons, which subsequently resulted in new modifications to operant chambers and novel discoveries concerning the experimental analysis of behavior. Notably, it was during this time of research that Skinner discovered "superstition" in the pigeon (Skinner, 1948), later termed *adventitious reinforcement* in the field of behavior analysis.

Back at Brown University, Lindsley read *Psychosomatic Medicine* (Dunbar, 1947) and decided to "personally solve the mind-body problem by becoming an expert in both" (Lindsley, 2001, p. 132.). He double-majored in both experimental psychology and histochemistry, received highest honors in psychology, and eventually went on to the master's program in psychology at Brown, where he employed his engineering training in designing and building the department's histochemistry laboratory.

As Lindsley began planning his dissertation research on olfactory epithelium in rats at Brown, the Dean suddenly passed away (Lindsley, 2001). The incoming Dean then declared that Brown would no longer permit its students to earn three degrees at the same institution. Accordingly, Lindsley was left "ABD," and had to find a new graduate training program to complete his Ph.D. Lindsley ultimately chose Harvard, primarily because Robert Galambos was there researching nerve fiber recording. Unfortunately, during the second semester of Lindsley's first year at Harvard in 1950, Galambos left for a research stint at Walter Reed. Lindsley, who was unable to transfer any credits from Brown, was now without an advisor and funding sources.

Two years before Lindsley entered the Psychology Department at Harvard, B. F. Skinner returned to Cambridge, Massachu setts. Edwin Boring, the director of psychological laboratories at Harvard, had promised Skinner $4,000 worth of department funds, and $1,000 to maintain his experimental lab (Bjork, 1993). Skinner was now provided an opportunity he could not refuse—the chance to design and oversee the world's foremost laboratory committed to the experimental analysis of behavior. He would make his office in the basement of Memorial Hall, along with laboratory space for his experimental apparatuses (Skinner, 1983).

As a new faculty member within the department, one of Skinner's responsibilities was to increase enrollment in the introductory course Psychology 7 (Skinner, 1983). When Skinner took the reigns of this class, it was moved into the General Education program and renamed Natural Science 114. Skinner found this a fitting title, as he

would be teaching the science behind human behavior (Skinner). In seeking graduate students to serve as section leaders for the course, Skinner learned about Lindsley's series of unfortunate predicaments and made him a teaching offer. Lindsley accepted, forming a relationship that would soon prove an epic one.

As part of Lindsley's instruction as a section leader in Skinner's Natural Science 114, he devised a demonstration where he would shape a rat to pull weights (Lindsley, 2002). Appropriately, the rat was named "Samson," and it soon became a hit among the undergraduate students. Lindsley's interest in behaviorism was now piqued. While at Brown, Lindsley became familiar with Watson's behaviorism, but it was not until his relationship with Skinner that he viewed it as a viable approach to science (Lindsley, 2001). Subsequently, Lindsley sought out research opportunities in behaviorism, and Skinner provided him with a plethora of interesting ventures. It wasn't long before Lindsley "yearned to move [his] research from rats to people" (Lindsley, 2002, p. 385).

In 1957, Lindsley was granted the opportunity to introduce a new animal species to operant methodology (Lindsley, 2002). It was at this time that Walter Jetter from Boston University approached Skinner about assisting with a grant from the atomic energy commission to study radiation effects on beagle dogs. Skinner had agreed to assist Jetter, who was a state pathologist and legal medicine professor, but had little time to devote to the project. When Skinner offered Lindsley the chance to take the project over as his dissertation, Lindsley readily accepted. Lindsley understood that dog blood is very similar to human blood, and saw this project as a prime opportunity to demonstrate the effectiveness of operant methodology in new species. Particularly, this pushed Lindsley one step closer to translating Skinner's research to humans.

Throughout Lindsley's dissertation, he and Skinner would meet frequently, and often "strayed from topic" (Lindsley, 2002, p. 138). Most notably, they discussed the applicability of the free operant paradigm to human subjects. Contemporaneously, Skinner was speaking with Harry Solomon, who was head of the Department of Psychiatry and Director of the Boston Psychopathic Hospital (Skinner, 1983). Solomon had become noteworthy in the field by allowing freedom and choice to psychiatric patients on his ward. Solomon respected Skinner's interest in changing the behavior of psychiatric patients, and subsequently persuaded the superintendent of the Metropolitan State Hospital in Waltham, Massachusetts, to allow Skinner access to adults with chronic schizophrenia and children with autism. Meanwhile, Skinner had secured the support of the Office of Naval Research, the Rockefeller Foundation, and the Milton Fund of Harvard University to fund this collaborative project (Rutherford, 2003).

His dissertation completed, Lindsley chose to work on the project without pay for 5 years (Lindsley, 2001). With gratitude, Metropolitan State Hospital permitted Skinner and Lindsley to set up a human operant laboratory in an abandoned hydrotherapy unit within the hospital (Rutherford, 2003). Skinner and Lindsley appropriately titled this laboratory the "Behavior Research Lab."

It was in 1956 that Lindsley published his new approach to studying the behavior of adults with disabilities. First, he discussed the importance of arranging a suitable "experimental closure," which consisted of (a) sound-proofing, (b) one-way observation windows, and (c) apparatuses to deliver reinforcers and discriminative stimuli. Second, Lindsley described the creation of an operant chamber designed for adults. Rather than a "Skinner box," the general apparatus was in fact an entire experimental room. In place of levers to press, participants were provided a modified vending machine which dispensed a variety of reinforcers (e.g., cigarettes, jelly beans, candy bars) when the participants responded correctly by pulling brass rods on predetermined schedules of reinforcement. Discriminative stimuli were presented via visual display under Plexiglas windows or through audio speakers mounted within the ceiling. Like a standard "Skinner box," each room was connected to a cumulative recorder that plotted the patients' responding.

Unlike animals, physically placing the patients into these experimental rooms provided another conundrum for Lindsley (1956). Pigeons and rats could do little to refuse entry into an operant chamber, but a human could physically resist with great force. However, Lindsley applied the same principles that he had done on "Samson," that is, shape responses by selectively reinforcing successive approximations to the terminal behavior. In the case of human participants, Lindsley provided more and more cigarettes to the patients as they moved closer to the room. Once inside the room, the participants presented more complications to the research. For instance, some participants would enter and simply sit in the chair and not touch the vending machine. When this situation occurred, Lindsley modeled an appropriate response and ingested the reinforcer with "obvious relish" (Lindsley, pp. 128-129). With these methods in place, Lindsley had devised the first full-scale operant laboratory for humans.

Disseminating the results of these studies and the proposed methodology for experimenting with adults using operant procedures left Skinner and Lindsley wondering what they should call this experiment. Skinner first decided that the project should be titled "The Experimental Analysis of the Behavior of Psychotic Patients." In fact, he used the name when the project was first presented at the annual meeting of the American Psychological Association (Lindsley, 2001; Lindsley & Skinner, 1954). However, Lindsley noticed that this cold scientific title generated negative feelings about the project from staff, participants, and caregivers/guardians of the participants (Rutherford). Lindsley came up with 12 alternative titles, reviewed them with Skinner, and together they selected "Studies in Behavior Therapy" because it was perceived as more socially appropriate (Rutherford, 2003). Kazdin (1977) noted that although this early evocation of the term "behavior therapy" antedated other sources (e.g., Eysenck, 1959, 1960; Lazarus, 1958), it had only appeared in Lindsley and Skinner's unpublished research reports (Lindsley, Skinner, & Solomon, 1953; Skinner, Solomon, Lindsley, & Richards, 1954).

As fate would have it, the zeitgeist of psychological inquiry during the late 1950's and early 1960's was the analysis of the therapeutic effects of drugs using the human-operant methodology presented by Lindsley and Skinner during their "Studies in Behavior Therapy" (Laties, 2003). The experimental analyses of behavior had successfully been translated to the study of human behavior, and Skinner had effectively marketed his approach so that the field could benefit from its scientific rigor. Lindsley and Skinner's goal of promoting operant techniques to human research and therapy was thus fulfilled. And although "behavior therapy" has come to mean many things to many people (e.g., a Google search of the term yields more than 23,500,000 web hits), we owe a debt of gratitude to Lindsley and his illustrious mentor, Skinner, for introducing the term into the professional lexicon and setting the

occasion for more than 50 years of clinical and applied research.

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Correspondence to Derek D. Reed, Ph.D., BCBA-D, Assistant Director of Clinical Services–Research and Training, Melmark New England, 461 River Road, Andover, MA 01810; e-mail: dreed@melmarkne.org

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