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The Ingrown World of Animal Model Research in Psychology

by Kenneth Shapiro

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In the previous essay, I described the proper function of models in science as heuristic, as a way of generating hypotheses about the actual object of study. Turning to animal models in psychology, I offered a general characterization of that enterprise using sham feeding, an animal model of the eating disorder called bulimia, as an example. In this final of three essays, I offer an evaluation of this animal model strategy that largely employs the tools of social science. I close with a recommendation and a prediction.

Studies of Treatment Effectiveness

Psychologists conduct studies of the effectiveness of different forms of treatment of particular disorders. Are there effective treatment interventions for bulimia? The answer is yes and no. In their review of 19 controlled studies involving the treatment of bulimia, Mitchell and Raymondⁱ found decreases in the frequency of bingeing and purging, two definitive symptoms, of between 70 and 80% (p. 316). Depressive symptoms were significantly abated in 16 of the 19 studies.

However, there are two serious qualifiers. First, the levels of abstinence found immediately following the termination of treatment are "disappointingly low" (p. 325). Subjects are still bingeing and purging but less frequently. Second, these levels diminish when remeasured at the end of a follow-up period varying from six weeks to one year. A review of four studies with a follow-up period of more than two years yielded 16-50% of the subjects still diagnosable as bulimicⁱⁱ (p. 140). Clearly, while immediate and short-term effects are

comparable to the level of effectiveness of therapy in general (around 70%), longer term results are much less impressive. Bulimia shares with obesity, another eating-related disorder, a reputation in the field for recalcitrance to treatment and high relapse rates.

The critical question in the present evaluation is, even within the confines of this limited effectiveness, what contribution have the many animal models of bulimia developed made to its treatment?

As I noted in the second essay, constraints imposed by the laboratory experimental method bias research toward the investigation of physiological mechanisms and the discovery of pharmacological treatments, notwithstanding strong evidence pointing to a cultural basis of this disorder. To date, no drug discovered through animal models of bulimia has been found to be effective in its treatment. The only drugs presently utilized in the treatment of bulimia are the anti-depressants. The several current families of antidepressant drugs were already available for the treatment of other disorders and did not originate in animal models of eating disorders. Further, it was clinical observation, not animal models research, that suggested their use in the treatment of bulimia: "The starting point for these trials [of antidepressant medications] was the observation made by a number of clinicians in the early 80s that many patients with bulimia nervosa exhibited significant mood disturbance"ⁱⁱⁱ (p. 334). This drug-based treatment shares the limitations of the psychotherapies - limited symptom relief in the short-term, and, in the case of the anti-depressants, no evidence to date of effectiveness in the long-term.

Finally, it should be noted that none of the many animal models of bulimia that have been developed have made any addition to the

forms of psychotherapy currently utilized in the treatment of this disorder.

Citation Analysis Studies

Citation analysis is another tool social scientists use to evaluate the enterprise of research. It provides quantitative indices of the extent to which particular studies are cited in the scientific literature. Obviously, research projects vary in the contribution that they eventually make to the field. At one extreme are investigations never completed or never published (rejection rates of submitted manuscripts in psychology are between 70 and 80%); in the middle are the large number of published studies that are read by a small number of investigators working in the same area; at the other extreme are the few published studies that profoundly change the field.

In the present citation analysis, I selected nine investigators from among those publishing studies related to one of three major animal models of eating disorders - sham feeding, tail pinch, and activity wheel. The number and annual frequency of citations of those studies published that involved animals in the laboratory and purported to be related to eating disorders were ascertained using the *Science Citation Index (SCI)*. Taken together, the studies on eating disorders published by the nine investigators were cited .69 times per year in the years following their publication, during the 9 year period considered (1986-1994). By comparison, the average annual frequency of all the references in the *SCI* is 1.87^{iv} (p. 317), or more than two and a half times the rate of those examined in the present study. This indicates that the level of citation - and, by implication, the level of contribution to the field - of those

investigators who develop animal models of eating disorders is low relative to published scientific studies generally.

Finally, following a suggestion in the literature on citation analysis, citations were judged as to their significance. The investigator may cite an earlier study only in passing in a generalized introduction to the relevant area, or, a more significant use, he or she may use an earlier study to interpret additional animal or human data or to provide an innovative method. When only those citations judged significant are counted, the overall annual frequency rate drops to .31. This means that, on average, in a given year seven in ten of the studies examined received no significant citations in the scientific literature.

Survey of Clinicians Specializing in the Treatment of Eating Disorders

Again, the more critical question in the present evaluation is, what contribution did these studies have on clinicians who treat eating disorders? To answer this question, I developed and administered a questionnaire that assessed the degree of awareness and rudimentary understanding of animal models of eating disorders among clinicians specializing in treating these disorders.

Of the 30 such specialists (defined as a clinical practice 20% of which involved working with people whose diagnosis is an eating disorder) completing the survey, more than half (60%) indicated that they were not aware of the existence of animal models of eating disorders. When asked if they could name and describe an animal model of eating disorders, 67% said they could not. Of the 33% who said they could, most gave inadequate or vague descriptions. When asked to identify and describe sham feeding, 87% could not.

When asked their view of whether animal models of eating disorders influenced their treatment approach to these disorders, 87% replied in the negative. Of those replying in the affirmative, one indicated that the research was useful for conceptualization but not for intervention, one indicated that it was "indirectly" an influence, and one stated, "only helpful in reinforcing my explanations to patients about how what's happening to them is a natural physiological response to food deprivation."

The clinicians were asked to indicate the journals that they found most helpful in their work. When the list of journals in which the studies of the nine investigators involved in research related to animal models of eating disorders were cited is compared to this list to those journals indicated in the survey of clinicians as "most helpful for clinicians that specialize or work with eating disorders," there is no overlap! Not one of the journals in which the studies of the nine investigators are cited is mentioned as helpful by these practitioners specializing in the treatment of eating disorders.

Clearly, clinicians specializing in the treatment of eating disorders generally are unaware both of the existence of and of the particular results of animal-model research purporting to provide further understanding and effective treatment of these disorders.

I have already provided one answer to the question of why clinicians do not know about this research: They do not know because this research enterprise has been unproductive in providing effective treatments. They do not read this literature because it is not helpful to them in their practices.

The Separate World of Animal Models of Psychology

Rather than constructively interactive with clinical practice and clinical research, research involving animal models of eating disorders exists in its own separate world. Rather than arising from extensive familiarity with the eating disorders in its human settings, the models build on procedures already in the scientific research repertoire. More critically, once an animal model is defined, its development proceeds largely through further research consisting of recursive and often duplicative investigation of already studied variables and of other models within the experimental literature. In place of continuous recourse to the target phenomenon for validation of the models, it relies on confirmation by the insular criterion of consistency with other comparably insulated research.

The logic of experimental discourse allows and fosters this separateness. The model is often based on one or two features that are only coarsely analogous to the target phenomenon. This rough analogic basis of the models and the use of already operationalized variables for their further investigation truncates rather than productively generates thought. The enterprise does not issue in fresh understanding and insight: everything is tried and nothing works. The resultant opus is relatively infrequently cited within the applied literature and even within other scientific literature.

Clearly practitioners and laboratory-based researchers operate in separate worlds. The animal models have contributed virtually nothing to the effective treatment of eating disorders. Clinicians specializing in their treatment read a literature that only rarely cites the purportedly relevant research. They are unaware even of the names and basic operations that identify several of the more fully

investigated animal models. They believe that animal models have not influenced their method of treatment of the eating disorders. The predominant view of practitioners and clinic-based researchers is at variance with the heavy emphasis on physiological aetiology and correlative psychopharmacological treatment of the eating disorders found in animal-based research.

Another aspect of the ingrown or separate world of animal model research is the relation of the investigators involved to their animal subjects. The investigators live in a world which they intentionally designed to be separate from the nonhuman animals with whom they, in fact, share a social space. While never fully realized, the attempt to reduce animals to preparations, physiological part-processes, conduits, and instrumentation - in effect, to technology - does stand between the investigator and any meaningful relation with his or her animal subjects.

Conclusion

The monograph from which these three essays have been drawn provides a strong set of arguments against the research strategy of developing animal models of human psychology. However, this present indictment does not imply that it is desirable or necessary to end all study of nonhuman animals. We human beings study everything. It is unthinkable that we would suspend study of the mind-boggling and marvelous array of phenomena, species, and individuals that constitute the animal world.

The results of this work are consistent with a narrower position: that study should be limited to investigations of animals for their own sake, to attempts primarily to understand them and only

incidentally ourselves; and, emphatically, to noninvasive and minimally intrusive studies to that end conducted in naturalistic or semi-naturalistic settings.

I believe that the enterprise of animal models of human psychology described here will end in the medium-range future. It will do so through a confluence of many forces: the influence of the several insightful and rigorous moral philosophies now available - Regan's rights theory, Singer's utilitarianism, and the emerging feminist ethic of caring^v; the growing visibility and effectiveness of the animal rights movement; the availability of sophisticated and noninvasive technologies that allow scientists to study disorders directly in humans; the regulatory and economic burden accompanying the need to provide for the well-being of animals in the laboratory; and the recognition that the enterprise is ineffectual and ingrown - existing largely to perpetuate itself.

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