Behavior and Philosophy, 47, 15-33 (2019). © 2019 Cambridge Center for Behavioral Studies

CAPTURING THE UNIQUE NATURE OF THE HUMAN SCIENCES: THE SECOND DEMARCATION PROBLEM

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ABSTRACT: As Meehl (1978) noted four decades ago, psychology has progressed at a significantly slower rate than the natural sciences. This paper argues that one factor that may account for this discrepancy in problem solving progress is that the scientific methods used by psychologists have not properly taken into account unique characteristics of humans that the natural sciences need not consider. This issue has been called "*the second demarcation problem" i.e.,* that a distinction between the methods of the natural sciences (the *Naturwissenshaften*) and the human sciences (the *Geisteswissenshaften*) -- needs to be made in order to properly understand the research methods that are necessary for scientific progress in each. This paper describes four such unique characteristics of humans as justification for this second demarcation: 1) radical idiography, 2) phenomenological experience, 3) the possibility of free will, and 4) radically new knowledge.

Key words: Idiography, Phenomenology, Free Will, Research, Methodology, Psychological Science[1]

Paul Meehl's 1978 seminal article, "Theoretical Risks and Tabular Asterisks: Sir Karl, Sir Ronald, and the Slow Progress of Soft Psychology" argued that the science of psychology has progressed at a much slower rate than the physical sciences. For instance, what scientific problem in clinical psychology is settled to the degree that say, motion or electricity is in the natural sciences? In a word, none -- even though the laws of motion and electricity in physics were uncovered centuries ago. As Meehl (1978) pointed out, numerous factors may be responsible for the slow rate of scientific progress in clinical psychology. However, this situation may suggest that there is a need for a "second demarcation" between the natural sciences and the human sciences. The first demarcation question (Popper, 1963) attempts to define the boundary between science and non-science; the second demarcation delineates a boundary between the natural and human sciences based on unique properties of the human subject matter that require corresponding unique scientific methods. In this paper, we will critically appraise arguments for

[1] *The authors would like to thank Jose E. Burgos for his many astute and helpful comments on an earlier draft of this paper.*

considering a second demarcation between natural sciences and the psychological science as is applied to the scientific study and understanding of humans. In particular, we focus on adult humans who are more or less cognitively intact (although some of our points would apply to older children). This is not to say that the above defines what it means to be human. It simply isolates the characteristics which make the study and understanding of the human condition potentially more fruitful.

The notion of a second demarcation implies that the scientific methods of natural sciences may not be adequate to capture the unique characteristics of individual humans and thus the idea of scientific method needs to be modified if scientific progress in the human sciences is to be made. To purloin an analogy philosophers have used in reference to Kant (1972) the general notion is that the characteristics of scientific methods are analogous to a net—scientists need to construct the net in a way that it will capture the phenomena under study in the same way, say, a fisherman needs to construct a fishing net based on his or her view of the size of the fish to be captured. Wrong assumptions—e.g., assuming the fish are much larger—results in few, if any fish captured, as these smaller fish slip through the too large netting. This approach is somewhat Kantian in that what can be known is somewhat dependent on characteristics of the knower, or at least the methods used by the potential knower. However, it is also consistent with evolutionary epistemology of Popper (1972) and even Skinner (1974)—that evolution has had a large role in determining what humans can perceive and can know. Similarly, as Feyerabend (1975) has pointed out, scientific methods involving microscopes and telescopes are based on assumptions about the size of the phenomena under study. A supporting consideration is that these unique characteristics relevant to humans can be argued for antecedently, that is, even prior to conducting science—as these characteristics are not the product of science, but facts about the humans or the human condition antecedent to science. For example, one doesn't need to conduct an experiment on whether humans are conscious, use language, can make and execute plans, and so on.

Others have attempted to separate social from natural sciences, to parse out the human factors which make mankind unique. However, these attempts have been lacking in their ability to isolate the factors which make the scientific study and understanding of humans so difficult. In this paper, we will argue that there are at least four characteristics unique to humans that affect human behavior in such a radical fashion as to minimize the probability of yielding progress in the human sciences utilizing the conventional methods of natural science that are not sensitive to these: 1) radical idiography, 2) phenomenological experience, 3) the possibility of free will, and 4) radically new knowledge and its effects on humans. What is novel about our position is that we argue that these four characteristics may explain the slow progress of psychology because psychology's conception of method is insufficiently sensitive to these. These 4 characteristics are not criteria for humanness but are just the unique characteristics of humans that then give conventional nomothetic science problems when applied to humans because conventional scientific methods in the natural sciences need not account for any of

these. For example, each oxygen molecule is only unique by its spatial temporal location -- as opposed to the radical uniqueness of each human. Second, no natural scientist argues that this molecule has inner phenomenological experiences. Third, no natural scientist argues that this molecule has free will. Finally, this molecule is not affected by discoveries in the way humans are (e.g., humans now use the internet, but such technological advances are not influencing the regularities associated with oxygen molecules). We make these 4 distinctions in an effort to explain why there is such a drastic difference between the progress of natural science and human science. This isn't to say that these demarcations are absolute and not found in any other species, or that they are found to the same degree across all humans. We are arguing that these distinctions are significantly more pronounced in the typical human, and as such, tend to interfere with progress in the traditional approach to the science of human understanding.

The natural sciences approach has obviously been very successful at identifying scientific regularities and laws in natural phenomena. On the other hand, when clinical psychology has employed similar research methods, generally what has been produced are reports of "statistical significance" indicating that the two samples are probably not from the same population. Clinical psychological science has not produced quantitative point-predictions, but rather much more imprecise predictors (e.g., "Sexually abused children will tend to have a higher rate of depression than children who have not been sexually abused"). Or, as another example, some general notion that depressed individuals may make different kinds of attributions than nondepressed individuals. The results of this approach have not allowed precise predictions even probabilistically (e.g., the probability of such attributions is .63 or certainly nomothetically, e.g., all depressed individuals will make such attributions).

Historically, some scholars have expressed similar concerns that have been captured by the German distinctions of G*eisteswissenschaften* (human sciences) and *Naturwissenschaften* (natural sciences), e.g., Wilhelm Windelband (1894). These concepts place human science in contrast to natural science in that the former necessitates special scientific methodologies to adequately capture the uniqueness of the human condition -- none of which need concern the physical scientist. Wilhelm Dilthey (1894, 1989) also argued for the demarcation between *Geisteswissenschaften* and *Naturwissenschaften.* Dilthey suggested that knowledge of the world – human sciences included- is dependent on perception and 'lived-experience' of the individual - something that the natural objects of the Naturwissenschaften do not possess. For example, in the natural sciences, *all* copper conducts electricity, and *all* objects with mass attract other objects with mass. These groupings are universal and allow for precise predictions. On the other hand, perception and "lived experience" are part of the human experience but may be too idiosyncratic to produce universal laws due to the radical uniqueness of this experience. Dilthey argued that because no two humans have the same life-experiences, the generalized methods of the natural sciences are not able to uncover knowledge about those unique experiences. Dilthey's perspective leads to the

conclusion that universal scientific laws only apply when the objects studied are fungible, "generic" entities.

The unique experience of each individual is characterized by more than just spatial temporal differences. According to Dilthey, the study of human behavior must begin with individual perception and the individual life-experience. How does this unique individual perceive the world? What are the unique historical and cultural factors that influence what is important to this individual? Only when this information is obtained can the scientist work towards generalizations. However, these generalizations, due to the uniqueness under study, will not have the same scope as in the natural sciences. Another example, the periodic table of elements, a taxonomy based on atomic composition and the resultant interactions with other elements provides the natural scientist a platform from which to conduct a further analysis of the characteristics of these elements. Whereas with humans, categorization has yet to achieve the same level of scientific lawfulness. For example, Hispanics vs. non-Hispanics or any other human grouping—e.g., women vs men (and it is important to note that this "binary" has been recently called into question) have yet to show themselves as a taxonomy that is capable of yielding any scientific laws. The Diagnostic and Statistical Manual (American Psychiatric Association, 2015) now in its fifth edition also raises the question of whether it is possible to group humans in such a way as to reveal universal laws that make for a progressive science, as few if any laws have emerged from this taxonomy and there is really no increased scientific explanatory power across editions, i.e., no problem solving progress.

Should the field of psychology emphasize research methods better suited to its subject matter? It would not be the only scientific discipline to do so although they perhaps not as radically. For example, consider astronomy. Astronomists generally do not attempt to adopt the experimental methods of the other natural sciences – one simply cannot experimentally manipulate the action of planets. As such, astronomers have identified the fact that their science often requires more observational, descriptive methods to uncover the nature of interstellar and planetary movement and interactions. Of course, fortunately, some of the laws that apply to smaller objects also apply to planets (e.g., gravitation, mechanics).

This is not to say that some generalities cannot possibly be discovered in psychology by traditional scientific methods. Take the example, "Men are generally taller than women"—a sample can be collected, and relevant measurements can be taken to provide evidence for this generalization. However, this is still not a scientific law—it is at best a weak probability—as there are many exceptions due to overlap between the two distributions. And of course, this statement is not precise because it is not quantitative.

In an effort to answer the question of whether a second demarcation between the natural and human sciences is warranted, we will examine four human characteristics that suggest that conventional scientific methods used in the natural sciences may need to be modified in order for scientific psychology to progress: 1) the radical ideography of each human; 2) phenomenological experience; 3) the

possibility of free will; and 4) the impact of new knowledge on human behavior which constrains prediction of human behavior.

Radical Idiography

Radical idiography is the claim that each human being is wholly unique and this uniqueness often interferes with the formation of nomothetic generalizations that are applicable across individuals. Paul Runyan (1983) stated,

> Learning what is true of persons-in-general and of groups of people often has severe limitations in enabling us to understand and predict the behavior of individuals. There are many important problems in describing, explaining, making predictions about, and intentionally changing the course of experience in individual lives that cannot be adequately addressed without the use of idiographic methods. (p. 413)

For example, the behaviors of Abraham Lincoln, Elvis Presley, Michael Jordan, and my next-door neighbor are partially (and thus weakly) captured as being members of broad classes (males, tall, right-handed, and so on), but no number of these class memberships can fully describe, explain, or predict all the uniqueness associated with the behavior each of these individuals. What is it about these broad classes, if anything, that can help to explain or predict Abraham Lincoln's Gettysburg address, Elvis Presley's choice of cape wearing, Michael Jordan's decision to play professional baseball, or my neighbor's unabashed choice to regularly pick up the morning paper in an open robe? In some important sense each of these are better captured through biographies which can better capture the associated idiosyncrasies rather than scientific analysis. Admittedly at times natural scientists are concerned about singularity—what is exactly happening to some glacier in Antarctica, for example, but the uniqueness of this phenomenon is generally only due to parameters such as location. For all other matters it is not very unique—composition, temperature, and so on and thus can be subsumed under the laws of physics and chemistry.

Hence, no two individual human beings are exactly the same – even monozygotic (identical) twins are unique. Although genetically identical, individual differences in past experience, present context, and epigenetic expression makes each of these twins unique. These differences then manifest in an accelerating and reflexive manner in diverging memories, perspectives, personalities, temperaments, abilities, social networks, and so forth. However, despite this, it is the goal of a nomothetic psychological science to describe, predict and control behavior by using classifications in which there is a high degree of homogeneity. How can these tasks be accomplished given this radical uniqueness of even genetically identical twins?

Stem (1911, 1919), an advocate of the importance of the nomothetic - idiographic distinction argued that although it may be that clinical psychologists can conclude that two individuals are both introverts, what does that knowledge imply about how their "introversions" manifests in particular behaviors? The idiographic

approach to the study of human behavior does maintain that distinct events in individual lives are often not fully explainable or predictable in terms of such general categorizations (cf. Fales, 1980, p. 261). In light of this understanding, Stem concluded that an idiographic approach was necessary in order to make progress in the understanding of human behavior.

The *degree* of idiography in humans is *significantly* higher than that in other animal species. How much higher? No one knows for sure, but you could hypothesize that it is *sufficiently higher* to call for statements (and methods, and concepts, and theories) that apply more validly and specifically to the individual human. A molecule of oxygen may only be individuated by location; a virus by perhaps some unique mutation, a dog by her affections, learning history as well as her physical characteristics, but a human individual is unique to a many more ways than any of the prior examples.

Gordon Allport (1962) also claimed that clinical psychology should not rely heavily on a nomothetic approach in order to make scientific progress. Although Allport (1937) argued that "the outstanding characteristic of man is his individuality" (p. 3), he did nevertheless advocate for a balanced approach in which nomothetic and idiographic applications are combined, emphasizing the organization of more general processes and variables within the individual. These general variables and processes present as nomothetic dimensional traits such as anxiety, introversion, and perception, which are common across individuals. However, according to Allport, this does not properly address the idiosyncratic nature of how these traits are uniquely organized within the individual. Allport rejected trait and factor theories as stand-alone theories that reduced behavior to common traits. He insisted that one person's stubbornness was different than another person's stubbornness and the way one person's stubbornness interacts with his or her extroversion and creativity is duplicated by no other individual. In response to this problem, Allport (1962) advocated for several morphogenic (i.e. a synthesis of idiographic and nomothetic) methods that gather and organize data on a single individual – e.g. forced choice ordering – such as the Q-sort, identification of central themes, content analysis of letters, extensive clinical interviews, identification of patterns and/or correlations of behaviors, and causal relations between variables. However, even Allport, who advocated for a morphogenic approach to the individual, could not resolve the issue of how the multitude of dimensions identified through this approach could explain their organization within the individual to the extent that they produced laws regarding human behavior. Essentially, he understood that it takes a very large number of variables to capture individuality, which even if possible to theoretically capture, creates several practical problems, e.g., time to measure these; errors in each measurement—and then a methodological problem—how does one actually design and conduct a study to find order among these many variables. Thus, the error term-unaccounted-for variance- will always be quite large.

Another promoter of an idiographic approach to clinical psychology was Runyan (1983) who argued for an alternative based on the Kluckhohn and Murray's (1953) maxim, "every man is in certain respects (a) like all other men, (b) like some other men, (c) like no other man" (pg. 53). Runyan (1983) claimed that,

> According to this view, there is order or regularity in the world at each of these three levels, and there is a need to develop universal generalizations, group-specific generalizations, and generalizations applying to specific individuals… In short, the field is concerned with the five tasks of describing, generalizing about, explaining, predicting, and intentionally changing behavior at each of the three levels of persons-in-general, groups of persons, and individual human beings. (p. 417)

However, he also suggested that these three approaches are only semi-independent, meaning that one course of study does not necessarily inform the others. In other words, solving problems at one level of analysis doesn't *necessarily* solve problems at the other levels.

Certainly, to date the nomothetic approach has ruled the day in psychology—but again, with little success as few laws or quantitative regularities have emerged despite a century of research efforts. Skinner's law of effect might be a notable exception, although it has been critiqued as circular and has failed to make precise quantitative predictions (Meehl, 1950 but see O'Donohue & Krasner, 1988). This law in some way hides the idiographic problems as what will function as a reinforcer varies across individuals, time, and other contexts. Michael Jordan found executing a reverse dunk as reinforcing for certain preliminary behaviors in certain contexts, while Donald Trump never did. Thus, in order to apply the law of effect the clinician or researcher is forced to find information about an entire set of problems associated with idiography, e.g., what functions as a reinforce for what behavior, at what deprivation levels, for how long, with what setting events, and so on.

Runyan (1983) proposed a list of idiographic methods that included:

- Quantitative descriptive methods that gather data regarding a particular individual at different points across time
- Intraindividual correlational methods that correlate variables within the same individual
- Single-case experimental designs in which independent variables are manipulated within-subject to identify causal variables
- The case study which looks at anecdotal evidence from psychological tests, personal histories, testimonials, etc.
- Personality measurement dependent upon an outlined range of possible alternative actions that are scored over different sets of situations and scored in relation to possible values for those situations
- Idiographic prediction based on data from that particular case and no other cases
- Configurational analysis (Horowitz, 1979), which recognizes patterns of stability and change in personality functioning.

The above characteristics and methods of radical ideography suggest that there are a number of approaches that may capture idiosyncratic differences between

individual humans that may help lead to a better understanding of individuals, which may improve the progress of the psychological sciences.

Phenomenology

Phenomenology refers to the subjective experience that is unique to each human. According to Hopp (2008), "The most basic task of phenomenology is to acquire a certain body of knowledge – knowledge about the essential characteristics of consciousness, intentionality, and, perhaps principally, knowledge itself." (p. 194). There is an important dimension of phenomenology related to the classic philosophical problem of other minds. That is, first person conscious experience is directly perceived only by the individual having these experiences; another person cannot directly observe or experience this. Furthermore, when these experiences are verbally described to another—this verbal description is not the same as the actual experience. The sentence "My tooth is throbbing" is not the same as the felt throbbing sensation of pain. A consequence of this is that one never knows how similar or different one's experience of a tooth throb is from another's tooth throb—the same going for all visual, auditory, tactile, olfactory, emotional or cognitive experience. Private experience is just irreducibly that: private. A second factor related to phenomenology is that this inner experience is important—it is not in any way trivial so that it can be ignored. Skinner (1972) recognized this special situation but thought it could be handled (contra Watson's methodological behaviorism) by simply having subjects report their inner experience to another—and such reports can be understood as verbal behavior.

The natural sciences function by examining phenomena that are intersubjectively verifiable. For example, all can directly see that oxygen atoms have 16 protons; an object's momentum is fully determined by its mass and acceleration—and many parties can directly observe this mass and acceleration—these are in no way private. However, the same is not true of humans; the subjective experience of where one is at a moment in time does matter, sometimes dramatically.

This is not to say that our distinction between the natural and the psychological sciences hinges wholly upon strict observability of subject matter. Philosopher Bas van Fraassen in *The Scientific Image* (1980) reminded us that even in the natural sciences, conclusions are made about entities, which are not directly observed. Fraassen offers (pgs. 16-17) that micro-particles in a cloud chamber are studied by considering the paths of ionized atoms that their movements leave behind. The particles themselves had not been directly observed, yet they are still the object of study, and knowledge about the particles is consequently reported by these scientists. However, there is still a distinction between entities that are unobservable *technically* versus unobservable *in principle*. Technically, micro-particles are unobservable, but the field of particle physics is attempting to develop technologies for more direct observation, in part by favoring newer technologies than the cloud chamber that van Fraassen referenced. But when it comes to directly observing another human's consciousness—everything that makes up their own personal experience of being human—our limitations are not simply technical.

We will also acknowledge that our current argument may be difficult to accept by any readers who may hold a scientific anti-realist stance. That is, if one required direct observation of an entity as a criterion of existence of that entity, then it would be difficult for us to argue for the study of an entity by any other means. We are arguing both that the subjective experience of another human can never in principle be directly observed and yet that such phenomenological experience exists and can be studied scientifically. For readers who agree that minds other than their own exist, we can proceed with our argument concerning phenomenology.

Edmund Husserl (1970) applied the term *phenomenology* to what he described as the science of consciousness – based on the wholly unique experience of an individual. According to Fisette (2012), "Husserl defines phenomenology as descriptive psychology and assigned it the task of analyzing and describing the immediate data of consciousness or experience understood in a broad sense." (p. 57). In other words, phenomenology may be defined as the study of experience, perception, or consciousness—each a subjective, private phenomenon.

To Husserl, the demarcation of phenomenology from the natural sciences has at its core the phenomenal experience. (Fissete, 2012). From this account, the foundation for the division of the sciences is, "The distinction between lived experiences, conscious contents, and the nonexperiences presented in such experiences (and perceived in them or judged to exist) would remain, as before, the foundation for the division of the sciences as departments of research." (p. 66). Lamb (2007) expanded on this with his account of the subjective experience with the supposition,

> bodies of knowledge and personal knowledge count as knowledge only in that some mind (and usually we mean some actual mind or minds, even specifically "this" mind or "these" minds) can possibly experience their "contents" first-hand by actually living out some appropriate act of knowing. (p. 606)

A phenomenological perspective suggests that the lack of intersubjective observation makes direct interpretation of another's private experience impossible; an insoluble problem for applying natural science methodology to human experience exists because these experiences are only known from a first-person perspective. Radical idiography suggests that all individuals are wholly unique; phenomenology suggests that individuality is further complicated by the inaccessibility of the unique individual's unique subjective experience.

Skinner (1974) struggled with this problem and distinguished his radical behaviorism from Watson's methodological behaviorism. Skinner (1974) stated that, "one person does not make direct contact with the inner world of another, and so-called knowledge of another is simply an ability to predict what he will do" (p.189). Furthermore, this ability to predict can only be partially accomplished through the verbal community's ability to shape descriptions of internal experiences through associations of public conditions. Thus, it is more difficult to make distinctions between pains than airplanes.

At best, we understand another person when we relate to what we *suppose* are similar external experiences. Skinner (1974) also claimed that, "We find it easier to know what another person is feeling if he tries to communicate or convey his feelings verbally." (p. 191). For instance, when I hit my thumb with a hammer there is pain—so when I see my young child hitting his or her thumb I have the child label it as pain. However, my knowledge of my child's pain only comes from my ability to associate similar experiences that I have had with respect to pain. Similarly, I can teach my child to discriminate between yellow and blue based on my observations—but I can't know for sure if the child is having similar internal experiences. Thus, the verbal community discriminates another's private events through external collateral responses to stimuli (Skinner, 1974). However, even in this case, the experience of the speaker and listener may be different, and meaning can only be sought, "in the circumstances under which he [speaker] emits a verbal response." (p. 191) because words used to describe feelings are inexact. They are never duplicates of the feelings themselves in the listener. As Skinner says, "It does not make a feeling common to both." (p. 192).

Phenomenology contends that understanding and knowledge about the human condition are only possible by means of examining the unique subjective experience of the individual and furthermore, it is only through this insight that we can make progress in addressing some of the challenging issues of clinical psychology. This subjective knowledge is indispensable when trying to assess and treat someone suffering from what may be a mood disorder. In this view scientific progress may be served by a better understanding of inner experience: e.g., what fear feels like for that individual; what depression feels like and so on.

Phenomenology claims that each individual is only identified and understood through the context of the person's own subjective experience of their personal history and current context. Internal and external variables impact the individual in a way—a felt qualia—that simply does not occur within the natural sciences. An atom couldn't care less about its 'life experience' and hence, a second demarcation is warranted.

Phenomenology is about perspective, and as such, any methodologies proposed to address the subjective nature of the individual must include measures from the unique perspective of the individual. Because the individual is the only person to have their unique history and experiences, an autobiographical account of the subjective may be as close as one can come to the "truth"—although admittedly these can be distorted in a variety of ways.

The Possibility of Human Free Will

Natural scientists do not posit that natural phenomena possess free will. An oxygen molecule is not viewed as have agency or choice or deciding for itself what it might wish to do in the future. However, humans may have free will. If humans do there may still be some order to be discovered—most humans choose most of the time to engage in behaviors that will not hurt them—e.g., driving on the right side of the road in the United States. However, free will may also restrict the amount of

order to be found. For the purposes of this paper, a brief summary of the major positions regarding free will would be helpful. Philosophers have posited that the positions regarding free will can be divided into three general camps: libertarians, determinists, and compatibilists.

Cornman, Lehrer, and Pappas (1992), described the main argument supporting the *libertarian* stance, which highlights the existence of human deliberation. The argument is a simple one: if there is no free will and hard determinism is true, say the libertarians, then our behavior is due to causes outside of us, and for us to have chosen alternative behaviors is an impossibility. Yet, deliberation—taking time to weigh available choices and then choosing which behaviors we wish to enact—is something with which we all have first-hand experience. Why, ask the libertarians, would deliberation be a universal human phenomenon if it were entirely without function? It then follows that if our behaviors are freely chosen from possible alternatives, then determinism regarding human behavior is disproven, and free will exists.

This argument emphasizes rational agency. Defined as, "intentional activity that is guided by the agent's conception of what they have reason to do" (Wallace, 1999, p. 217). It is interesting to note that a belief in rational agency is generally contained in the endeavor of science itself, at least at the meta-level. For example, a series of what are generally taken to be rational choices must be made when conducting science, e.g., researchers deliberate and then choose problems to investigate, as well as deliberate to make a number of choices regarding experimental design (e.g., sample size, control groups, statistical analyses), In addition, scientists take great care in rationally appraising theories and the quality of their supporting evidence so that they can make sound *choices* among them. However, practicing such rational agency in these scientific pursuits is generally construed as practicing free will.

Determinists argue that all our behaviors have preceding events which are the sufficient causes of our behavior. Skinner (1972) was a well-known determinist, and suggested that his fellow psychologists view the field in this light:

> A scientific analysis of behavior must, I believe, assume that a person's behavior is controlled by his genetic and environmental histories rather than by the person himself as an initiating, creative agent… We cannot prove, of course, that human behavior as a whole is fully determined, but the proposition becomes more plausible as facts accumulate, and I believe a point has been reached at which its implications must be seriously considered. (p. 208)

Skinner's stance is that, even in situations when an individual's behavior does not have an identifiable environmental cause, this is not an example of free will. Rather, this is simply an example of the state of the knowledge of psychology not yet being able to fully identify the causes of the behavior. This Skinnerian view, then, offers a definition of scientific progress in psychology—progress is made when additional causes of behavior are identified, and more accurate predictions of human behavior are thereby formulated. Skinner (1971) spoke of the "escape route" of a free will explanation for behavior confronted with this type of progress:

> The escape route is slowly closed as new evidence of the predictability of human behaviour are discovered. Personal exemption from a complete determinism is revoked as a scientific analysis progresses, particularly in accounting for the behaviour of the individual. (p. 18)

However, as previously mentioned, Meehl argued that such facts and laws have not in fact been accumulating in psychology. Thus, would Skinner agree with the converse of this argument: if such lawful relations do not "accumulate" then this would be an argument for free will?

In the realm of clinical psychology, clinicians often encourage clients to *choose* their treatment goals, find ways to behave according to their *chosen* values, and learn to deliberate more rationally so that they can *choose* adaptive courses of action and change their lives for the better. This emphasis may lead one to conclude that clinical psychologists must necessarily be libertarians or at a minimum, compatibilists. However, when many of these same professionals conduct scientific research, they adopt the goal of identifying *causes* of behavior—a much more deterministic approach. How does such a clinician-researcher reconcile these two positions regarding free will and determinism? As discussed above an additional layer of complexity is that these researchers themselves often speak of their own *choices*: their methodological choices, their choices to publish in one journal vs another, their choices following rational deliberation of the data and so on.

Does existence of free will completely negate a deterministic universe? *Compatibilists* would argue no, arguing that free will can exist along with determination. P.F. Strawson (2008) defined free will as, "the identification of the will with the act" (2008, p. 4), and in doing allowed it to coexist with determinist forces (see his *Freedom and Resentment* for a full treatment of the contemporary compatibilist stance).

Free will for humans, for the compatibilist, means freedom to make choices, in the context of lawful regularities that produce outcomes within the realm of causal determination. For example, one person may choose to buy an ice cream cone based on a causal prediction that it will cause his mood to improve, and another person may choose not to buy an ice cream cone based on a prediction that it will cause his stomach to ache due to his lactose intolerance. Both individuals in this example are behaving under the control of causal factors (determinism). However, a thought experiment allows us to see that both are not strictly bound to one course of action and can choose among alternatives (free will).

Sir Karl Popper (1972), the influential philosopher of science, added much to this debate on free will vs. determinism in his essay, On Clouds and Clocks. Popper suggested that there is a continuum, the ends of which have two categories of phenomena: clouds and clocks. At one end are phenomena that seem more like clouds—measurable, but with a degree of complexity and randomness and without clear boundaries or definite patterns. While at the other end are phenomena that seem more like clocks—such that their movements can be precisely measured in clear intervals and their actions can be reliably predicted— i.e., a deterministic system.

Popper invoked Johannes Kepler and Isaac Newton as proponents of physical determinism, and as highly influential scientists who argued that all natural phenomena are lawful and determined. This perspective declares that all phenomena in the physical world—even those that appear to be clouds—are actually clocks. Popper then offers the contrasting viewpoint, the advancement of which he credits to Charles Sanders Peirce, that scientists should acknowledge that there exists a degree of error and randomness within everything in the physical world. In support, Popper makes his own metaphor literal, pointing out that even the inner workings of a wristwatch—the most clock-ish of clocks—are subject to eventual physical wear, that will render an initially precise timepiece less so over time. This viewpoint, then, arrives at the opposite conclusion—all clocks are actually clouds.

Popper himself endorses the latter of these two viewpoints and aligns himself with "indeterminism." He defines this stance and affirms its compatibility with causal determination:

> Indeterminism-or more precisely, physical indeterminism-is merely the doctrine that not all events in the physical world are predetermined with absolute precision, in all their infinitesimal details. Apart from this, it is compatible with practically any degree of regularity you like, and it does not, therefore, entail the view that there are `events without causes'; simply because the terms `event' and `cause' are vague enough to make the doctrine that every event has a cause compatible with physical indeterminism. While physical determinism demands complete and infinitely precise physical predetermination and the absence of any exception whatever, physical indeterminism asserts no more than that determinism is false, and that there are at least some exceptions, here or there, to precise predetermination. (p. 220)

Popper concluded that if a method of science that presupposes physical determinism is ill-fitting for the natural sciences, it is even more so for psychology. He argued that the indeterminist view, then, is the one that fits best with the research topics of psychology:

> [T]he formula `Every event has a cause' says nothing about precision; and if, more especially, we look at the laws of psychology, then there is not even a suggestion of precision. This holds for a `behaviourist' psychology as much as for an `introspective' or `mentalist' one. In the case of a mentalist psychology this is obvious. But even a behaviourist may at the very best predict that, under given conditions, a rat will take twenty to twenty-two seconds to run a maze: he will have no idea how, by specifying more and more precise experimental conditions, he could make predictions which become more and more precise--and, in principle, precise without limit. This is so because behaviourist `laws' are not, like those of Newtonian physics, differential equations, and because every attempt to introduce such differential equations would lead beyond behaviourism into physiology, and thus ultimately into physics; so it would lead us back to the problem of physical determinism. (p. 221)

Popper offers an interpretation that human behavior is subject to the "plastic" controls that humans creates themselves. "A control with feedback," explains Popper. Popper goes on to offer the metaphor of a community's legal system, "produced by us, yet controls us" (p. 251). Examples of such controls include unobservable yet influential things such as goals, a sense of purpose, wishes, allegiances, and values. Thus, Popper believes that humans do have free will-- to act within the context of controls which we have used our free will to create.

Radically New Knowledge

If one took the stance that free will did not exist and hard determinism explained all phenomena, this would be akin to adopting a "closed" system regarding human behavior—one in which no new information predicting is added or created that could influence human behavior. However, psychologists also have taken the viewpoint of an open system—one in which human behavior is affected by the constant introduction of radically *new knowledge (and its resultant technologies)*. Manicas & Secord (1983) stated:

> [W]e may often be in a position to explain some event once it has occurred, when it would have been impossible- even in principle- to predict it. Although the relatively enduring structures of the world have definite (and knowable) causal properties, it is only under closure that explanation and prediction are symmetrical. In an open world, the configurations of structures and structured processes are not predictable.…the future is *not* determined precisely because the complexly related structures and systems of the world are constantly being reconfigured. (p. 403)

Popper (1982) also tied together these ideas of free will and radically new knowledge:

> We are 'free' (or whatever you want to call it), not because we are subject to chance rather than to strict natural laws, but because the progressive rationalization of the world- the attempt to catch the world in the net of knowledge- has limits, at any moment, in the growth of knowledge itself which, of course, is also a process that belongs to the world. (p. 81)

For a more concrete example, consider the increasingly ubiquitous nature of smartphones in the late 20th Century. It is obvious that their explosion in usage in the past 30 years or so has dramatically changed human behavior. Humans carry these, look at these, find information on these, play games on these and so on. Humans also design these and construct these. Could a psychologist in say, 1900 predict how smartphones were to change human behavior 80 or so years in the future? No. Such a prediction would have required knowledge of all the details of the technology industry of the late 20th century- both the concept and the technology of the smartphone and its related phenomena (e.g., Google, Facebook, Instagram and so on). But such knowledge did not exist in 1900, otherwise the smartphone

could have been invented then. As such, new knowledge which is to subsequently influence human behavior in the future, puts a limit on the predictive power of psychology.

By contrast, the work of the natural scientist is not confronted by this epistemic challenge. Could a physicist in 1950 predict the acceleration of an object with the physical properties of a smartphone would fall to earth? Yes (9.8 meters per second squared), because gravity is not influenced by new knowledge. Would an astronomer's prediction in 1950 about the movement of planets in our solar system in 2019 be an accurate one? Again, yes, because new knowledge created within that span of time did not influence that topic of study. It follows that the subject of human behavior, with its reaction to new knowledge, presents a unique challenge to psychological sciences.

R.G. Collingwood (1994), a philosopher and historian, also alluded to the problem of new knowledge when he critiqued psychology by saying its scientists are erroneously presuming their objects of study to be "transhistorical universals." He cautioned:

> [P]ermanent and unchanging laws of human nature [are] therefore possible only to a person who mistakes the transient conditions of a certain historical age for the permanent conditions of human life. (p. 224)

Collingwood reminded psychologists that the field of history is one with research methods as well and invited psychologists to borrow these methods. He proposed that this would take the form of historical reviews of human behavior, and reports of what patterns of human behavior seem to be stable across time and culture. Such studies would seem to be much more responsive to cultural changes or influential historical events.

Humans generate new knowledge—by means including scientific and technological advances. When humans change their behavior in response to new knowledge and technology, it necessarily means that psychology's predictions about human behavior prior to the existence of this new knowledge become less accurate.

Conclusions

The natural sciences have produced a large body of knowledge, but psychology has not. We argue that this may be due to at least four properties associated with humans that are not found in the subject matter of the natural sciences: radical idiography, phenomenological experience, the possibility of free will, and radically new knowledge. Thus it may be the case that human sciences necessitate distinct scientific methods that are properly sensitive to these properties to be more effective at making scientific progress, and therefore that a second demarcation ought to be drawn–between the natural sciences and the human sciences. The failure to properly consider these four properties in scientific method may be a reason for Meehl's quandary—the slow progress of psychology.

At a minimum we would suggest that in designing research, psychologists present arguments regarding the extent to which these four properties ought to effect the research design that they employ. For example, let us imagine two diverse cases. In the first case, a psychologist is studying the eye blink reflex. There is some idiography associated with this (all humans may not have reflex due to neurological abnormalities, for example) and some may have unique stimuli that elicit it due to past histories of conditioning, for example). Phenomenological experience may have some bearing—an individual may have unique internal experience, e.g., they may have the experience of "trying to inhibit the reflex." Free will may have some relevance—an individual may be able to choose or not choose to attempt to inhibit the reflex. However, radical new knowledge, may be largely irrelevant. In a second case, let us examine a psychologist's attempt to devise effective rape prevention programs. Idiography is relevant as there are many individual reactions to pathways to rape; for example as no two humans have the same social histories or perhaps even the same stimulus properties to a rapist; phenomenological experience is relevant also—as even the experience of consent may be a private experience; free will may be relevant as the researcher may assume the person goes through a series of choices that vary regarding risk and the prevention programming is designed to help aid the person to make safer choices. Finally, new knowledge also is relevant with the advent of dating apps people may choose dates in different manners and thus must be accommodated in the research design. Thus, all four properties are relevant here. However, the general point is that the researcher may first need to decide the extent to which these properties are relevant to their domain of interest.

Second, the researcher must then ask, how can my research methods properly capture the impact of the properties that are relevant? This may be the more difficult question, but it would suggest that more emphasis needs to be placed on developing scientific methods that can properly capture each of these properties or subsets of these properties. Philosophers of science have suggested that the notion of a single scientific method is not sound and rather scientists need to be opportunistic to devise methods that can best solve problems in their phenomena of interest (e.g., Feyerabend, 1975; Gower, 1997). However, the general point is that ignoring these properties may be a reason why psychology has made such slow progress.

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RUNNING HEAD: SECOND DEMARCATION