SHOULD PSYCHOLOGY BE A NATURAL SCIENCE?

A preliminary question is whether psychology should be a science of any kind? Social workers with the MSW degree do psychotherapy and social work is not a science of any kind. Ministers, priests, and rabbi’s engage in pastoral counseling. Their interventions are based, at least in part, on theology as revealed in the Bible and/or Tora rather than science. Freud welcomed non-medical psychoanalysis. They are called Lay Analysts. Theodor Reik trained Lay Analysts in his institute. Perhaps we only need psychotherapists. They would only need a BA in some field, any field, and could include psychology taught as a human science. Professional training might consist of two years of readings in philosophy and/or human science. They would also need externships and an internship. Their degree might be Masters of Psychotherapy, M. Psy. so as to clarify that they are not any kind of Western doctor to avoid association with natural science. The degree could also be a Masters in Applied Philosophy (M.Phil. or M.A. Phil.).

If psychology is to be a natural science, then explanations will need to involve mechanism information as defined by Kazdin and others versus continuing with the functional explanations that we currently use including the causal inferences based on correlational data. Some form of effective integration of psychology with biology (neuroscience) that entails both vocabulary and basic concepts will be needed. Explaining how mind emerges from brain; how psychology

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1 V1 stands for Version 1 which implies that subsequent chapter updates will become available.
2 See http://en.wikipedia.org/wiki/Lay_analyst
3 Teaching psychology as a human science is rare these days in major universities.
emerges from biology versus continuing to understand the mind as entirely mental without a convincing connection with neuroscience will be required.

**EXPLANATION AS CAUSES VS. REASONS**

Psychologists typically distinguish causes from reasons. If one asks how a light comes on, then they might expect that the desired explanation would entail physical causes including electrons moving though and heating wires. Maxwell’s equations might also be cited. If one asks why a particular person turned on a light then the desired explanation would typically include their reason for doing so such as to see better in a darkened area. This distinction between causes and reasons fails when we think physically about the brain; when we consider the brain to be a mechanism just like the light bulb. The new answer to why the person turned the light bulb on concerns what activated the person’s neural networks to produce this behavior at this time. Citing improved vision with more light would still be a good reason. Prior positive consequences associated with turning lights on in dark places would continue to be involved because experience-dependent plasticity mechanisms are known to biologically reinforce neural network pathways between stimuli and responses. Connectionist network simulation that causally mediated these and other factors would animate this explanation. This is what it means to **Think Physical; Not Mental**. Readers should revisit the example of the person who thought that a tape recorder stole his tongue described in Chapter 1.

**REPLICATION**

The additional research reviewed below extends the discussion of this issue by Tryon (2014, p. 71). It further documents the extent to which replicated results are rare. Results that have yet to be replicated cannot be trusted and therefore are not eligible participate in discussions of theoretical unification. The primary reason for this is that the results in question may not be replicable. Such findings may be the result of chance or fraud.

There are at least two reasons why theories should not try to explain unreplicated results. First, no theory should be faulted for failing to explain a finding that cannot be replicated and therefore there is no reason to try to explain results until they are replicated or until meta-analytic results have securely established the result in question. Second, modifying a theory to explain a result that subsequently cannot be replicated would be an embarrassment to the theory because
now it has explained something that does not in fact occur. Correct theories should not explain or predict events that are contrary to facts for such results require that the theory be revised.

The systematic bias that psychology journals have against vetting “original” discoveries constitutes a major impediment to psychology becoming a mature science. Such practices insure that psychological science will remain in its present immature pre-paradigmatic situation.

Ioannidis (2005b) presented multiple reasons why most published findings are false. 1) Conclusive findings are sometimes based on a single study without replication. 2) Conclusions are frequently based on statistical significance testing and the $p < .05$ criterion which is incorrectly interpreted to mean $p > .95$ that the findings are replicable. 3) The low prior probability of the finding being true which can be inferred from the absence of formal theory and plausible proximal causal mechanism information. 4) Small sample sizes can give rise to extreme variability that can be capitalized upon by chance to reveal a statistically significant result that cannot be replicated in large-scale studies. 5) Experimenter expectations can bias results in favor of positive results. This is especially likely when grant funding is contingent upon positive findings. 6) Hot new research areas are prone to positive findings and effect sizes that diminish over time.

Ioannidis (2005a) reviewed all published research in three major biomedical journals with high impact-factors between 1990 and 2003. He identified 49 articles that had been cited more than 1,000 times; 45 of which claimed that their intervention was effective. He compared the initially reported results with subsequent reports based on larger samples or better controlled methodology. He reported replication in 20 of the 45 (44%) of the cases. But he also found smaller effect sizes in 7 other studies (16%). Most troublesome was his report that the claims of effectiveness were contradicted in another 7 studies (16%).

Ioannidis (2006) emphasized that our focus upon making new discoveries has come at a cost of failing to verify and validate these discoveries to see which ones are real. He reported that four fifths (80%) of epidemiological findings concerning the correlation between vitamins, diet, and hormones and health were rapidly contradicted. He estimated that the refutation rate in molecular research occasionally exceeded 99%.

Ioannidis (2012) noted that all forms of replication are not equally persuasive. Replications by the same team of investigators may perpetuate the same unconscious and/or conscious biases in their replications as were present in their initial reports. This includes students of the
investigators who published the initial reports. Replications by independent investigators is more convincing but still subject to shared biases.

Among the more controversial publications in psychological science is an article by Bem (2011) who claimed to have found evidence that the future can causally effect the past as indicated by the following quote from his abstract.

The term *psi* denotes anomalous processes of information or energy transfer that are currently unexplained in terms of known physical or biological mechanisms. Two variants of psi are *precognition* (conscious cognitive awareness) and *premonition* (affective apprehension) of a future event that could not otherwise be anticipated through any known inferential process. Precognition and premonition are themselves special cases of a more general phenomenon: the anomalous retroactive influence of some future event on an individual’s current responses, whether those responses are conscious or nonconscious, cognitive or affective. This article reports 9 experiments, involving more than 1,000 participants, that test for retroactive influence by “time-reversing” well-established psychological effects so that the individual’s responses are obtained before the putatively causal stimulus events occur (p. 407).

Briggs (2011) posted a reference to an article published in the Skeptical Inquirer that reported that the *Journal of Personality and Social Psychology* rejected an article by James Alcock that failed to replicate Bem’s research on the basis that they only publish positive findings. Alcock (2011) posted comments on this decision that included a history of the failure to replicate similar extraordinary claims. Leading journals in psychology have policies against replication.

Pashler and Wagenmakers (2012) wrote an introduction to a special section of *Perspectives on Psychological Science* (Vol. 7, #6) concerning replication containing 17 articles. Their article provided a review of relatively recent events that have questioned the extent to which psychological findings are replicable. Pashler and Harris (2014) asked whether or not the replicability crisis is overblown. They answer in the negative and recommend substantial systematic reforms.

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4 See [http://www.csicop.org/si/](http://www.csicop.org/si/)
The January 2014 issue of *Perspectives on Psychological Science* contains a “Special Section on Behavioral Priming and fits Replication”. The lead article by Cesario (2014) concerned the replicability of priming which by now is beyond question. Klatzky and Creswell (2014) attempted to explain how priming works using an intersensory interaction bidding model that does not provide the type of causal mechanism information that Kazdin and others have called for.

Walton (2014) introduced what he claimed to be “the new science of wise psychological interventions” (p. 73). He reported:

> Citizens complete a survey the day before a major election; a change in the survey items’ grammatical structure increases turnout by 11 percentage points. People answer a single question; their romantic relationships improve over several weeks. At-risk students complete a 1-hour reading-and-writing exercise; their grades rise and their health improves for the next 3 years. Each statement may sound outlandish – more science fiction that science. Yet each represents the results of a recent study in psychological science (respectively, Bryan, Walton, Rogers, & Dweck, 2011; Marigold, Holmes, & Ross, 2007, 2010; Walton & Cohen, 2011)” (p. 73).

These are dramatic claims that require replication. Is an increase in voter turnout of 11% a replicable value that can be consistently produced by completing a survey the day before a major election? Can clinicians really expect to improve the romantic relationships of all of their clients by asking them to answer a single question? Can the health of the general population be continuously improved over three years following a 1-hour reading-and-writing exercise? Only methodological replication can tell. Launching a “new science” based on such extreme reports that have yet to be replicated runs counter to the position that the Association for Psychological Science has recently taken with regard to the need for replication.⁵

**PHILOSOPHICAL STANCE**

Some readers may form the impression that I am operating from the philosophical position of eliminative materialism. I now explain why I do not accept this categorization. According to

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Wikipedia\(^6\) eliminativism is about things that are thought not to exist such as phlogisten and luminiferous aether. I consider the psychological states that we all experience every day to be real and consequently I am not arguing for any kind of eliminativism. I fully accept the materialism label.

**Revisionary materialism** comes closer to the mark but the revisionary part maintains that psychological states are somewhat **reducible to physical phenomena**. I reject revisionary materialism because I support the view that **psychological states are physical states** for at least three reasons. First, brain imaging evidence clearly demonstrates that brain neural networks are activated during psychological states. Altering the function of these neural networks chemically, electrically, or traumatically such as via automobile accident or stroke alters the associated psychological state. Brain death completely removes psychological states. Hence, psychological states are entirely dependent upon brain states. Second, the concept of reducible implies that psychological states and physical states are different and that the former is at least partially reducible to the latter. To say that psychological states are physical states avoids the reduction process altogether and thereby avoids having to explain how the reduction process works. This issue of reducibility is a false issue created by Descarte’s mistaken claim that mind differs from brain. Third, the appeal of reducibility is that the whole is best explained as the sum of its parts. This arguments seems to be based on an erroneous additive assumption. Some phenomenon exist only at a certain level of aggregation. Efforts to reduce such phenomena eliminate them; they fail to exist below some critical level of aggregation.

**Emergence** is the relevant issue. How psychological states emerge from physical states is the pertinent question. Reductionism entails analysis, emergence entails synthesis. No amount of analysis will produce any degree of synthesis. Take water for example. One typically hears how water, H\(_2\)O, can be reduced to hydrogen and oxygen. However, the physical properties of water are completely different from the physical properties of hydrogen and oxygen. Understanding the physical properties of these two constituent gasses does nothing to explain the physical properties of water. Hence, the relevant question is how the physical properties of water emerge from the physical properties of hydrogen and oxygen when arranged as H\(_2\)O. Emergence means not reducible.

I therefore prefer to understand that psychological states are real events that emerge when many physical neural networks interact in a dynamic way. I find that this view is what enables me to **Think Physical Not Mental** about psychology and behavior.

I characterize the philosophical orientation outlined above as **emergent connectionism** to emphasize the theoretical role of emergence and the methodological role of connectionism as a way to simulate neural networks. It is through the functioning of neural networks that the psychology emerges from biology. Connectionist models presently provide the best method for studying how such emergence occurs.

**PHILOSOPHICAL SCHISMS**

The philosophical schisms discussed by Tryon (2014) in Chapter 2 reflect different perspectives on what it means to be a person; a human being. Rychlak (1968) was open about this matter in that he rejected the Lockean perspective because he did not like how it portrayed people. Liking differs from thinking in that it is largely emotional vs. rational. Science aims to temper, if not replace, emotional choices with rational ones. However, endorsing a position that conflicts with one’s preferred view of people induces dissonance and that is uncomfortable. The section on philosophical schisms should be read after first engaging in self-reflection and asking oneself the following question. To what extent am I open to argument based on reason vs. closed to argument based on how I currently feel about these issues?

**Reductionism vs. Emergence**

Tryon (2014, p. 91) began a comparison of reductionism and emergence by making the following point:

Another argument against reductionism by Miller and Keller (2000) questions the connection between biology and psychology. They concluded ‘**There is an indefinite set of potential neural implementations of a given psychological phenomenon. Conversely, a given neural circuit might implement different psychological functions at different times or in different individuals. Thus, there is no necessary identity between psychological states and brain states**’ (p. 214 italics in the original; bold face added)
Tryon (2014) supported this position by stating that color vision is implemented differently in the avian than mammalian brain. Sanders (2014) provided further supportive evidence in that the January 24th issue of *Science* reported that the mantis shrimp has 12 types of photoreceptors that enable them to see color with less brain processing compared to both mammals and birds. This additional evidence in support of Miller and Keller (2000) does not mitigate the stronger argument against their view that Tryon (2014) made.

**PRINCIPLES AND MECHANISMS NOT PHILOSOPHIES**

One might think that Humanistic and Positive psychology are so similar that they would surely agree on fundamental core issues but it seems that this is not the case. The manifest intention of Waterman’s (2013) article on “The Humanistic Psychology-Positive Psychology Divide” was to clearly and succinctly document a serious schism between humanistic and positive psychology based on long-standing seemingly irreconcilable philosophical differences regarding: (a) ontology, (b) epistemology, and (c) practical philosophy that includes their approach to psychotherapy despite substantial apparent similarities, calls for and attempts at reconciliation, and a special interest group seeking common ground. Waterman (2013) concluded “Because of this philosophical divide, adherents of the two perspectives may best be advised to pursue separately their shared desire to understand and promote human potentials and well-being” (p. 124). This powerful divisive conclusion is striking because it demonstrates that two psychological orientations that seem to share so much can be so deeply divided that little if any hope of effective reconciliation remains.

The more general reading of Waterman’s (2013) article leads to at least the following two conclusions: (a) similar articles could be written for other pairs of psychological orientations, and (b) the perils of psychological schisms constitute a serious impediment to the possibility of psychology ever becoming a mature science. I elaborate on these two conclusions below.

Similar articles could be written for other pairs of psychological orientations. Rychlak (1968, 1981a, 1981b) convincingly documented that psychologists can be divided into three groups that see and understand the world and its people in distinct and incommensurate ways: (a) psychologists who endorse the philosophy of Emanuel Kant, (b) psychologists who endorse the philosophy of John Locke, and (c) psychologists who endorse some of the philosophy of Kant and some of the philosophy of Locke. Rychlak (1981b) identified Harry Stack Sullivan, Dollard and
Miller, Skinner, Wolpe, Stampfl and Bandura as Lockean. He identified Rogers, Binswanger, Boss, Piaget, and Kelly as Kantians. He identified Freud, Adler, and Jung as mixed Kantian-Lockean. One could write an article like Waterman’s by contrasting any advocate of one of these three philosophical orientations with any advocate of either of the other two orientations. Hence, the irreconcilable philosophical schisms that Waterman identified are not limited to humanistic and positive psychology but are sadly true of our entire field.

The basic problem here is that philosophers make unsubstantiated claims about what is and is not the case and how people really are and there are no reliable and valid methods for resolving these conflicting claims. These assertions function as axioms when philosophy is understood as a logical system. But one reasons from axioms not to them. Axioms are therefore immune to argument. Fundamental assumptions are therefore not modified by logical argument or empirical evidence. Moreover, these core beliefs are not held dispassionately as they might be if discourse was purely rational. Philosophical assumptions and assertions are frequently so passionately held that they function as articles of faith and as such are imbued with all of the absolute certainty and fervor that has always accompanied, and will always characterize, religious convictions. These emotionally charged hot cognitions are vigorously defended. Consequently, there is as little hope of achieving a unified philosophy, and thus a unified psychology, as there is of achieving a unified religion. Only by moving beyond such unresolvable articles of faith can psychology avoid their divisive consequences and have a chance to become a mature science. In this sense, psychological science must leave philosophy behind in order to grow and develop. In an interview with Kat McGowan (2014), Elizabeth Phelps answered the question of why she went into psychology instead of philosophy as follows: “To me, psychology was like philosophy with answers” (p. 31).

What alternative do we have to organizing psychology around philosophical faiths? Whereas philosophies and religions are organized around august persons such as the philosophers that continue to divide psychologists, sciences are organized around principles and mechanisms. Tryon (2012, 2014) has identified core and corollary principles that provide some of the missing mechanism information regarding psychological phenomenon. Psychologists have reliable and valid methods for establishing scientific principles and mechanisms. For example, replication is the best way to adequately control for Type I errors of mistaking chance for real events and to build the required consensus among a majority of psychologists. Tryon (2013, 2014), shows how
these principles provide a sixth orientation that synthesizes the Big Five (a) behavioral (applied behavior analysis), (b) cognitive, (c) cognitive-behavioral, (d) psychodynamic (including Emotion-Focused Therapy), and (e) pharmacologic clinical orientations. It is a hybrid cognitive-neuroscience orientation that was constructed from (a) well replicated psychological phenomena, (b) basic neuroscience mechanisms, (c) parallel distributed processing connectionist neural network models and mechanisms, and (d) multivariate statistics. This seemingly new theoretical orientation is actually just a new combination of old well replicated solid scientific facts and as such is ready to be used today with confidence. Only their organization into core and corollary principles is new.

Philosophy was and remains parent to psychology. This means that psychology can never fully escape its philosophical roots and heritage. However, just as children grow up and have their own identity separate from their parents, psychology should establish its own identity in a way that no longer binds itself to the irreconcilable conflicts of faith that continue to characterize its parent especially when there is a promising alternative where differences of opinion can be settled through established methods.

THINK PHYSICAL; NOT MENTAL?

Some readers may question whether one always needs to think about psychology and behavior in mental terms. One student in my graduate Cognition & Affect class wrote “At my university counseling center externship I only see clients that have no formal psychopathology but are having normative adjustment issues. Why do I need to think physically about their problems?” My reply was that sometimes you won’t need to think in physical terms. There is no obvious theoretical or clinical advantage of thinking physically when treating: home sickness, roommate problems, boyfriend/girlfriend issues, what major should I choose, how to improve my study skills, should I come out of the closet, how to tell my parents that I am gay, and what is the meaning of life? There is no particular need to think in physical rather than mental terms if all of the important people in your client’s life also have no formal psychopathology. But such clients are the very rare exception. Matters change when your client’s roommate or romantic partner has a borderline personality disorder or an eating disorder or engages in nonsuicidal self-injury or if a parent is suffering from major depression, substance abuse, or major psychiatric disorder.
Sometimes seemingly normal developmental issues encounter psychopathology which requires thinking physically to best understand what is going on. Consider the case study that I presented in Chapter 1. A father discussed the problems he was having with his teenage daughter. At first these problems seemed to be normal developmental issues of autonomy and independence. He wanted advice about how to better control her behavior. I could have used by knowledge of behavioral principles to help him modify her behavior. Applied Behavior Analytic (ABA) clinicians do just that without further consideration. I might have administered a structured interview and recommended a manualized treatment. But then he asked why she was behaving this way. His question required me to ask additional questions and to think physically about what might be going on. I concluded that she was not a normal teenager but one with a borderline personality disorder. I further explained that her inability to talk meaningfully about her feelings and her insensitivity to the feelings of others was likely due to a dysfunctional mirror neuron system. Hence asking her about her feelings or to be sensitive to the feelings of other people including her parents and sister is like asking a color blind person to sort paint chips of varying hues. This information changed his view of his daughter from that of a normal teenager to that of a person who needs extensive treatment. So, normative problems may be just that or they may indicate greater problems in which case your understanding and treatment may be very different than if you reject the recommended Applied Psychological Science clinical orientation. Put otherwise, there is always risk in taking a client’s presentation at face value without any further consideration as to whether something more fundamental is wrong. Can you imagine the problems that I would have run into if I had taken a straight ABA approach to this case? Treatment would most likely have failed. The father would be disappointed. His daughter would have learned that psychologists don’t understand her. She would not have received proper treatment. All of these bad things would have happened because All because of my not thinking in physical terms about her condition. Overlooking psychopathology on the view that you are dealing only with normative issues can be a serious clinical mistake.

The admonition to think in physical rather than mental terms pertains to situations in which an explanation is required. Explanation is fundamental to science including psychological science. Clinicians who view their practice as based on psychological science will value being able to actually explain how cognition and affect interact to produce behavior rather than provide an
interpretation as Teo (2012) has pointed out. This book is about explanation. Explanations enhance case formulation. Explanations are valuable when treatment is not going as planned.

Problems?

What problems are associated with thinking physically about psychology and behavior? Physicians promised that treating mental illness as a physical illness would reduce stigma but this has not happened. Mehta and Farina (1997) could not find any evidence that thinking about mental illness as a disease reduces stigma. Angermeyer, Matschinger, and Schomerus (2013) and Schlier, Schmick, and Lincoln (2014) both reported that the disease model failed to reduce stigma. Lebowitz (2014) conducted an extensive literature review and concluded that “… biological attributions for psychopathology among symptomatic individuals appear to be associated with prognostic pessimism” (p. 80). The most positive conclusion he could reads was that “The few experimental studies that do exist in the literature suggest that although biological explanations can reduce perceptions of blameworthiness among symptomatic people, they also seem to increase prognostic pessimism: (p. 80). It is noteworthy that this literature equates thinking physically about psychology and behavior with the medical disease model.

There is a HUGE difference between thinking physically about psychology and behavior and attributing psychology and behavior to a medical disease. The disease model only explains abnormality. Disease does not explain anything that is considered to be normal. Thinking physically about psychology and behavior applies to both normal and abnormal conditions. Thinking physically entails neuroscience and this field is not limited to disease. Experience-dependent plasticity and epigenetic mechanisms are physical and explain how normal memories are formed and normal learning occurs. All psychology, both normal and abnormal, is entirely dependent upon learning and memory. These neuroscience mechanisms are also involved in psychopathology but are not diseases in the standard medical sense. Hence, presenting abnormal psychology as a medical disease is wrong and therefore a bad idea the consequences of which do not bear upon the validity of thinking about psychology and behavior in physical terms.

Determinism

What are the consequences of belief in determinism? It is important to qualify what I mean by determinism. Tryon (2014, p. 101) presented determinism as the degree to which alternatives
are reduced. Therapists aim to facilitate selected alternatives that correspond to treatment goals. Clinicians implicitly believe in determinism when they administer psychological treatments and expect that their efforts will exert their intended effects. Determinism is what powers treatments.

Alternatively, determinism can be polarized to mean helplessness to the point of futility in that nothing you can do can or will alter your future. Baumeister, Masicampo, and DeWall, (2009) provided evidence that “disbelief in free will increases aggression and reduces helpfulness” (p. 260). Vohs and Schooler (2008) reported that a belief in determinism enhances cheating. Presenting determinism in its most extreme hard form may justify cheating for some people but such conclusions on the part of some people should not cause clinicians to conclude that their actions do not have predictable consequences.

**INTERESTING LINK**


**REFERENCES**


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7 References not included in this list are in Tryon (2014).

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