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Overcoming the Impassable Gulf: Phenomenologizing Psychophysics

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Abstract

This paper examines Fechner's (1859) introduction to experimental psychophysics from a phenomenological perspective. Horst's (2005) analysis is used to demonstrate the phenomenology that is inherent to classical perceptual psychophysics (Fechner's "outer" psychophysics). Horst argues that the psychophysical event of perception can only be understood as an intentional intertwining of subject and object. From this we move to physiological component of psychophysics—that is, the processes that mediate perceptual awareness (Fechner's "inner" psychophysics). Drawing primarily on the work of Rosen (2008, 2015), it is argued the phenomenology provides the most appropriate approach for what could be understood as a contemporary psychophysics—one that borrows from recent trends in physics, neuro-physiology, and perception as classical psychophysics had done (or promised to do). This results in a psychiatric neurophenomenology. Examples of the placebo effect and treatment of traumatic brain injury are used to demonstrate the usefulness of a phenomenological psychophysics, one that ultimately meets the demands of Fechner's original proposal.

Keywords

psychophysics – phenomenology – perception – neuropsychology

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> We can trace the development of a nervous system and correlate it with the parallel phenomena of sensation and thought. We see with undoubting certainty that they go hand in hand. But we try to soar in a vacuum the moment we seek to comprehend the connection between them … Man as object is separated by an impassable gulf from man as subject. There is no motor energy in intellect to carry it without logical rupture from one to the other.
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> TYNDALL, 1874; IN STAPP, 2013, P. 1

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The present paper considers Fechner's (1859/1966) introduction to his program for psychophysics which features sensation of external stimuli (outer psychophysics) and internal physiological processes (inner psychophysics). It is argued that each of these may be best understood by a phenomenological psychophysical model and not a classical (i.e., 19th century) psychophysical model. In phenomenological psychophysics, the physical and psychical poles of experience are intertwined. In Wundt's (1897) language, these two poles may be understood as the "experiencing subject" and the "object of experience" which are bound together in the event of experience (p. 3). Combining subject and object in this manner emphasizes their reciprocal relationship. It will be argued that the phenomenological event provides the best starting point for developing a contemporary psychophysics. This begins with a review of the project as Fechner has seen it from its outset.

Like Wundt's two-part project of exploring the experiential event in psychology, Fechner (1859/1966) observes two poles to the project of psychophysics. He writes,

> By its nature, psychophysics may be divided into an outer and an inner part, depending on whether consideration is focused on the relationship of the psychical to the body's external aspects, or on those internal functions with which the psychic are closely related. In other words, the division is between the mediated and the immediate functional relationships of mind and body.
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> P. 9

We maintain that phenomenology is useful in understanding this mind and body interrelationship.

The Weber-Fechner law demonstrates the intentional structure of the psychophysical event. This is to say that it is neither subjective or objective by itself. To borrow from phenomenological philosopher and scholar of contemporary physics Steven Rosen (2008), these two poles share a non-coincidental, yet non-disjunctive relationship in the psychophysical event of experience. Subject and object are not an identity, yet they cannot be separated. In classical psychophysics, this includes the relationship between objective image (stimulus) and subjective perception (percept). The classical assumption is that an event of perception may be predicted and understood from an objective and empirically validated vantage point. However, Horst (2005) has shown that the event of perception may in some cases only be predicted and understood from a phenomenological vantage point. Contemporary psychophysics is, as Whitehead (1929/1978) has said, "at once the subject experiencing and the superject of its experiences. It is subject-superject, and neither half of this description can for a moment be lost sight of" (p. 29).

Accompaniment: Fechner and the Phenomenology of Classical Psychophysics

Fechner's guiding theory for psychophysics was that physics and psychical processes are combined. He writes, "[b]riefly, psychophysics refers to the *physical* in the sense of physics and chemistry, [and] to the *psychical* in the sense of experiential psychology" (p. 7). Each of these, it is argued, can be understood as constituents of a phenomenal event.

For Fechner, the physical and psychical poles of experience are always interrelated, and this is not a relationship of unidirectional causality. It is more accurate to speak of mental activity and physical activity as reciprocally causal: mental activity co-occurs with physical activity. Fechner refers to this as "accompaniment" across these two poles of experience. He writes,

> All our mental activity has dependent upon it an immediate activity in our brain, or is accompanied immediately by brain activity, or else directly causes the activity, of which the effects then are transmitted to the external world via the medium of our neural and effector organs.
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> P. 8

Whether the mental activity causes neural activity or the reverse is uncertain. The question becomes: from which side does the psychophysical investigation begin? Fechner is confident that psychical and physical are linked. For example, he explains how "Insofar as a functional relationship linking body and mind exists, there is actually nothing to prevent us from looking at it and pursuing it from the one direction rather than from the other" (p. 8). However, the tools that had been available and the methodological commitments at the time favored a particular direction of investigation. Fechner continues,

> There is a reason, however, why psychophysics prefers to make the approach from the side of the dependence of the mind on the body rather than the contrary, for it is only the physical that is immediately open to measurement, whereas the measurement of the psychical can be obtained only as dependent on the physical.
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> P. 8

It seems as though the particular direction of investigation that psychophysics has followed—the way in which psychical states are dependent on physical states—is not the identity of psychophysics. Instead it merely indicates the state of the 19th century art of perception studies. The division of perception into "awareness" and "cause of awareness," Whitehead's observed bifurcation of perceptual experience, is a result of methodological limitation and not necessarily an ontological privilege. Given the 19th century preoccupation with British Empiricism, it is understandable that psychophysics would emphasize physical processes which are the cause of psychical processes. According to Fechner, however, this direction could just as easily be reversed without missing the psychophysical phenomenon.

The century following Fechner's proposal for an experimental psychophysics has seen the vast development of procedural and analytic methodologies that concern psychical or subjective processes. In the present work, this has included the tradition of phenomenology. Following closely the work of the Berlin School of Gestalt Perception Theory, Husserl and Merleau-Ponty have carefully explicated the structure of experience. Like Gestalt images in subjective perception, experience may be understood to cohere around particular and meaningful wholes. This is to say that experience does not arise arbitrarily, but follows basic patterns of emergence. Indeed, it is quite likely that one may now begin with psychical experience—that is, a subjective protocol—and work towards an understanding of its physical accompaniment. In this capacity, it

would not be unusual to hear of mental states causing brain states. This has been demonstrated at length with studies of neuroplasticity (several instances of this psychophysical reversal have been neatly organized by Noë, 2009). Before considering the phenomenological reversal of Fechner's psychophysics, observe the necessary role of phenomenology even in the physically-oriented project.

Horst (2005) argues that even classical psychophysics—the psychological experimentation of a physicalist ilk—requires a certain element of faith in phenomenological investigation. He explains this through the example of the Weber-Fechner Law. First, the Weber-Fechner Law:

> One might intuitively assume that when a stimulus *A* seems twice as bright as a stimulus *B*, this is because the intensity of the light reflected from *A* is twice as intense as that reflected from *B*—i.e., that the subjective impression of brightness is a linear function of stimulus intensity. But Weber's experiments showed that this was not the case. Rather, subjective brightness is a logarithmic function of stimulus intensity. The Weber-Fechner law gives us a precise description of one aspect of vision: a general mathematical law governing the relationship between the intensity of the *stimulus* (i.e., luminance) and that of the *percept* (i.e., brightness). These data, moreover, serve as a constraint upon further theoretical work in vision: any viable model of vision needs to accommodate the Weber-Fechner law.
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> P. 3

The Weber-Fechner law describes the transformation that occurs between an objective measure of the stimulus and the subjective description of said stimulus. If it were the case that the event of perception could be simply understood as "awareness and cause of awareness"—that is, subjective components which are caused by objective components—then the Weber-Fechner law would never have been established. Phenomenology proves integral to this well known psychophysical law.

The necessary inclusion of phenomenology in classical psychophysics is itself an interesting detail, but the role of phenomenology in classical psychophysical protocols does not end here. Horst (2005) explains that the Weber-Fechner law fails to explain some perceptual occasions. These are instances where subjects will reliably see more than the Weber-Fechner law allows for, or see less than what the law would predict. Horst refers to images which feature patches of varying luminosities. There are two instances in which the Weber-Fechner law has no explanation: first, a variety of luminosities (separated by

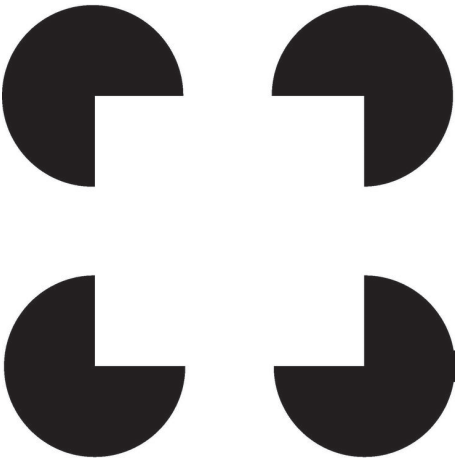

FIGURE 1
Kanizsa Square.

noticeable differences) are perceived as a single brightness; second, no change in luminosity is perceived as a change in brightness. Since either example aptly demonstrates the important role played by phenomenology in classical psychophysical protocols, only one will explained in further detail. In some figures, subjects will reliably perceive variance in brightness when there is no corresponding variance in luminosity—that is, subjects will reliable perceive a "noticeable difference" when there is none.

Figure 1 is a Kanizsa Square (Kanizsa, 1979). The Kanizsa Square is an example of an image in which subjects reliably perceive brightness variability which does not correspond to luminosity variability. In terms of objective properties, the Kanizsa square is a perceptual stimulus which presents two contrasting luminosities—four black ¾ circles on a white background. The negative space made by each circle creates the corner of a square. Instead of superposing the circles on a white background, the percept is one of a white square superimposed on a background of black circles which are superimposed on a white background. The white square and the second white background appear as different brightnesses of white. Despite the properties of the stimulus limiting the luminosity variability to two—black or white—subjects reliably report a gradient in white brightnesses. It is impressive.

Instead of trying to fit the example into the classical, British Empiricist rendering of psychophysics as a fallacy of perception, Horst suggests including the phenomenological component of intentionality. Regardless of whether or not a stimulus—e.g. the Kanizsa Square—has the property of three luminosities, it has been seen as having three brightness. Indeed, to say that the Kanizsa Square *actually* has two brightnesses is to commit what E.B. Titchener

(1912) has called the stimulus error. This is the tendency for scientists (and the psychologists among them) to assert ontological validity only to that which can be measured. Moreover, the measurement becomes the rule guiding observations. To say that the Kanizsa Square is a discrete object that has only two luminosities is to commit stimulus error. Indeed, as a discrete stimulus, the Kanizsa Square is no square at all! There is no Kanizsa Square as a discrete object; there is only the Kanizsa Square as an intentional object. "This kind of Gestalt phenomenon" Horst explains, "is a very simple case of intentionality. It involves seeing a region *as* a figure of a given kind, and *seeing-as* is intentional in nature" (p. 11). This is because the Kanizsa Square is an event—a specifically perceptual event. Without the event-process unfolding, there is no square. As an intentional object, the Kanizsa Square cannot be broken down into part processes—Whitehead's "awareness and cause of awareness." These parts are invisible, or, as Wackerman (2010) explains in the event of perceiving a red strawberry, "*inexistent*."

> What the subject really sees are not her visual sensations, or excited retinal cells, or photons approaching her eye—no, she sees a red strawberry. It is the *object itself* that is primarily experienced by the perceiving subject, which is neither a complex of sensations (psychology) nor an aggregate of organic molecules absorbing or dispersing light of different wavelengths. The robust realism of primary experience is undeniable: tangible and visible things are there *before* any scientific reconstruction.
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> PP. 196–197

The psychophysical event described thus far represents a Gestalt. Gestalt Perception Theory explains how the stimulus-image of four black ¾-circles arranged upon a white background reliably produces a square as a percept in a perceiving subject. The Gestalt event does not exist within the objective stimulus, nor does it exist within the perceiving subject. Each of these—object and subject—are necessary for the Gestalt to emerge as such. The explanatory efficacy of Gestalt Theory need not be limited to the event of perception. Indeed, perception is not simply limited to stimulus and percept. Merleau-Ponty (1945/1962) has argued that the event of perception requires a body. Only by including the body in the discussion of the Gestalt event does one see what Fechner means when he explains that psychophysics may begin with either "outer" processes or "inner" processes. This is because perception is not simply a subjective event, and nervous excitation is not simply a physiological event.

Phenomenology and Contemporary Psychophysics

It has been argued above that classical Fechnerian psychophysics may be understood from a phenomenological perspective. That is, despite borrowing a method from 19th century classical physics, psychophysical experimental protocol has itself required the inclusion of phenomenological data. The examples discussed above have been limited to Fechner's introduction to outer psychophysics. The present section will consider his introduction to inner psychophysics. Fechner (1859/1966) describes the distinction and why his research favored the former.

> Psychophysics, already related to psychology and physics by name, must on the one hand be based on psychology, and on the other hand promises to give psychology a mathematical foundation. From physics, outer psychophysics borrows aids and methodology; inner psychophysics leans more to physiology and anatomy, particularly of the nervous system, with which a certain acquaintance is presupposed. Unfortunately, however, inner psychophysics has not profited so far from recent painstaking, exact, and valuable investigations in this field to the extent it should. Inner psychophysics undoubtedly will do this one day, once these investigations (and those from the different kind of attack on which this work is based) have succeeded to the point of reaching a common meeting ground, where they will be able to cross-fertilize each other. That this is not yet the case to any extent indicates only the incomplete state in which our theory finds itself.
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> P. 10

To Fechner's mid-19th century proposal for psychophysics we may now add two things: 1) "outer" psychophysics is itself inherently phenomenological; and 2) experimental tools have been designed that are sufficiently exacting for the investigation of "inner" psychophysics.

This may be defended by the inclusion of phenomenological data necessary for psychophysical experimentation. Moreover, if psychophysics were to continue down the path of fidelity to contemporary physics, then it would likely evolve a phenomenological perspective. Rosen (2008) explains:

> To be sure, enacting a phenomenological reversal [in contemporary physics] would entail a truly radical departure from science's standard operating procedure. It would call for new priorities, a new posture, a

> new intuitive grasp of object and subject. Instead of maintaining their stance as detached subjects seeking to arrest nature via equations that objectify, physicists would need to accept the transpermeation of subject and object by becoming active participants in nature's dynamic process. Why should physicists be willing to undergo such a dramatic transformation? I submit it is because there is no other way for them to achieve their goal of bringing the basic forces of nature into harmony.
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> P. 89

Rosen does not merely think that physics would be better off were it to phenomenologize, but he sees that this is the direction that it is going. Classical physics has undergone a great transformation over the past 130 years, a transformation that has been catalyzed by such experiments as Michelson and Morley's (1887; Rosen, 2015). In its contemporary iteration, Whitehead (2015) explains that physics is no longer the natural science that Husserl (1931/2002), Heidegger (1927/1962), and Merleau-Ponty (1942/1963, 1945/1962) have eschewed. For example, Globus (2015) explains a new quantum brain dynamics that he maintains "concords with Heidegger's account of *Existenz*" (p. 326).

Moving from contemporary physics to physiology and neurophysiology today does not have to be met with the disapproval of decades past. Relying on dynamical systems theory, two proponents of a natural phenomenology, Thompson and Varela (2001), argue for "two-way or reciprocal relationships between neural events and conscious activity" (p. 418). Moreover, they maintain that conscious experience is not a brain-bound event. What they observe in the laboratory is the tendency for the nervous system and environment (ecological and social) to be reciprocally related in a "highly structured dynamic system" (p. 423). There is no mind-body gap in their account.

The naturalized phenomenology (or neurophenomenology) of Varela (1996), Thompson et al (2001), and Roy et al (1999) is precisely what is intended by a phenomenologizing of psychophysics, specifically insofar as it handles the mind-body gap. The purpose of introducing the psychophysical element is in an effort to speak to the history of perception studies within the discipline of psychology. Doing so demonstrates how what is happening in laboratories of contemporary physics and cognitive neuroscience are of importance to psychologists as well. However, what is intended is not a mere introduction of new terminology. As Roy et al (1999) explain of a naturalized phenomenology, "it is not enough that such a phenomenology be descriptive and analytical; it should also be explanatory, and the explanations it gives should make clear how phenomenological data can be properties of the brain and the body …" (p. 19). The following exemplars are intended to accomplish this. Bringing phenomenological psychophysics into the domain of neuropsychiatry does more

than describe what occurs with the placebo effect; it provides an explanation where modern neuropsychiatry has traditionally had little to give.

An Exemplar: The Placebo Effect and Neuropsychiatry

To demonstrate what is intended by phenomenologizing of inner psychophysics, two examples will be explored. These examples have been chosen to demonstrate the intentional psychophysical relationship as it occurs *within* the body. Both come from the doctor's office. The first considers the well-documented phenomenon of the placebo effect as a phenomenological psychophysical event following Frenkel (2008; Moerman, 2002). It is argued that the placebo effect only makes sense when it is understood to implicate physiological and psychological processes together. The second reviews the interdisciplinary temperament of neuropsychiatrist George Prigatano (1999a, 1999b). Prigatano exemplifies the psychophysical clinician by his mutual consideration of physiological and phenomenological elements of client experience. It is argued that these do not share an additive relationship, but together comprise the Gestalt of client-illness.

The Placebo Effect as a Phenomenological Psychophysical Event

The placebo effect aptly demonstrates the interrelationship between psychical and physical components in medicine. This is to say that the effect in question is neither a psychological effect nor a physical effect. Indeed, both parts are required in order for the effect to take place. Frenkel's (2008) phenomenological analysis of the placebo effect as an intentional action will be consulted in demonstrating its significance in the psychophysical event.

The term "placebo effect" has a rich history that has been explored in a manner particularly relevant to its present consideration (Moerman, 2002; Miller, Colloca, Crouch, & Kaptchuck, 2013). For the present discussion, the placebo may be understood through the example of an inert substance—that is, an object that does not have the property of affecting a subject in a particular way. For example, a sugar pill object does not have the properties of reducing pain or swelling in the body of a headache-suffering-subject; thus, for the headache sufferer, a sugar pill is a placebo. The placebo is important to the biomedical model of health and wellness because it appears to enable researchers to separate physiological effects of substances from the confounding effects of treatment. Frenkel (2008) explains that this model puts the placebo's effect into the head of the patient:

> Despite acknowledging its existence, there is a large resistance by biomedical physicians to engage in a discussion about the placebo effect because it is often perceived as something that can be fully accounted for within a first person description, putting it "all in someone's head."
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> P. 59

The biomedical model of health and wellness begins with the assumption that the body may be understood as a machine and the doctor, a mechanic. Drugs are the substances which interact with and influence the machine. If a headache sufferer is given a substance that ameliorates the pain, then the pain reduction may be attributed to the substance provided the change in pain is not "all in the patient's head." The placebo is used as a control against the ameliorating effects of the event of treatment which could possibly confound with the effects of the headache-abating-substance. Notice how the placebo implicates the entirely undifferentiated event of treatment as a gestalt. Any influence that the placebo has on the state of the headache may be attributed to the treatment gestalt itself and not the independent properties of the drug object. Therefore, 'experimental group effect' minus 'control group effect' equals the influence of the drug being tested. Kirsch, Moor, Scoboria, and Nicholls (2002) have collected evidence that this conception of the placebo effect is insufficient. Hull and Bond (1986) have demonstrated the social expectation effects of alcohol (e.g., disinhibition) have been brought about by placebo alcohol—effects which are not seen when alcohol is administered surreptitiously! Kirsch and Rosadino (1993) have demonstrated a similar expectation effect with the consumption of caffeine. Frenkel (2008) cites a collection of medical trials which also call into question the ease with which treatment effect might be separated from pharmacological effect.

> These examples preempt this criticism by capturing an essential property for our discussion: they are *measurable* and *observable*. They do not solely exist subjectively, but force themselves upon the perception of another agent who can acknowledge that something has indeed happened in an empirically verifiable fashion.
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> P. 59

This passage indicates that the placebo effect is not merely "in one's head" but may also be traced to one's body. But there is an interrelationship between the mind and body during the placebo effect. Substances (like alcohol) will not have the same effects when administered surreptitiously; subjects must know that it is being consumed. This is to say that the placebo effect is also not simply

"in one's body." Frenkel uses the "expectancy" conceptualization to defend his argument that the placebo effect may be understood as an intentional event.

> The main gain of expectancy theory over an explanation solely built upon stimulus substitution is the addition of cognitive content. Expectancies are anticipatory, as opposed to conditioned reflexes, which are solely reactionary. Since expectancies are defined as consciously accessible beliefs about the world, they appear to possess the property of intentionality. Thus, accessing an expectancy puts it squarely in the realm of an intentional state, and we can appropriately label its associated placebo response an intentional act.
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> … Although psychologists were correct to seek an intentional account for most placebo effects, the kind of intentionality built into the expectancy account fails to include the body at the center of such effects.
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> P. 62

In the examples of the caffeine and alcohol placebo effects, it might be argued that the expectancy effects of consuming caffeine or alcohol were conditioned reflexes. Frenkel argues that these effects are contingent on a greater array of cultural and social cues, making the placebo event far more complicated than simple stimulus substitution (e.g. placebo alcohol for alcohol).

The placebo effect comprises a psychological pole (e.g. expectancy effect) and a physical pole (e.g., administration of some substance or intervention). Kirsch et al (2002, p. 9) have suggested the "balanced placebo design" for testing the interaction effects between the physical and psychological poles of the placebo effect. This design may be seen in Hull et al (1986) and Kirsch et al (1993). In the balanced placebo design, half of the participants are *told* that they will be receiving the active drug (e.g., alcohol) while the other half are *told* that they will be receiving the placebo. Within each of these two groups, half of the subjects are *given* the drug and half are *given* a placebo for a two by two design: (told: drug, placebo) x (given: drug, placebo). Frenkel (2008) might suggest that another variable could be introduced for a 2x2x2 design where the physician herself thinks she is administering the drug or the placebo since this is necessarily also a part of the treatment-Gestalt.

An inert substance can have an effect on a patient when the latter is under the impression that the effect might follow. Frenkel (2008) describes scenarios where this is the case with peptic ulcer disease sufferers (pp. 59–60) and Parkinson's Disease sufferers (p. 60). In each of these cases, the patients undergo empirically observable physiological changes. The intentional attribute of expectancy in these cases demonstrates the psychophysical nature of the

placebo effect. To emphasize the importance of this, consider its comparison with Moerman's (2002) placebo tools:

> Consider a thought experiment: We fabricate some placebo socket wrenches. They look like socket wrenches, sound like them, and feel like them. But we design them so that when you put the socket over the loose nut and tighten it, the nut will stay loose. We secretly place these wrenches in the toolboxes of a randomly selected set of mechanics at the car repair shop. Now, if we discovered that the nuts these mechanics were working on really did tighten up, we would have a good reason to be surprised.
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> IN FRENKEL, 2008, P. 73

While this is a bit ridiculous to consider in the workshop, this is precisely what is happening in the placebo effect provided the human is understood by way of the biomedical model. The placebo effect demonstrates that "the psychological and the physiological are two sides of a single phenomenon" (p. 74). This also provides an argument for drawing a line of psychological demarcation around particular event constituents. If it were the case that placebo socket wrenches were found tightening nuts, then there would be a need for a handbook on the psychology of hex-nuts.

Psychophysics in Neuropsychiatry

Neuropsychiatrist George Prigatano (1999a) opposes the conventional biomedical models of neuropsychology which operate with physically reductive, uni-directional causation. This model begins with the assumption that all experience is in principle reducible to neurology (Koch, 2012). This conception neglects the psychological pole that has been explored in the present project. Like Rosen (2015, 2008) and Horst (2005), Prigatano (1999a) suggests that this conventional model might benefit from the addition of phenomenology. What results is a neuropsychology that recognizes the mutual relationship between neurology and phenomenology in the experience of trauma in his patients. For example, Prigatano explains how phenomenology is not only beneficial to assessment and treatment, but that clinical neuropsychology might be incomplete without it. Indeed, without considering the patient's subjective experience, effective rehabilitation following traumatic brain injury (TBI) is halted. Rather than working within the confines of a particular model, Prigatano expands the possible avenues of understanding the patient's experience, shaping

rehabilitation accordingly. For example, in some instances TBI is followed by a loss of self-awareness which can be troubling for traditional neuropsychological models of rehabilitation.

Loss of Self-Awareness Post Brain Injury

An impairment to self-awareness is common in patients who have suffered TBI. Prigatano (1999b) observes how "this phenomenon has always been associated with controversy because it is difficult to describe, classify, and measure" (p. 146). That is, the validity of "loss of self-awareness" is difficult to demonstrate with empirical measures. A general definition of this impairment might read: a disturbance in consciousness that affects ability to accurately perceive or experience the changes in cognition and personality" following a brain injury (p. 146). According to Prigatano (1999b), patients often "lack awareness about the extent of their neuropsychological deficits and this characteristic has been identified as a major barrier to good rehabilitation outcomes" (p. 76). Following brain injury, patients tend to underestimate or overestimate the severity of their brain injuries. The estimation of the patient's capabilities is measured and compared alongside location of brain injury, standard intelligence and memory testing, employment status, and the comparisons of relatives' reports. Making sense of patient experience following TBI requires the mutual consideration of objective and subjective elements. As such, relying on either physical measures to the neglect of psychological measures (or the reverse) would be insufficient. Prigatano suggests the goal is to "understand how brain injury has affected higher cerebral functioning" (p. 77), impaired self-awareness, and how this information can be used to help the patient regain a productive lifestyle and cope with the problem of lost normality. That is, Prigatano maintains that the patient's experience of TBI must be understood as a psychophysical event.

Neural location of brain injury as an indicator of impaired self-awareness. Prigatano (1999b) describes four broad different location- type injuries that may be indicative of the type of self-awareness disorder that emerges. In these, size and location of the TBI may be found having reliably occurring consequences. These demonstrate the importance of the physical component of TBI. Prigatano (1999b) defines and describes these disorder effects:

> Damage to frontal regions, may cause impaired awareness of socially inappropriate actions or exhibit a lack of awareness about disorders of planning, initiation, and so on. Damage to parietal regions may result in impaired awareness of a limb. Temporal damage is associated with a wide variety of impairments that include poor awareness of language

> dysfunction and memory impairments. Occipital damage is often associated with disturbances in vision.
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> P. 155

These locations of brain injury may also help decipher the severity (that is, partial or complete) of impaired self-awareness. For example in a partial unawareness case, Prigatano (1999b) notes "a professor may insist that he is able to return to his job after a right-hemisphere stroke because work has always been the way in which he has organized his life and obtained his primary sense of self-value" (p. 155). Knowing where the injury is within the brain and the severity (complete or partial) of impaired self-awareness makes it possible to predict and measure how the patient may react to treatment, which also allows for individual modification and customization of treatment and rehabilitation options.

Location and severity of TBI may be reliably related to the impairment of particular cognitive tasks. These instances demonstrate the importance of the physiology of TBI. Despite the strength of these relationships, location and severity cannot predict the impairment to a patient's self-awareness. For this, physical elements of TBI must be considered in conjunction with phenomenological information.

Phenomenology as an Effective Method of Measuring Self-Awareness Post Brain Injury

Whether the patient is experiencing a complete or partial impairment of self-awareness can only be ascertained when physical location and severity of TBI is considered alongside phenomenological information. Prigatano (1999a) admits there is a lack of training in sensing the experience of patients with brain damage within neuropsychology which includes addressing patient experience during and following interviews, testing, treatment, familial relationships, and home function. Consideration of each of these elements is important in understanding the impairment to patient self-awareness. Prigatano emphasizes that in each case of patients who typically spend an hour with the neuropsychologist before turning them over to a technician, the patient complains the psychologist seems more interested their tests than them. Along with this irritability and the loss of self-awareness, recovery can be hindered. When a patient's autonomy and awareness is acutely stifled by TBI, the exercise of these processes is necessary for their subsequent rehabilitation. However, such rehabilitation does not follow when the patient is led to believe that their experiences are insignificant and their emotions, ignored. In one example, Prigatano

(1999a) describes the experience of a woman with a brain injury resulting from a gunshot wound:

> She often sat looking down, saying little to the therapist who worked with her. In the context of a day-treatment program, she unexpectedly refused to participate in one cognitive rehabilitation exercise aimed at improving her communication skills. The exercise required her to be videotaped. She refused to be videotaped.
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> P. 78

Addressing this refusal, the therapist gained insight to the woman's frustrations via a psychotherapeutic picture she drew reflective of her feelings. The picture is the projection of a woman with no mouth, tears falling from her eyes, surrounded by the phrases: "I'm alone, I'm behind, I'm mad, I'm trapped, I'm confused" (p. 78). A thick frame labeled a "permanent wall" alongside a large question mark with a statement inside that reads: "I am not a computer, I must have died because this isn't living" enclosed the drawing (p. 78). Such a description urges one to wonder how many patient scores that indicate debilitation are actually reactions to subjective negligence? This demonstrates the practical utility of applied psychophysics in neuropsychiatry. Prigatano (1999a) concludes of the aforementioned patient:

> Her drawing reveals that brain injury not only affects thinking, it also affects emotion and motivation substantially. The patient was overwhelmed by her brain injury and felt belittled by those who wished to videotape her in a manner that she perceived as insensitive. By the therapist accepting her feelings and not forcing her to do something that she was emotionally unprepared to do, she not only completed her course of rehabilitation but eventually obtained training that allowed her to work in a very productive manner.
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> P. 78

For effective TBI rehabilitation, the patient must be assessed and understood by neuropsychological and phenomenological processes. As post-brain-injury self-awareness impairments are extensively measured, their limitation to a single explanatory model can be ineffective. Neural location of injury can be a helpful predictor of the type of self-awareness impairment that may emerge and is useful in creating a successful rehabilitation regimen. Rehabilitation, however cannot flourish under conditions in which patient experience ignored.

The patient must feel their personal experiences are acknowledged and significant to the therapist to establish the imperative motivation needed for recovery.

Prigatano maintains the importance of a phenomenologically psychophysical consideration of patients in the treatment of TBI. Combined with the theoretical consideration of the placebo effect, this argues for a phenomenological approach to Fechner's "inner" psychophysics. Indeed, the psychophysical event of experience, when viewed from the inside, must be taken as a phenomenological psycho-physical unfolding where both components are understood to be integral.

Conclusion

Fechner (1859/1966) has been useful in understanding the psychophysical event as it pertains to psychology. His mid-19th century method for understanding experience has been phenomenologized—that is, found considering both physical and psychological components of experience, combining them in a way that is understood to be intentional in nature. This goes for the classically physicalist rendering of psychophysics—i.e., "outer," as well as the contemporary neuroscientific perspective—i.e., "inner." In each, something new emerges in the psychophysical event of experience which cannot be traced exclusively to the subject nor to the object: its emergence can only be understood as the chiasm between subject-and-object. Phenomenological psychophysics must always consider the experiencing subject *and* the object of experience.

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