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Motivation, emotion regulation, and the latent structure of psychopathology: An integrative and convergent historical perspective☆

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ABSTRACT

Motivational models of psychopathology have long been advanced by psychophysiologists, and have provided key insights into neurobiological mechanisms of a wide range of psychiatric disorders. These accounts emphasize individual differences in activity and reactivity of bottom-up, subcortical neural systems of approach and avoidance in affecting behavior. Largely independent literatures emphasize the roles of top-down, cortical deficits in emotion regulation and executive function in conferring vulnerability to psychopathology. To date however, few models effectively integrate functions performed by bottom-up emotion *generation* system with those performed by top-down emotion *regulation* systems in accounting for alternative expressions of psychopathology. In this article, we present such a model, and describe how it accommodates the well replicated bifactor structure of psychopathology. We describe how excessive approach motivation maps directly into externalizing liability, how excessive passive avoidance motivation maps directly into internalizing liability, and how emotion dysregulation and executive function map onto general liability. This approach is consistent with the Research Domain Criteria initiative, which assumes that a limited number of brain systems interact to confer vulnerability to many if not most forms of psychopathology.

1. Introduction

Motivational accounts of psychopathology have a long history in the psychophysiology literature, but faded from prominence after the affective neuroscience revolution swept the field. Here, we suggest that (1) motivational constructs are as relevant as ever toward understanding psychopathology in the era of neuroscience and the Research Domain Criteria (RDoC), (2) motivation and emotion are inextricable aspects of behavioral function that were artificially separated in the history of psychology, (3) this separation yielded unnatural distinctions at both behavioral and neural levels of analysis that have impeded progress in our understanding of mental illness, and (4) re-integrating motivation and emotion represents a major advance in thinking. In demonstrating these points, we discuss the role of paradigm shifts in science, which sometimes unwittingly obscure causal mechanisms of natural phenomena. We present an historical account of motivation and emotion research in psychology, which illustrates how paradigm shifts have diminished the motivational perspective, even though it dovetails well with RDoC, neural systems accounts of mental illness, and the factor structure of psychopathology.

2. Paradigm shifts in psychopathology research

2.1. Advances and trends in science

It is a common misconception that the scientific method leads inexorably to improved understanding of natural phenomena. Kuhn (1962) noted this over 50 years ago when he described epistemological *paradigm shifts*, which comprise fundamental and often rapid changes to ways scientists measure, interpret, and/or conceptualize information. Paradigm shifts provide new ways of thinking about longstanding scientific connundra. Although some paradigm shifts advance science, as when Einstein's general theory of relativity supplanted Newton's theory of gravity, others stagnate and even impede scientific progress. This is especially likely in the social sciences, where levels of analysis are often pitted against one another (e.g., motivational vs. emotional; genetic vs. environmental; individual vs. cultural) in attempts to determine which is most relevant to understanding behavior. As a result, the history of psychopathology research is replete with paradigm shifts that have cycled between biological and environmental—sometimes following from political considerations rather than scientific discovery and innovation (see e.g., Rutter et al., 2006).

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Unlike theory testing in the hard sciences, where hypotheses can often be refuted with precise experiments, theories of psychopathology are difficult to falsify given the complexity of human behavior and its multiple determinants. Rather than being abandoned through refutation, theories of psychopathology therefore fade from prominence as their proponents retire or as the field loses interest and seeks new or recycled paradigms to explain mental illness. Thus, useful theories are sometimes jettisoned not because they lack explanatory power, but rather because they are no longer trendy. This can occur for a number of reasons, as described by others (e.g., Meehl, 1978). Motivational theories of psychopathology, which were prominent in the psychophysiology literature in the latter part of the 20th Century (see Beauchaine, 2001; Fowles, 1980, 1988; Gray, 1987), and are forerunners to the contemporary Research Domain Criteria (RDoC; see Beauchaine and Thayer, 2015), provide one such example. In sections to follow, we (1) briefly describe the history of such models and their fade from prominence despite clear and continued relevance to understanding diverse forms of mental illness; and (2) consider how motivational models of psychopathology dovetail with both emotion regulational and structural accounts of mental disorder. Such integration is consistent with the RDoC mission, and migrates psychopathology research away from excessive focus on description, as exemplified by the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2013), toward greater emphasis on explanation—a migration that occurs as any scientific discipline matures (e.g., Popper, 1985; see also Beauchaine and Cicchetti, 2016; Beauchaine et al., 2007).

2.2. Methods-driven research and biological reductionism

Some paradigm shifts in science follow largely from methodological innovation. For example, invention and widespread use of factor analysis to reduce large numbers of observed variables to limited numbers of individual differences generated foundational advances in psychometric theory, intellectual assessment, and measurement of both personality and psychopathology. Such advances could not have been realized through continued use of rational test construction. In psychopathology research, factor analysis and related but more advanced latent variable models have provided key insights into interrelations among mental disorders. As detailed in later sections, research on the latent structure of psychopathology—as evaluated in a number of population based samples of children, adolescents, and adults—invariably yields separate but correlated internalizing and externalizing factors, which confer common vulnerability to what have traditionally been considered to be different disorders (see e.g., Achenbach and Edelbrock, 1991; Krueger and Markon, 2006). Factor analytic techniques also form the backbone of behavioral genetics (see e.g., Plomin et al., 2013), and have generated important questions about mechanisms of common vulnerabilities to psychopathology, concurrent comorbidities of psychopathology, and heterotypic continuities among psychiatric disorders across the lifespan (e.g., Beauchaine and McNulty, 2013; Krueger and Markon, 2006). Such questions, some of which are discussed in this article, have only begun to be answered by behavioral scientists.

More recently, a major paradigm shift in psychology—the so-called neuroscience revolution—was also brought about by methodological innovation. Over the past two decades, neuroimaging has been used to interrogate central nervous system substrates and correlates of virtually all psychiatric disorders. This research has produced an inordinate amount of structural and functional data, the scope and detail of which is unparalleled in the history of behavioral science. Although the significance and continued promise of neuroimaging toward understanding etiology, specifying pathophysiology, and improving treatment outcomes is clear (e.g., Akil et al., 2011; Poldrack and Yarkoni, 2016; Weingarten and Strauman, 2015), imaging techniques have been exalted to such an extent that biological reductionism now pervades the field (see e.g., Beauchaine et al., 2017; Bergner, 2016). This paradigm shift is reflected in the ascendance of RDoC, which focuses primarily on neurobiology, with no explicit representation of or accommodation for context in shaping and maintaining behavior.

From a motivational systems perspective, human behaviors and their neurobiological substrates and correlates cannot be understood when decontextualized from relevant approach-approach, approach-avoidance, and avoidance-avoidance contingencies within which they emerge (e.g., Corr and McNaughton, 2016). Almost no form of psychopathology is characterized by atypical neural or peripheral responding to all classes of stimuli. Rather, behavioral maladaptation occurs when individuals experience atypical responses to either incentives, threat cues, and/or emotion evocation in core biobehavioral systems involved in approach/active avoidance motivation, passive avoidance motivation, and/or affect regulation, respectively (see Beauchaine, 2015a; Beauchaine and Thayer, 2015; Beauchaine et al., 2017; Neuhaus et al., 2015). Accordingly, stimulus conditions must be considered carefully when interpreting temperamental response tendencies, individual differences in personality, and vulnerabilities to psychopathology, and when devising effective experiments to assess central and autonomic nervous system substrates and correlates of mental disorder.

Although psychophysiologists have historically been careful in this regard (see e.g., Beauchaine et al., 2001; Brenner and Beauchaine, 2011; Brinkmann et al., 2009; Fowles, 1980, 1988; Iaboni et al., 1997; Richter and Gendolla, 2009), it is not uncommon outside the psychophysiology literature for stimulus conditions to be ignored when interpreting behavioral and neurobiological responses exhibited by those with psychopathology (for extended discussion see Beauchaine, 2009; Zisner and Beauchaine, 2016). Moreover, although some neuroimaging research on neural substrates of psychopathology is driven by functionalist theories of motivation and emotion (see Beauchaine, 2015a), a considerable proportion of such research is atheoretical (see e.g., Sternberg, 2007). Despite certain advantages, current trends toward "bottom-up" approaches to analyzing vast amounts of imaging data threaten to further isolate neural responses from their eliciting events. As already noted, the current zeitgeist in psychopathology research favors neurobiological explanations, often ignoring and even eschewing environmental context (Beauchaine et al., 2017). One purpose of this article is to describe a contemporary functionalist account of psychopathology that emphasizes emotional response biases to motivational cues encountered in local environments. A second purpose is to outline how such an account dovetails with the well replicated factor structure of psychopathology noted above.

2.3. Misguided searches for independent causes

A third impetus for paradigm shifts in psychopathology research follows from the implicit assumption that independent causal mechanisms of large effect size will eventually be identified for individual disorders. When such effects are not found, effective theories that explain limited portions of variance in key outcomes are sometimes abandoned in efforts to articulate new theories that specify major causes. Yet with the exception of behavioral genetics studies, which account for a preponderance of variance in many psychiatric phenotypes, effect sizes are almost always modest in psychopathology research. Furthermore, behavioral genetics studies do not identify causal mechanisms, and very little of the complex phenotypes they account for is explained by molecular genetic targets (Plomin, 2013). Progress in our understanding of multifactorially inherited phenotypes will therefore require careful assessment of causal influences across many levels of analysis, including interactions among multiple genes, genes and environments, physiological response tendencies and operant reinforcement contingencies, and neural mechanisms of motivation and self/emotion-regulation, to name a few (Beauchaine & Constantino, in press; Beauchaine and McNulty, 2013; Beauchaine and Zalewski, 2016).