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15 Motivation

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Motivation is a topic of relevance in all areas of human endeavor. Defined by what "moves" people into action, motivation concerns both the energy and direction underlying behavior. Yet, how motivation has been understood has varied greatly over the short history of scientific psychology. In fact, more than in many other areas of psychology, the field of human motivation has had a clear evolution of ideas that has to a large extent been empirically driven. New theories have emerged to account for limitations in their predecessors, allowing the field to become more sophisticated and explanatory with time.

In this chapter we trace this development of organizing ideas, their empirical dilemmas, and the emergence of new theories about what moves people to act. We begin with post-Darwinian speculations concerning instincts and drives as fundamental motivators of action. This scholarship was overtaken by the advent of behaviorism, which dominated motivational science for more than half of the twentieth century. Behaviorist drive and operant theorists provided broad and sometimes competing explanatory frameworks, although both focused on external reinforcements and their effects on behavior. Despite their empirical strengths, shortcomings in these theories spawned three streams of reactions that remain salient today. One is the "cognitive revolution" (Mahoney, 1974), which introduced a focus on the cognitive mediators such as expectancies, values, and attributions that connect environments and behaviors. A second is a turn away from a primary focus on external sources of motivation toward an understanding of inherent internal sources such as intrinsic motivation and psychological needs. A third is a reemphasis on evolutionary and biological psychology as foundations for motivational processes.

This history will be necessarily incomplete. For one thing, we will focus on big theories, rather than specific mechanisms and models, because these mechanistic models of how motivation works can typically be incorporated into larger theoretical frameworks. For example, there is much understood about the feedback loops associated with hunger and appetite, mechanisms that can be placed within more general drive theory frameworks. Second, many theories of motivation are popular and plausible, but not primarily built around empirical data or experimental studies. Some of these traditions such as psychodynamic psychologies and humanistic approaches will be only lightly treated here, as our focus will be on the ideas shaping the empirical sciences of motivation. In addition, rich traditions in the study of individual differences

such as achievement motivation (e.g., McClelland, 1961) and reinforcement sensitivity (Gray, 1971) will not be extensively covered. Third, motivation is currently a vibrant field, and in this modern landscape of research there are a number of active and competing theories of motivation, not all of which can be comprehensively treated. Our goal in this chapter is instead to outline the broad historical shifts in the landscape of human motivation science over time, and their implications for research, practice, and society. We begin with the speculations of early pioneers in motivation about instinctual mechanisms, and then turn to theories of motivation based in: physiological drives; external reinforcements; cognitive mechanisms; core psychological needs; and evolutionary foundations.

Early Motivation Theories

Perhaps a good beginning for this history of the science of human motivation is Charles Darwin's (1998) speculations concerning emotions and motivations to act. Darwin argued that humans have evolved emotional reactions that lead to or energize actions that have been adaptive. Sexual arousal, fear, and anger all have specific roles in activating behaviors such as reproduction, flight, or fight, respectively. In humans, vestiges of these instinctual reactions remain in facial expressions and bodily gestures, which often have a signal function to ward off or attract specific behaviors from others. In forwarding these ideas Darwin was locating the explanation of human motives in evolved instinctual reactions, providing a starting point for organismic thinking.

William McDougall (1923) was a prominent motivation scholar perhaps best known for his theory of instinct-based motivations that extended Darwinian ideas into psychology. He argued that when a creature is aroused by a physical need, it becomes purposively motivated toward a goal. He defined *motivation* specifically as the psychological impetus that gives rise to action, and he argued that motivation could be both measured and manipulated in scientific studies. He was a strong advocate of the idea that behaviors were goal oriented, even if individuals did not always consciously know their aims, a position that brought him into conflict with behaviorists whose theories eschewed goals and motives as explanations of behavior.

Robert Woodworth (1918, 1958) was another early motivation theorist who introduced what he labelled a *behavior-primacy theory*. Perhaps more notably, he is also credited with moving the field away from the concept of *instincts* to that of *drives*. He derived the concept of drive from observing the inventions of his time such as the automobile. As he stated: "I got it from mechanics. . . . The 'drive' of a machine is the supply of energy that puts it in motion" (see Young, 1936, p. 71).

In Woodworth's view, drives activate both innate and learned mechanisms within the organism, which then steer actions. Many drives were seen as specific in their focus, although Woodworth also emphasized the organismic

importance of behavior that is connected simply to the "pleasure of being a cause." He argued that such spontaneous behaviors are part of our "native equipment to be active in a motor way, as well, indeed, as in the way of exploration" (1918, p. 50). He thus anticipated the much later work of White (1959) in suggesting that much human behavior is directed toward having effects on one's environment, and further, that drive-based motives are better conceived of as often interrupting such activities, rather than being the drivers of them. Woodworth (1958) argued that without an exploratory tendency that is stronger than anxiety, animals (including people) would be paralyzed in new circumstances.

To Woodworth, phenomena such as curiosity, constructiveness, and self-assertion are pursued as their own ends, but they also provide satisfaction of other general motives. He also argued that motives such as pursuing a reward or avoiding a punishment may initiate behaviors, but "only when it is running on its own drive . . . can (it) run freely and effectively." This notion corresponds to what Allport (1937) would later describe as *functional autonomy*.

The Behaviorist Movement

The early work of thinkers such as McDougall, Woodworth, and others was soon eclipsed by a movement that would dominate much of twentieth-century motivational psychology, namely, *behaviorism*. Behaviorists were in many ways nonmotivational theorists – viewing behavior as a function of external contingencies rather than internal instincts, drives, needs, or desires. Their focus was on environmental (and therefore manipulable) factors that are controlling behavior rather than forces or mechanisms inside the "black box" of mind.

Schooled in functionalist thinking at the University of Chicago under John Dewey, John Watson argued in contradiction to his mentor that behavior rather than mind was the true subject matter of scientific psychology. Explanations of behavior, he argued, need not implicate consciousness, goals, or motives (Watson, 1913). Instead, he advocated direct observation of behaviors emitted in response to the experimental manipulation of hypothesized causes. From this starting point, Watson argued that animals – humans and other species alike – adjust to their environments with habit mechanisms through which responses are linked to varied stimuli. This, of course, placed relatively little emphasis on the nature of drives or needs pertaining to any specific species.

In fact, Watson's framework emphasized the plasticity of organisms, including humans. In addition, his theory concerning what prompts human behaviors was quite simple. The more frequently, or more recently, a stimulus has been paired with a response, the more probable its occurrence. Presumably all the potential stimulus–response ("S–R") connections already exist in the brain – what the pairing does is activate and strengthen these connections.

Watson's work depended on the assumption of already existing associative pathways, which works well for explaining automatic or reactive behaviors.

Edward Thorndike's (1913) work went beyond that of Watson by specifying a means through which new habits and responses can be acquired, and that could explain learned "voluntary" behaviors. Thorndike proposed the *law of effect*, asserting that if a given behavior is followed by a *satisfier*, the likelihood that the behavior will recur is enhanced (i.e., a habit will be strengthened). If the behavior is instead followed by an *annoyer*, its likelihood should decrease.

Watson was critical of the mentalism conveyed by Thorndike's satisfier and annoyer concepts, even as Thorndike worked to define these behaviorally. However, Watson and Thorndike were in common critical of Dewey's functionalist theory and argued that behaviorism, with its focus on stimulus events and observable behaviors, was the only true functionalism: behavior was understood as a direct function of external stimuli and, in the case of Thorndike, the application of observable reinforcing events.

The Emergence of Drive Theory

The work of Clark Hull was focused on the mechanisms underlying this strengthening of behaviors through reinforcement. Hull was interested in *why* some connections are made and habits formed, and others not. Specifically, Hull predicted the kinds of events that would be reinforcing were those that would reduce the arousal brought about by drives. According to Hull (1943), these drives stem from four basic physiological needs: food, water, sex, and pain avoidance. These physiological needs give rise to drive states, and behaviors that have returned the organism to equilibrium – that is, that have reduced the drive state – are those that are reinforced.

Within Hull's theory, the concept of *secondary reinforcement* explains much of the behavior of organisms. Whereas anything that directly reduces one of the four drives is considered a primary reinforcer, an object or event that is paired with a primary reinforcer may itself take on reinforcing properties, becoming a secondary reinforcer. To be effective, a secondary reinforcer must periodically be re-paired with primary drive reduction; otherwise its capacity to reinforce will dissipate over time.

Operant Theory

Operant psychology, unlike drive theory, is not concerned with the nature of drives. Indeed, B. F. Skinner (e.g., 1953), the originator of operant approaches, was critical of any interest in motives, drives, or other events "internal to the organism." Instead his focus was how rates of responding change as a function of the external and observable consequences of behaviors. Certain external consequences increase the rate of responding, and are thereby considered *reinforcements*. Reinforcements may be positive (if their presence increases the probability of responding) or negative (if their removal increases the probability of a response). When a reinforcing event is terminated, the frequency of behavior returns to its prereinforcement level of frequency, a process he referred to as *extinction*.

As noted, unlike drive theories such as those proposed by McDougall or Hull, Skinner's operant approach was in a principled way not concerned with the properties of what activates or reinforces organisms; instead it emphasized the functional effects of external events. This is not to say that certain types of events, such as food, were not predictably reinforcing, even on first presentation to an organism, especially if the organism had been deprived. Yet, other reinforcers seem to acquire their reinforcing value over time. Skinner referred to these as *conditioned reinforcers* (similar to Hull's secondary reinforcers), suggesting that a stimulus can take on reinforcing properties through being paired with an already effective reinforcement. Money is a prime example of a conditioned reinforcer for humans. Skinner (2003) even once described how human behavior can be readily controlled by that "universal generalized reinforcer, money" (p. 62), presumably because money has for most of us been so frequently paired with primary reinforcers.

Because behaviors that recur were thought to be invariantly "under the control of" reinforcement processes, research focused on the most effective schedules of reinforcement for increasing and maintaining response rates over time. Although in this operant view the organism's behavior is largely controlled by external events, there is nonetheless an active motivational idea within this theory, namely, the *operant*. As the term suggests, Skinner understood that organisms spontaneously "operate" on their environments. However, these operant behaviors are treated as essentially random outputs, rather than as systematic or purposive events. These random outputs are then essentially "selected" by the contingencies of reinforcement in the environment, shaping the patterns of human behavior.

Given theories to come, it is worth highlighting that within Skinner's behaviorism, animals (including humans) do not behave *in order to* get reinforcements; rather they emit behaviors that were reinforced in the past. This is a critical point, because the idea of doing something in order to obtain a reinforcement requires that cognitions and goals be given a causal (mediational) role in the analysis of behavior, an issue that would violate Skinner's functional methodology. As we shall see, this issue is what distinguishes social cognitive and expectancy theories (e.g., Bandura & Walters, 1963; Rotter, 1954; Vroom, 1964) from operant theory.

Operant theory and motivation. Strictly speaking, there are *no* motivational concepts within operant theory, although in practice they are implicit within the approach. Reinforcers are simply defined as events that change the rate of responding, not as objects of goals, motives, or needs. Similarly and formally, there is no concept of *rewards* within operant theory, because the very idea of a reward carries mentalistic connotations of desirability.

Further, in operant theory there are also no concepts for autonomous or intrinsic motivations. In part, this stems from the technical definition of *reinforcement*, which is operationally defined as an external event that is separable and distinct from the behavior itself (Skinner, 1953). Because reinforcements must by definition lie in the external environment, any notion of rewards

that are inherent in behavior is anathema (Deci & Ryan, 1985). The concept of *intrinsic motivation* – that is, spontaneous behaviors done for their own sake, as Woodworth had imagined – is rendered in the operant view an obscure idea, referring only to behaviors for which the contingencies of reinforcement have not yet been identified (e.g., Carton, 1996, Flora, 1990).

Drive and operant theories. There are noteworthy similarities and differences between the behaviorist drive and operant approaches. In both the concept of reinforcement is seen as essential for acquiring habits or recurring actions. However, in drive theory, reinforcement is defined in terms of drive reduction, and in operant theory, reinforcement is defined only functionally, in terms of whether an external event alters the rate of responding. In this sense, Hull was concerned with the "nature" of the organism and with motivation, whereas Skinner was, in principle, not concerned with either. Another similarity is that both theories allow for initially neutral stimuli to become reinforcers. In Skinner's theory, a conditioned reinforcer is defined functionally – that is, an event that did not initially affect response rates acquires the characteristic of affecting response rates – whereas in Hull's perspective, a secondary reinforcer is defined by having been paired with drive reduction. Finally, both of these frameworks guided substantial research programs that commonly highlighted an important fact: under specified circumstances, and with seemingly few exceptions, behaviors *can* be brought under the control of external reinforcements.

Well into the mid-twentieth century these two behaviorisms successfully framed the outputs associated with motivation as being primarily, if not wholly, a function of external contingencies of reinforcement. However, all was not at ease within the sciences of motivation. As mentioned earlier, three movements emerged in reaction to this dominant behavioral view that challenged its relative explanatory power, and set the stage for today's motivational sciences. One was the *cognitive movement* within behaviorism resulting in social cognitive or cognitive-behavioral theories of today. Second was a movement away from physiological drives to *psychological needs* as motivating much human behavior. Third was a renewed interest in *evolved mechanisms* that potentiate motives and structure social behaviors. We review each of these movements in turn, all of which pointed motivational researchers to look inside the "black box."

The Cognitive Movement in Motivation: Expectancies and Efficacy

Edward Chase Tolman may perhaps be the most underrated theorist in the history of motivation. In the heyday of behaviorism, he not only recognized, but also compellingly showed how to operationalize the cognitive intervening variables of which behavior is so often a function. Tolman traversed in the idea that behavior was goal-oriented and purposive, and its occurrence was affected by expectations of reinforcements. He showed, for example, how rats, trained to efficiently run a maze, will run into a wall if the path is suddenly shortened,

betraying an "expectancy" and a "cognitive map" of their territory. Rats also demonstrated *latent learning* of their domains, which can be made evident once reinforcement calls forth specific goal-directed behaviors. In fact, for Tolman *learning* goes on all the time, even without specific reinforcement, whereas specific behaviors are elicited by reinforcements. Tolman thus introduced, and powerfully supported with ingenious experiments, the importance of cognitive mediators such as expectancy, as well as the distinction between learning and performance.

Tolman also importantly focused on *molar behavior* – the sequence of organized actions leading to a goal object. He argued that a goal is not simply a mentalistic inference – it can be inferred by persistence, docility, selectivity, and more generally the equifinality of animal behavior (see Heckhausen, 1991). His focus on molar behavior has been widely emulated since.

Yet, if there was to be a "cognitive revolution" within the field of behaviorism, it awaited the work of Julian Rotter. Rotter (1954) set off this revolution by asserting that it is the expectancy (E) of reinforcement that determines the probability of responding. One must believe that one's behavior can affect an outcome in order to act. Although Rotter agreed that reinforcement strengthens expectancies, he showed that changes in expectancy can alter probabilities of response independent of actual histories of reinforcement. Second, Rotter emphasized that *reinforcement value* (RV) also matters. Indeed, both E and RV represented critical *cognitive mediators* between the environment and behavioral responses.

Rotter most famously created the construct of an *internal locus of control* to describe an individual's belief that he or she can reliably obtain a desired outcome by behaving. Factors adding to an internal locus of control would enhance motivation, and the likelihood of effort toward the outcome. In contrast, an *external locus of control* is experienced when a person believes that he or she cannot reliably obtain an outcome. One's history of experiences with locus of control eventually leads to *generalized expectancies*, or individual-difference expressions of these expectancies that affect a person's motivation more globally.

The strong negative impact of an external locus of control is also the phenomenon known as *learned helplessness*. Popularized by Martin Seligman (1975), learned helplessness is a motivational state of passivity and unresponsiveness. It results, as Seligman showed experimentally, from exposure to conditions in which outcomes (particularly aversive ones) are neither predictable nor controllable. Such conditions create a learned, negative-affective experience of helplessness that diminishes one's motivation to act.

Albert Bandura significantly contributed to this cognitive revolution within behaviorism by establishing two fundamental points beyond Rotter. First, like Tolman before him, Bandura showed that learning was occurring even without direct reinforcement. Vicarious learning and modelling represented mechanisms for acquiring new behaviors beyond the direct reinforcement processes specified by Skinner.

Second, Bandura argued that there is an internal experience of efficacy that accompanies effective, reinforcement procuring, action. This feeling of *self-efficacy* takes on reinforcement properties of its own. Self-efficacy, the belief that an action can reliably affect an outcome, thus becomes a cornerstone of Bandura's (1997; Bandura & Walters, 1963) social cognitive theory of motivation.

The social cognitive, self-efficacy theory, like Rotter's approach, places expectancies at its core. Efficacy expectations refer to the extent to which an individual believes that she or he has the capacity to do a behavior that is reliably linked to a desired outcome. Greater efficacy expectations influence the likelihood a person will enter a situation where there are behavior–outcome contingencies and how persistent his or her efforts will be. Motivation is thus mediated by expectancies and efficacy beliefs.

It is important to note that, within social cognitive theory (SCT), motivation is a unitary construct; one has more or less motivation as a function of efficacy expectations. Also salient is that SCT is to a large degree an "empty" organism theory. Like operant behaviorism from which it was spawned, modern SCT does not differentiate types of motivation and does not focus on or prioritize any specific contents of human nature or needs, with the exception of competence. Rather motivations are viewed as learned or acquired such that any outcome that is desired and that the person feels able to attain will have similarly positive consequences in terms of satisfaction and well-being.

These assumptions of cognitive mediation for expectancies and efficacy reign not only in SCTs, but also in expectancy-value theories (e.g., Vroom, 1964; Wigfield & Eccles, 2000). In a nutshell, expectancy-value theories identify two key factors that influence behavior: the degree to which individuals believe they will be successful if they try to attain an outcome (expectancy), and the degree to which they perceive that the outcome has personal importance, value, or interest (value). Expectancy beliefs can be both general (e.g., global self-concept) or task specific (Wigfield & Eccles, 2000). Studies in schools, for example, show that expectancy beliefs predict both engagement in learning activities and learning achievement (e.g., test scores and grades). Expectancy of success can even exceed past performance as a predictor of success.

John Atkinson (1964) dove especially deeply into achievement motivation, attempting to bring a mathematical rigor to his theorizing. Atkinson proposed that strength of motivation was a multiplicative function of motive, expectancy (subjective probability of success), and incentive. Where Atkinson differed from traditional expectancy value approaches was his conception of motives. Rather than focusing only on drives or external rewards, Atkinson measured motivation as a disposition for a certain kind of satisfaction, such as achievement (McClelland, 1961) along with situational incentive. He also assessed motivation to avoid failure as a countervailing force to approach motivation. Those high in achievement motivation value success and are not compromised by fear of failure. Atkinson further proposed that greater value from success intrinsically results from undertaking more difficult tasks. His work set the stage for

contemporary theories of achievement goal pursuits (Murayama & Elliot, in press).

Beliefs and expectations regarding efficacy and success are also central to the *attributional approach* of Bernard Weiner (1986). In this cognitive perspective emphasis is especially placed on causal attributions as affecting motivation, or the person's understanding of what causes outcomes such as success or failure to attain a goal. For example, consider an individual who fails at a goal. He or she may attribute that failure to a number of factors including lack of ability, lack of effort, or chance. Attributing the failure to low ability would likely lead to less subsequent motivation, because ability is a stable attribute, not likely to change. In contrast, attributions of low effort can support positive expectancies, because one's effort can more readily be changed. Because motivated behavior depends upon a belief in the controllability, such adaptive attributions enhance the key proximal determinant of acting – namely positive expectancies.

Cognitive mediation and attributions are similarly the core elements in work by Carol Dweck (2006) on *mindsets*. According to this model, motivation is dependent on the belief or attribution that trying matters. Dweck describes an incremental or *growth mindset* in which people believe that effort will impact performance. In contrast she describes an entity or *fixed mindset* in which people believe that abilities are predetermined, and one cannot change outcomes or one's standing through effort. Based on this conceptualization, interventions focus on changing or manipulating maladaptive mindsets, which are assumed to be malleable and thus changeable.

Inner Sources of Regulation: Intrinsic Motivation and Psychological Needs

We now turn to a second "response" to the behaviorist framework, namely the emergence of a focus on intrinsic motivation, and more generally the internal or inherent psychological needs that often drive human behavior.

Ironically, it was behaviorist theories that gave rise to the first empirical studies of *intrinsic motivation*. In particular, researchers increasingly uncovered behaviors that were not well explained by drive-based or reinforcement processes. For example, Nissen (1930) observed that rats would cross an electrified grid to get into a novel maze area. There was no clear explanation for this behavior within the Hullian framework; the grid crossing would increase rather than reduce arousal and pain, and the novel space had not been previously paired with reinforcements. Subsequently, Butler (1953) showed that rhesus monkeys would learn discrimination problems simply for the opportunity to visually explore the environment, without other drive-related reinforcement. Montgomery (1955) afforded drive-sated rats a choice between exploring a maze area or returning to their nests. They showed a preference for exploration, even though it had not been paired with primary reinforcement and presumably "cost" energy. Harry Harlow (1953) reviewed experiments that rhesus monkeys would solve

discrimination tasks for the sole reward of being able to manipulate novel objects. He noted that this "manipulation drive" was highly resistant to extinction. These and other studies were pointing to spontaneous activities that did not seem to be a direct function of external reinforcements or drive reduction.

Harlow (1950) is, in fact, the first scientist we know of to have used the term *intrinsic motivation*. He did so in the title of a report: "Learning and satiation of response in intrinsically motivated complex puzzle performance by monkeys," in the *Journal of Comparative and Physiological Psychology*. Here Harlow reported on observations of how primates' exploratory behaviors often persisted without reinforcement, and did not show the typical properties of drive reduction.

Drive-theory accounts. As researchers such as Harlow suggested that orthodox drive and operant theories could not explain curiosity and exploratory behaviors, others attempted to provide accounts of such behaviors that required minimal or no change to the basic drive theory. One account held that novel stimuli are anxiety provoking, and because anxiety is painful, exploratory behaviors reduce such pain and reinforce the behaviors (Brown, 1961). However, the most obvious response to anxiety provoking novelty would be to avoid it rather than explore it. Moreover, fear inductions were found to generally reduce tendencies to explore (Montgomery, 1955), whereas, as Harlow (1953) reported, animals facing novel stimuli typically display excitement rather than fear. Thus, it seemed that anxiety reduction did not provide a very satisfactory account of exploration.

Other drive-theory accounts of exploration used the concept of secondary reinforcement. Here the idea was that exploring novel spaces can lead to primary drive reduction (e.g., food is found), and thus exploration takes on secondary-reinforcing properties. But this does not explain the fact that animals exhibit persistent curiosity and exploratory urges soon after birth, before meaningful chances to be paired with drive reduction. Further, as Butler (1953) demonstrated, exploratory or curiosity behaviors show high resistance to extinction, and appear to function more like primary reinforcers.

A final attempt at explaining, within the confines of drive theory, exploratory-type behaviors, was *drive naming*. Candidate drives included an *exploratory drive* (Montgomery, 1952), a *visual-exploration drive* (Butler, 1953), a *manipulation drive* (Harlow, 1953), and a *boredom-avoidance drive* (Isaac, 1962). But the problem with these approaches, other than their ad hoc nature and lack of parsimony, was that positing new drives such as these would require a major change in the definition of drive. These new "drives" were not based in tissue deficits like Hull's physiological needs, and did not necessarily energize behaviors that resulted in any known drive reduction. As Hebb (1961) summarized it, "Emphasis on biological needs seems to limit animal motivation too narrowly" (p. 179).

An Alternative: White's Effectance Motivation

After a decade of controversial research on exploration, curiosity, and play, Robert White (1959) contributed a seminal paper arguing that accounts of such

behaviors based on the physiological needs (or drives) were not compelling, nor were accounts based on operant models. He suggested an alternative idea, namely that behaviors could be derived not only from physiological drives, but also from *innate psychological tendencies*. White summarized one of these tendencies under the concept of *competence*. Referring to the competence motive as *effectance motivation*, White suggested that it involves the feeling of satisfaction and pleasure in producing effects and developing capacities, and it was manifest in curiosity, play, and exploration. White further suggested that such competence-promoting activity "satisfies an intrinsic need to deal with the environment" (1959, p. 318). He thus set the stage for an enormous amount of subsequent work, not only on competence but also on other basic psychological needs (e.g., Deci & Ryan, 1985).

In this thesis, White was echoing themes voiced decades earlier by Groos (1898), Woodworth (1918), and others, but seemingly ignored by the behaviorists, that being curious about and exploring one's world is a natural motive. Although it has important developmental and adaptive consequences, this motivation is supported by experiences of interest and enjoyment – the inherent pleasure of engagement and proactivity – rather than by any instrumental goals or reinforcement consequences. This idea that the very *enjoyability* of certain proactive, assimilative, and relational tendencies can itself yield selective advantages is one central to many modern perspectives (see Ryan & Deci, 2017).

White's (1959) ideas fell so far outside the boundaries of the behavioral theories that dominated psychology at the time that Hilgard (1987) proclaimed White's paper to represent the end of motivation as a field. However, a different view is that, rather than extinguishing motivation theory, White was refocusing it on its proper object – namely, the active organism, liberally endowed with propensities to engage its environment. White's theory of effectance motivation represents the theoretical forerunner of theories of *intrinsic motivation* as well as other psychological-needs based formulations of motivated phenomena (e.g., Deci & Ryan, 1985; Elliot, McGregor, & Thrash, 2002; Harter, 1978). The idea that actions emitted by organisms can be inclined by inherent satisfactions may have marked the end of the dominance of behaviorist theories of motivation, but it was the starting bell for a new era in the science of human motivation.

Before going into more depth on the intrinsic motivation and psychological need theories, we briefly address another component of White's (1959) work. In addition to addressing how the empirical development of motivation using experimental methods took the field from drives to psychological needs as basic energizers of behavior, he also pointed out a parallel history within psychoanalytic theory. Specifically, he pointed out that psychoanalytic theory initially used the concept of drives (trieb) – especially the sexual and aggressive drives – as primary motivators, from which other secondary motives are derived. But psycholanalytic observers and scholars increasingly had difficultly using these drive concepts in explaining healthy development. In normal development, motivational processes such as curiosity, manipulation, and exploration, are generally "conflict free" and do not seem dependent on drive gratifications.

Even using the concept of neutralized libidinal energy, as Hartmann (1958) did, or the idea of naming a new instinct – the instinct to master – as Hendrick (1942) did, was not enough to explain healthy development satisfactorily. This led White (1963) to propose that humans have an *independent ego energy* that is not derivative of id processes or physiological drives, and is similar to what was referred to as intrinsic motivation within empirical psychology. Thus, as in experimental psychology, White was moving the field of motivation within psychoanalytic theory toward intrinsic motivation and basic psychological needs (see esp. White, 1963).

Richard de Charms (1968) extended White's theorizing on intrinsic motivation in his classic work *Personal Causation*. Here he agreed with White that persons who are intrinsically motivated feel efficacy and agency. Looking further at the concept of agency using the attributional terminology of Heider (1958), de Charms argued that people who are intrinsically motivated have an *internal perceived locus of causality*. They see themselves as self-regulating – or causing their own actions. In contrast, de Charms argued that any factor that detracted people from this feeling of being an "origin," or that led them to experience an *external perceived locus of causality* would undermine intrinsic motivation. In doing so de Charms argued that people have a primary propensity to be origins of their own actions, thus articulating a need for autonomy and self-regulation.

The ideas of both White and de Charms were put to work in several experiments on intrinsic motivation in humans that changed the focus of motivational research in the early 1970s. In a series of experiments, Edward Deci (1971, 1972) showed that rewarding participants for doing something interesting led to an undermining of subsequent "free-choice" behavior depending on what the rewards were or how they were applied. If rewards (e.g., praise) signified an increased sense of competence, intrinsic motivation would be maintained. If rewards signified external control, intrinsic motivation was undermined. Thus rewards affected intrinsic motivation as a function of how they were related to psychological needs for *autonomy* (i.e., perceived locus of causality) and *competence* (i.e., effectance).

Important in this work was that Deci used a behavioral "free choice measure" that became a standard in the field (see, e.g., Lepper & Greene, 1978). More importantly the studies showed how volitional motivation could be studied, manipulating not rewards and punishments, but rather conditions supporting or thwarting basic psychological needs like autonomy or competence.

Subsequently Deci and Richard Ryan (Deci & Ryan, 1985; Ryan & Deci, 2017) developed *self-determination theory* (SDT) from these roots. Specifically, SDT distinguishes multiple forms of motivation that vary in their relative autonomy (or as de Charms described it, their perceived locus of causality). Some behaviors are externally controlled, others more willingly or autonomously done, impacting persistence and quality of performance. SDT further posits that people have basic psychological needs for autonomy (to be

volitional), competence (to feel effective), and relatedness (to experience care and belonging). Supports for these three need satisfactions are associated with well-being and more autonomous forms of motivation, including enhanced intrinsic motivation. Rigorous experimental and controlled-intervention studies have widely supported the importance of both autonomy and support for basic needs in enhancing motivation, performance, and wellness. Indeed, SDT research has shown across diverse life domains, including parenting, education, work, health care, sport, and exercise, that when social environments are supportive of these three basic psychological needs, people in those settings benefit significantly in terms of wellness and motivation.

Mihaly Csikszentmihalyi (1975) introduced the concept of *flow* to describe the state of optimal challenge during intrinsically motivated activities. The flow model is distinguished by its focus on phenomenology – what the person is experiencing while engaged in an activity for its own sake (Nakamura, Tse, & Shankland, in press). Research by Csikszentmihalyi and colleagues that began in the 1970s suggested that people are intrinsically motivated when they enjoy a focused immersion in what they are doing. The flow state – "the holistic sensation that people feel when they act with total involvement" (Csikszentmihalyi, 1975, p. 4) – is also described as an *autotelic experience*, insofar as the goal of behavior lies within the activity itself.

Other contemporary models and theories of motivation have been spawned around various psychological needs and motives. For example, in their *sociometer theory*, Baumeister and Leary (1995) posited that self-esteem, an accessible human feeling, serves as the internal barometer of a fundamental need for belonging. Andrew Elliot et al. (2002) developed a theory of mastery and performance achievement goals that is premised on the basic psychological need for competence, as well as Atkinson's focus on approach and avoidance motivations. In terror management theory (Greenberg, Pyszczynski, & Solomon, 1986), people are focused on gaining relatedness and self-esteem, in large part to defend against the awareness of death that humans inevitably face, and the anxiety it engenders. This existential approach thus posits a psychological dynamic basis for human actions.

Clearly, inner causes are no longer taboo, and instead a central focus of many of today's theories of motivation is on psychological needs and motives. Additionally, there is a strong interest in *self-regulation*, people's capacity to internally regulate motivation, that now accompanies the perennial interest in vulnerabilities to external control. Rather than motivations merely being "driven" by spontaneous instincts, or "caused" by environmental events, in self-regulation models the focus is on how individuals can organize and direct their energies, as well as protect themselves against both external controls and inner impulses that can otherwise drive behavior. This focus on self-regulation includes work by Roy Baumeister and colleagues on *ego-depletion* (see review by Muraven, 2012), and how effortful demands on the regulating self can deplete the psychological resources needed to regulate motivations and impulse. It is also evident in work by Julius Kuhl and colleagues, who

developed *personality systems interaction* theory to describe integrated self-regulation and factors that deplete, divide, or disrupt it (e.g., see Kuhl, Quirin & Koole, 2015). And certainly our work on self-determination theory mentioned earlier (Ryan & Deci, 2017) is concerned with both regulation of behavior by the self, and the psychological need-supports required to sustain it.

In sum, decades of careful experiments under the framework of behaviorism had shown that well-managed contingencies of reinforcement could control much behavior. Yet, this near exclusive focus on external sources of control led behaviorists to neglect investigations of other "naturally occurring" sources of motivation and of motivational regulation. Although behaviorists showed convincingly how external reinforcements *can* control behavior, from this it did not follow that all (or even most) behaviors *are* controlled by external reinforcements (McCall, 1977). Many motivations can arise instead from internal propensities toward competence, growth, and assimilation. This second "response" to behaviorism's shortcomings was expressly concerned with these internal sources of motivation – initially intrinsic motivation for play and exploration, and subsequently other basic psychological needs and propensities of individuals such as striving for belonging, esteem, competence, or autonomy. Today's field of motivation is thus no longer focused exclusively on environmental control, and to the contrary is more concerned with regulation by the self and the need satisfaction that supports it.

Before moving on to the third response to behaviorism concerning evolutionary psychology, we cannot neglect another well-known advocate of basic psychological needs, namely, Abraham Maslow. Maslow (1970) directly responded to behaviorism with the idea that people's motivation is shaped by a fundamental drive for self-actualization. He specifically proposed a *hierarchy of needs* in which there were two types of needs, *deficit needs* that are primarily physiologically based, and *growth needs* that are primarily psychological. Among the first are thirst and safety, and among the second are love and self-actualization. A primary postulate of his theory is that people must satisfy their lower-order deficit needs before the higher-order growth needs will be salient. Despite the popularity of the hierarchy concept, empirical support for the model has not been vigorously pursued.

Another well-known needs approach stemming from this same period is the *personological tradition* that is based in the work of Henry Murray (1938) and David McClelland's (e.g., 1961, 1975), among others. These theories focus on central human needs or motives such as those for achievement, affiliation, and power. Individuals are thought to differ in *need strength* as a function of both learning history and basic temperament. For example, one person's affiliation motive may be strong, whereas another may not care about social connections. Researchers in the personological tradition see these individual differences in need strength as moderating many motivational processes, and generating patterns of personality and behavior over development (McAdams, 1993).

Evolutionary Psychology and the Foundations of Motivation

A third response to behaviorism's explanatory gaps was the emergence, albeit slowly, of an evolutionary psychology, alongside a renewed focus on the mechanisms within the brain that may constrain, modify, or activate various motivations. John Tooby and Leda Cosmides (1992), who were early champions of evolutionary psychology, were specifically critical of the largely behaviorist and social learning theory assumptions that organisms were largely "black boxes" that could be made to do almost anything. Tooby and Cosmides even dubbed this assumption of plasticity the "standard social science model" (SSSM) because it seemed so pervasive in the field.

Evidence that there were strong constraints on the malleability of behavior was nonetheless pointing away from the SSSM. The first exceptions to this "blank slate" view of organisms were studies showing difficulties in reinforcing and sustaining actions that ran against the grain of instinctual behaviors (e.g., see Breland & Breland, 1961; Garcia & Koelling, 1966). These *instinctual drifts*, as they were labelled, were generally considered to be anomalies of neural wiring within behaviorist circles, rather than a central theoretical problem (Schwartz & Lacey, 1982). But such phenomena highlighted the idea that there were evolved, species-specific propensities to perceive and to react that are not so plastic. Also well-known were the challenges of psycholinguist Noam Chomsky (1959) to the blank slate view of language learning posited by operant theory. Language behaviors, it appeared, could not be acquired and generated simply through the processes of reinforcement. Native equipment and propensities were required.

There were also species-specific universalities. In the 1970s, Paul Ekman (1972) assembled evidence that humans universally share at least five basic emotions: fear, sadness, happiness, anger, and disgust. He and other motivation and emotion theorists (e.g., Izard, 1977) further argued that social emotions, such as shame, pride, and retributive sentiments, evolved to motivate social behaviors that were adaptive within small groups. Others argued for an evolved sensitivity of self-esteem, to provide an estimate of one's status and motivate social bonding (Baumeister & Leary, 1995).

Work by David Buss (2016) applied evolutionary thinking to the behavioral psychology of mating strategies, and especially to gender differences in selection preferences and strategies for mate retention. Such gender differences, especially when universal, provide evidence of the relation of biological design to motives, aims, and goals. This work helped to establish the idea that evolution provides menus of strategies for different adaptive problems, and an elegant complexity of design especially in an area as central to adaptation as reproduction.

Yet evolutionary psychology also pertains to motives and behaviors that are, on the surface, only distantly connected to reproduction per se. Recent work on prosocial motivation and its placement within evolutionary thinking illustrates this. For a long time the focus of evolutionary psychology thinking was on selfish behaviors, largely because of their prima facie connection to survival.

But in fact adaptation within groups is also enhanced by propensities toward cooperation and helpfulness, as emphasized in the work of D. S. Wilson (2003) and others. Experiments now suggest that even prosocial or "helping" behaviors may be intrinsically motivated, such that the inherent satisfactions associated with helping support this potentially adaptive class of activities (e.g., Warneken & Tomasello, 2008). Such research suggests not only that there are evolved propensities to behave in prosocial ways that have had adaptive value, but further that psychological satisfactions may have simultaneously evolved to support the expression of these interpersonal propensities (Ryan & Hawley, 2016).

The notion of any specific human nature (e.g., Woodworth, 1918), or even no human nature (Skinner, 1953), has accordingly been revised to understand there are multiple human natures, facets of which are contingently activated. Humans clearly inherited both a large set of tools for perceiving "what mattered" in the "era of evolutionary adaptation" (EEA), as well as propensities to react that are often environment contingent. In addition, however, there is increased attention not only to automatic mechanisms, but also to the evolution of self-regulatory capacities, and the social conditions that foster them (Biglan, 2015).

In short, evolutionary psychology represents another rich strand of work that in part grew in reaction to the more-empty organism, or "SSSM" view of human motivation that characterized both behaviorism and neobehaviorism. Perhaps only still in their adolescence, evolutionary psychology perspectives on the ultimate foundations of our natures will be essential to the field of motivation as it moves forward, especially given its needs for interdisciplinary consilience and explanatory breadth.

The Space of Contemporary Theories: Into the Black Box

As we have emphasized, the history of empirical motivation research was critically influenced by behaviorism, which dominated the field for more than a half-century. These behavioral approaches were rigorously theoretical as well as empirically testable. They showed compellingly that manipulating external contingencies of reinforcement could reliably affect motivation.

Nonetheless, attempts to understand the full range of human motivations by manipulating external contingencies ultimately revealed phenomena that could *not* be satisfactorily explained within these paradigms. We reviewed three strains of research that developed in direct response to specific weaknesses in behavioral theories: namely *social cognitive* theories, which addressed the role of expectancies and value; *psychological need* theories, which addressed internal motives that initiate or guide actions, and *evolutionary psychology* perspectives, which place proximal motivations within a larger biological perspective. Each of these themes is alive and well in motivation research today, alongside other theories focused on cognitive mediators and fundamental motives.

Ironically, the focus of motivation studies today is perhaps directly opposite to the one B. F. Skinner had so long ago warned against. Whereas Skinner cautioned against the search for inner causes and inner mechanisms as a distraction from identifying the "antecedent causes in the environment" (1953, p. 30) – the science of motivation is now intensely occupied with the "black box" of human motivation, both at the psychological and neurological levels. Researchers want to know the mechanisms, both experiential and molecular, through which actions are selected and regulated.

There are good reasons why empirically minded motivation researchers are no longer afraid of the dark inside that black box. Insofar as rigorous methods help illuminate new phenomena, motivation research is today armed with new methods and tools shedding light on inner processes. At the level of subjective experience, today's researchers have access to methods that allow sensitive tracking of change in both behaviors and "inner states" over time. Multilevel modelling, experience and event sampling, and refined longitudinal methods contribute to understanding of the day-to-day covariances in motivational processes and outcomes. At the level of biology, new methods for assessing cardiovascular and neurological processes associated with motivation are beginning to form a "two-way street" of inquiry between motivational and neuropsychological research (Reeve & Lee, in press). Neuropsychology researchers in the past relied almost exclusively on external reinforcement to catalyse and control motivation in the lab. Today's neuropsychologists are also mapping other types of motivational states and conditions, including some that are more logistically difficult to elicit (Di Domenico & Ryan, 2017). Understanding temporal changes in the areas of activation and arousal can help to detail the mechanisms underlying motivation, and their phenomenological and motivational correspondences. Finally at the level of cultures, the globalization of research now allows for cross-cultural comparisons to unveil what is culturally specific and what is universal about human motivation processes and goals.

Dewey, the American philosopher and behavioral scientist from whom Watson and Thorndike rebelled, once argued that there have been two opposing views that have long characterized approaches to motivation. On the one hand, said Dewey (1938), some theories depict motivation as stemming "from within" the organism – its drives, needs, and goals. On the other hand are theories that see motivation as something caused by forces "from without" (outside the organism). Just as Dewey described, we saw that early motivation theorists focused on instincts, and later on drives, as forces that come from within the person, providing the energy and direction for behavior. These approaches were displaced by a focus, especially within radical behaviorism, on exogenous sources of motivation as the fundamental causes of behavior.

Today's theories have largely moved beyond the polarity Dewey describes, and instead are engaged with the interactive dynamics between internal needs, motives, and capacities, *and* the contingencies external to the individual to

which they relate. It is an era of research marked by consilience – the convergence of evidence from multiple disciples ranging from biology to sociology. Such collaboration is required because several scientific disciplines have a stake in explaining human motivation, and a wide range of applied sciences must harness that knowledge toward improved social practice.

References

Allport, G. W. (1937). The functional autonomy of motives. In S. Chalmers & D. Manfred (Eds.), *Understanding Human Motivation* (pp. 69–81). Cleveland, OH: Howard Allen.

Atkinson, J. W. (1964). *An Introduction to Motivation*. Princeton, NJ: Van Nostrand.

Bandura, A. (1997). *Self-Efficacy: The Exercise of Control*. New York: Freeman.

Bandura, A., & Walters, R. H. (1963). *Social Learning and Personality Development*. New York: Holt, Rinehart and Winston.

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*, 497–529. https://doi.org/10.1037/0033-2909.117.3.497.

Biglan, A. (2015). *The Nurture Effect*. Oakland, CA: New Harbinger.

Breland, K., & Breland, M. (1961). The misbehavior of organisms. *American Psychologist*, *16*, 681–684.

Brown, J. S. (1961). *The Motivation of Behavior*. New York: McGraw-Hill.

Buss, D. M. (2016). *The Evolution of Desire: Strategies of Human Mating*. New York: Basic Books. (Original work published 1994)

Butler, R. A. (1953). Discrimination learning by rhesus monkeys to visual-exploration motivation. *Journal of Comparative and Physiological Psychology*, *46*, 95–98.

Carton, J. S. (1996). The differential effects of tangible rewards and praise on intrinsic motivation: A comparison of cognitive evaluation theory and operant theory. *Behavior Analyst*, *19*, 237–255.

Chomsky, N. (1959). Reviews: Verbal behavior by B. F. Skinner. *Language*, *35*, 26–58.

Csikszentmihalyi, M. (1975). *Beyond Boredom and Anxiety*. San Francisco: Jossey-Bass.

Darwin, C. (1998). *The Expression of the Emotions in Man and Animals* (3rd ed.). New York: Oxford University Press. (Original work published 1872).

de Charms, R. (1968). *Personal Causation: The Internal Affective Determinants of Behavior*. New York: Academic Press.

Deci, E. L. (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, *18*, 105–115.

Deci, E. L. (1972). Effects of contingent and non-contingent rewards and controls on intrinsic motivation. *Organizational Behavior and Human Performance*, *8*, 217–229.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. New York: Plenum.

Dewey, J. (1938). *Experience and Education*. New York: Macmillan.

Di Domenico, S. I., & Ryan, R. M. (2017). The emerging neuroscience of intrinsic motivation: A new frontier in self-determination research. *Frontiers in Human Neuroscience*, *11*, 145. https://doi.org/10.3389/fnhum.2017.00145.

Dweck, C. S. (2006). *Mindset: The New Psychology of Success*. New York: Random House.

Ekman, P. (1972). Universals and cultural differences in facial expressions of emotion. In J. Cole (Ed.) *Nebraska Symposium on Motivation, 1971*, (pp. 207–283). Lincoln: University of Nebraska Press.

Elliot, A. J., McGregor, H. A., & Thrash, T. M. (2002). The need for competence. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of Self-Determination Theory* (pp. 361–387). Rochester, NY: University of Rochester Press.

Flora, S. R. (1990). Undermining intrinsic interest from the standpoint of a behaviorist. *Psychological Record*, *40*, 323–346.

Garcia, J., & Koelling, R. A. (1966). The relation of cue to consequence in avoidance learning. *Psychonomic Science*, *4*, 123–124.

Gray, J. A. (1971). *The Psychology of Fear and Stress*. London: Weidenfeld and Nicolson.

Greenberg, J., Pyszczynski, T., & Solomon, S. (1986). The causes and consequences of a need for self-esteem: A terror management theory. In R. F. Baumeister (Ed.), *Public Self and Private Self* (pp. 189–212). New York: Springer-Verlag.

Groos, K. (1898). *The Play of Animals*. New York: Appleton.

Harlow, H. F. (1950). Learning and satiation of response in intrinsically motivated complex puzzle performance by monkeys. *Journal of Comparative and Physiological Psychology*, *43*, 289–294. https://doi.org/10.1037/h0058114.

Harlow, H. F. (1953). Motivation as a factor in the acquisition of new responses. In J. S. Brown, H. F. Harlow, L. J. Postman, V. N. T. M. Nowlis, & O. H. Mowrer (Eds.), *Current Theory and Research on Motivation* (pp. 24–49). Lincoln: University of Nebraska Press.

Harter, S. (1978). Effectance motivation reconsidered: Toward a developmental model. *Human Development*, *21*, 661–669. https://doi.org/10.1159/000271574.

Hartmann, H. (1958). *Ego Psychology and the Problem of Adaptation*. Translated by D. Rapaport. Madison, CT: International Universities Press.

Hebb, D. O. (1961). *The Organization of Behavior: A Neuropsychological Approach*. New York: Wiley.

Heckhausen, H. (1991). *Motivation and Action*. Berlin: Springer-Verlag.

Heider, F. (1958). *The Psychology of Interpersonal Relations*. New York: Wiley.

Hendrick, I. (1942). Instinct and the ego during infancy. *Psychoanalytic Quarterly*, *11*, 33–58. https://doi.org/10.1080/21674086.1942.11925485.

Hilgard, E. R. (1987). *Psychology in America: A Historical Survey*. San Diego, CA: Harcourt Brace Jovanovich.

Hull, C. L. (1943). *Principles of Behavior: An Introduction to Behavior Theory*. Oxford: Appleton-Century.

Isaac, W. (1962). Evidence for a sensory drive in monkeys. *Psychological Reports*, *11*, 175–181. https://doi.org/10.2466/pr0.1962.11.1.175.

Izard, C. E. (1977). *Human Emotions*. New York: Plenum.

Kuhl, J., Quirin, M., & Koole, S. L. (2015). Being someone: The integrated self as a neuropsychological system. *Social and Personality Psychology Compass*, *9*, 115–132. https://doi.org/10.1111/spc3.12162.

Lepper, M. R., & Greene, D. (1978). Overjustification research and beyond: Toward a means-end analysis of intrinsic and extrinsic motivation. In M. R. Lepper & D. Greene (Eds.) *The Hidden Costs of Reward* (pp. 109–148). Hillsdale, NJ: Erlbaum.

Mahoney, M. J. (1974). *Cognition and Behavior Modification*. Cambridge, MA: Ballinger.
Maslow, A. H. (1970). *Motivation and Personality* (2nd ed.). New York: Harper & Row.
McAdams, D. P. (1993). *The Stories We Live By: Personal Myths and the Making of the Self*. New York: Morrow.
McCall, R. B. (1977). Challenges to a science of developmental psychology. *Child Development*, *48*, 333–344. https://doi.org/10.2307/1128626.
McClelland, D. C. (1961). *The Achieving Society*. New York: Free Press.
McClelland, D. C. (1975). *Power: The Inner Experience*. New York: Wiley.
McDougall, W. (1923). *An Outline of Psychology*. London: Methuen.
Montgomery, K. C. (1952). A test of two explanations of spontaneous alternation. *Journal of Comparative and Physiological Psychology*, *45*, 287–293. https://doi.org/10.1037/h0058118.
Montgomery, K. C. (1955). The relation between fear induced by novel stimulation and exploratory drive. *Journal of Comparative and Physiological Psychology*, *48*, 254–260. https://doi.org/10.1037/h0043788.
Muraven, M. (2012). Ego depletion: Theory and evidence. In R. M. Ryan (Ed.), *The Oxford Handbook of Human Motivation* (pp. 111–126). Oxford: Oxford University Press.
Murayama, K., & Elliot, A. J. (in press). Achievement goals. In R. M. Ryan (Ed.) *Oxford Handbook of Human Motivation* (2nd ed.). Oxford: Oxford University Press.
Murray, H. A. (1938). *Explorations in Personality*. New York: Oxford University Press.
Nakamura, J., Tse, D. C. K., & Shankland, S. (in press). Flow: The experience of intrinsic motivation. In R. M. Ryan (Ed.) *Oxford Handbook of Human Motivation* (2nd ed.). Oxford: Oxford University Press.
Nissen, H. W. (1930). A study of exploratory behavior in the white rat by means of the obstruction method. *Pedagogical Seminary and Journal of Genetic Psychology*, *37*, 361–376.
Reeve, J., & Lee, W. (in press). Motivational neuroscience. In R. M. Ryan (Ed.) *Oxford Handbook of Human Motivation* (2nd ed.). Oxford: Oxford University Press.
Rotter, J. B. (1954). *Social Learning and Clinical Psychology*. New York: Prentice Hall.
Ryan, R. M., & Deci, E. L. (2017). *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. New York: Guilford Press.
Ryan, R. M., & Hawley, P. (2016). Naturally good? Basic psychological needs and the proximal and evolutionary bases of human benevolence. In K. W. Brown & M. Leary (Eds.), *The Oxford Handbook of Hypo-Egoic Phenomena* (pp. 205–222). New York: Oxford University Press.
Schwartz, B., & Lacey, H. (1982). *Behaviorism, Science, and Human Nature*. New York: Norton.
Seligman, M. E. P. (1975). *Helplessness: On Depression, Development, and Death*. San Francisco: Freeman.
Skinner, B. F. (1953). *Science and Human Behavior*. New York: Macmillan.
Skinner, B. F. (2003). *The Technology of Teaching*. Acton, MA: Copley.
Thorndike, E. L. (1913). *The Psychology of Learning*. New York: Teachers College, Columbia University.
Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. In J. Barkow, L. Cosmides, & J. Tooby (Eds.), *The Adapted Mind: Evolutionary Psychology and the Generation of Culture* (pp. 19–136). New York: Oxford University Press.

Vroom, V. H. (1964). *Work and Motivation*. Hoboken, NJ: Wiley.
Warneken, F., & Tomasello, M. (2008). Extrinsic rewards undermine altruistic tendencies in 20-month-olds. *Developmental Psychology*, *44*, 1785–1788.
Watson, J. B. (1913). Psychology as the behaviorist views it. *Psychological Review*, *20*, 158–177.
Weiner, B. (1986). *An Attributional Theory of Motivation and Emotion*. Berlin: Springer-Verlag.
White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, *66*, 297–333.
White, R. W. (1963). *Ego and Reality in Psychoanalytic Theory: A Proposal Regarding Independent Ego Energies*. Madison, CT: International Universities Press.
Wigfield, A., & Eccles, J. S (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology*, *25*, 68–81. https://doi.org/10.1006/ceps.1999.1015.
Wilson, D. S. (2003). *Darwin's Cathedral: Evolution, Religion and the Nature of Society*. Chicago: University of Chicago Press.
Woodworth, R. S. (1918). *Dynamic Psychology*. New York: Columbia University Press.
Woodworth, R. S. (1958). *Dynamics of Behavior*. New York: Holt.
Young, P. T. (1936). *Motivation of Behavior*. New York: Wiley.