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Nature and autonomy: An organizational view of social and neurobiological aspects of self-regulation in behavior and development

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Abstract
The concepts of self-regulation and autonomy are examined within an organizational framework. We begin by retracing the historical origins of the organizational viewpoint in early debates within the field of biology between vitalists and reductionists, from which the construct of self-regulation emerged. We then consider human autonomy as an evolved behavioral, developmental, and experiential phenomenon that operates at both neurobiological and psychological levels and requires very specific supports within higher order social organizations. We contrast autonomy or true self-regulation with controlling regulation (a nonautonomous form of intentional behavior) in phenomenological and functional terms, and we relate the forms of regulation to the developmental processes of intrinsic motivation and internalization. Subsequently, we describe how self-regulation versus control may be characterized by distinct neurobiological underpinnings, and we speculate about some of the adaptive advantages that may underlie the evolution of autonomy. Throughout, we argue that disturbances of autonomy, which have both biological and psychological etiologies, are central to many forms of psychopathology and social alienation.

Organizational principles represent a paradigmatic framework in the life sciences, applying not only to issues in psychological development but also to problems across the fields of biology, psychology, and sociology, and to the interrelations among these disciplines (Mayr, 1982; von Bertalanffy, 1968). The organization idea applies to entities from cells, to organs, to organisms, to social organizations, and it describes the principles through which these successive levels of living forms operate and interrelate (Rosenberg, 1985). Because the concept of organization implies reciprocal influences among levels of analysis and thus entails consideration of both upward and downward forms of causation (Campbell, 1974; Sperry, 1977) or vertical coaction (Gottlieb, 1992), psychologists who employ this theoretical paradigm are able to place their work fully within the system of the life sciences (Laszlo, 1987; Piaget, 1971).

This article focuses on a specific and particularly central concept derived from organizational thought—namely, that of *autonomy*, which implies *self-regulation*. Theoretically, autonomy is both an expression and an outcome of the more general organizational nature of animate entities—a manifestation of a central tendency toward the extension, coordination, and integration of functioning that is a common property of living things (Augros & Stanciu, 1987; Laszlo, 1987). Although many theorists have suggested that autonomy is uniquely human and thus discontinuous within nature, an organizational perspective suggests instead that it can be related to the

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fact that all organisms, to varying degrees, are "centres of regulation" (Polanyi, 1958) that cohesively and purposively direct their behavior toward satisfying needs. As Sinnott (1958) once remarked, it is this "quality of self-directive regulation, whatever its chemical and physical processes may prove to be, that is a uniquely biological phenomenon" (p. 38). Thus, while there may be unique features and dynamics associated with the autonomy in human development, particularly given the facts of self-awareness and social embeddedness, it is our thesis that autonomy is a natural potential and one that has deep evolutionary roots.

In human personality, the construct of autonomy concerns the processes through which action and experience are initiated and governed by "the self." The greater one's autonomy, the more one acts in accord with self-endorsed values, needs, and intentions rather than in response to controlling forces external to the self, whether these forces are within the individual (e.g., drives or ego involvements) or from outside (e.g., social pressures). Autonomy can thus be understood as a critical developmental trajectory that concerns not only competence and control (J. Heckhausen, 1997; Skinner, 1996) but also the movement away from heteronomous regulation toward self-regulation (Deci & Ryan, 1985).

Many theories of human development and personality have embraced the organizational perspective, which assumes a natural progression toward autonomy and integration in psychological development (e.g., Loevinger, 1976; Piaget, 1971; Rogers, 1963). Yet clearly there are many behaviors in both adults and children that are not autonomous because there are forces, both organic and social, that can undermine the integrative process, or make its expression problematic. Internal challenges, from basic temperament to neurobiological constraints (Greenspan, 1979; Kuhl & Beckmann, 1994; Luria, 1973), as well as external challenges, from deleterious parenting to impoverished socioeconomic conditions, can impair the development and sustained enactment of self-regulatory capacities (Ryan, Sheldon, Kasser, & Deci, 1996). In this sense, autonomy, although a central human potential, is also fragile. It is dependent upon both biological and social conditions for its optimal development and expression.

Despite its clear importance within development, the concept of autonomy has prompted criticism from diverse quarters. For example, Bandura (1989) defined autonomy as behavior that occurs "without any external influence" and then used that inappropriate definition to deny the construct's significance. Other social–cognitive perspectives attribute behavioral regulation to internal schemata that are activated by contextual cues (e.g., Mischel & Shoda, 1995), thus peripheralizing the importance of regulation by an integrated self. In a different vein, some neuropsychologically focused theories emphasize modular accounts of complex brain processes, and in doing so raise important questions about the scientific promise of constructs such as autonomy that concern "central" regulative functions (e.g., Fodor, 1983). Finally, some sociocultural ists equate the idea of autonomy with individualism, thus viewing it as an ideology rather than as a central problem of life (Gergen, 1993).

Because of its observable fragility and the definitional controversies that surround it, we believe it is worth revisiting the construct of autonomy to clarify its meaning and functions within an organizational framework of thought. Specifically, we argue that the phenomenon of self-regulation or autonomy is neither mystical nor uniquely human. The striving to integrate and cohesively direct action is a basic form of biological activity. Organizational viewpoints, accordingly, postulate that living systems have an internal tendency to hierarchically coordinate their functions and, at times, to direct their behaviors in the service of needs or goals (Kuhl & Fuhrmann, in press; Ryan, 1995). Further, many organisms, particularly those with a protracted developmental course, show an intrinsic motivation to extend and integrate the regulation of their functioning (Deci & Ryan, 1985) and also show signs of developmental dysfunction and psychological distress when that tendency is disrupted (Kuhl & Halle, 1994; Ryan, Deci, & Grolnick, 1995; White, 1963).

Moreover, the fragility of autonomy is rendered explicable within an organizational per-

spective. The degree of autonomy possessed by an organism is always relative, both within and across species. For most organisms the tasks of coordinating and entraining their evolved component systems, while at the same time becoming coordinated within higher order biotic or social organizations, is formidable. This is perhaps especially true of human autonomy or integrity which is simultaneously dependent upon its evolutionary and neurobiological underpinnings and challenged by ever-changing higher order (and more vs. less autonomy-supportive) interpersonal and cultural conditions.

The analysis of integration and autonomy has particular significance for the field of developmental psychopathology. Many developmental psychopathologists have embraced the organizational paradigm and, with it, the underlying assumption of a developmental trajectory towards greater differentiation and integration in functioning (Cicchetti & Tucker, 1994). Within this framework the acquisition of self-regulatory capacities is seen as critical for adaptive functioning, and disruptions of self-regulation or "disturbances of autonomy" are widely implicated as etiological factors in various types of psychopathology (Kuhl & Beckmann, 1994; Ryan et al., 1995; Shapiro, 1981). Disruptions of autonomy, whether located in organic or social processes, can thus have a broad, cascading impact on subsequent developmental processes (Cicchetti, 1991; Ryan, 1993).

The remainder of this article explicates these views. We begin by tracing the historical origins of the concept of organization itself, showing how it inherently assumes the functional property of organismic self-regulation and relative autonomy. We next examine the phenomenological and attributional manifestations of organismic integration and autonomy in humans, as well as their linkages with specific types of motivational processes critical to optimal development. These processes include intrinsic motivation, which is the spontaneous tendency of organisms to exercise their capacities in the service of both cognitive and personality growth (Deci & Ryan, 1985; Flavell, 1977; White, 1963), and internalization (Kuhl & Kazen, 1994; Ryan & Connell, 1989), which is the process that allows individuals to assimilate extrinsic social prescriptions to the self. We then review recent work on the neurobiological foundations of autonomy in humans (e.g., Rosahl, Tennigkeit, Kuhl, & Haschke, 1993), arguing that there is reason to expect a specificity of neurological processes subserving the operation of autonomous regulation. We then speculate on the sociobiology of autonomy and self-regulation, particularly the adaptive advantages yielded by it and by its phenomenological accompaniments. Finally, we discuss the significance of autonomy in the study of developmental psychopathology.

Organization Construct: Origins and Applications

Although many contemporary life scientists acknowledge organizational principles as paradigmatic (Mayr, 1982; Rosenberg, 1985), it is noteworthy that the concept of organization itself represents, historically speaking, a relatively recent human invention. It emerged primarily as an outcome of intense debates about the nature of life which transpired between reductionists (e.g., Helmholtz, 1861; La Mettrie, 1748/1961; Loeb, 1906) and their now extinct rivals, the vitalists (e.g., Bichat, 1815; Dreisch, 1908).

Reductionists aspired to explain the workings of life solely by reference to elemental or lower order efficient and material causal principles (Augros & Stanciu, 1987; Rychlak, 1975). In short, they tried to reduce biology to physics. By contrast, vitalists argued that living entities, with their obvious tendencies toward activity and integrity, possess an irreducible, unique nature. Dreisch (1908), for example, ascribed to organisms a principle of *entelechy,* which guided the ordering and realization of organismic potentials, a concept that has much in common with psychological constructs such as actualization (Rogers, 1963) and individuation (Jung, 1923). Bergson (1911) attributed to life an *élan vital,* a nonphysical force through which development and evolution flowered.

However, in spite of their focus on life and development, the early vitalists' program was

hopelessly regressive. The course of the debates entailed reductionists producing ever more detailed accounts of processes vitalists had hoped would remain unexplained, forcing the vitalists to retreat ever backward and finally into silence. Nonetheless, these debates produced concessions among reductionists as well, because simple principles of accretion and efficient causality were found insufficient for framing, describing, and predicting processes such as the coordination of functioning, equifinality, and, more generally, the nature of self-regulation. As Jacob (1973) put it, given the observed unity, coordination, and regulation of organisms, "it had to be admitted that these elements were not merely stuck together, but integrated" (p. 116). Thus, although vitalists never accomplished their full aims, their efforts prompted a fuller, more appropriate framework for scientific discourse, namely *the organismic paradigm* (Jonas, 1966; Mayr, 1982), within which biological mechanisms and physiological processes can be studied as aspects of an overarching nonreductionistic account of living systems.

The organismic paradigm thus arose as a framework for describing the attributes that differentiate developing organisms from inanimate entities. Perhaps the most basic of these is the *negentropic* nature of animate forms. Indeed, the very essence of organization, to which the term *organism* itself refers, involves living systems working to maintain and elaborate themselves. In contrast, inanimate objects are characterized by entropy; they tend toward equilibrium or deterioration to simpler forms (Bartley, 1987). The animate attribute of negentropy is in no way contradictory to the laws of physics (e.g., the second law of thermodynamics) because such entropy concerns only closed systems, not living systems that are in active exchange with an environment (Nicolis & Prigogine, 1977).

Negentropy thus implies a tendency toward the "working together" or coordination of parts in an active, self-regulating unity. This organization entails an assumption that such unities are made up of, or constituted by, lower order functional unities, and are also embedded within higher order ones. That is, living systems involve parts and structures that are hierarchically arranged. Indeed, it has been argued that most of the problems unique to biology concern the issue of hierarchical organization—how lower order elements are combined and coordinated into higher order structures and functions that operate as a unit. The hierarchical, systems' view suggests that the "whole is more than the sum of its parts" and that the parts are interdependent across levels (Jonas, 1966). The phenomenon of autonomy represents, in this respect, a particularly compelling problem for hierarchical models, because it concerns how an organism at times operates as a self-directed unit, coordinating its parts toward certain ends.

Sperry (1969) and Campbell (1974) have used the term *downward causation* to describe how higher order units are not only dependent upon and constrained by the elements that constitute them, but can, in certain circumstances, entrain and redirect those very constituent mechanisms. More recently Gottlieb (1992) depicted such top-down influences as instances of *vertical coaction,* to better specify that such influences are not, strictly speaking, unidirectional causes. The recognition of top-down influences, however described, is nonetheless critically important to developmental and personality psychologies, whose central phenomena concern how humans develop the capacities for purposive action and behavioral regulation. Although purposive, self-regulatory capacities are to some extent based in, and operate on behalf of, lower order biological processes, they are also shaped in content and operation by still higher order social organizational processes and pressures. That is, social conditions influence the acquired motives and experienced goals of the individual, which in turn exert top-down effects upon the functioning of the components upon which they depend. Only within the context of these hierarchical dynamics can human autonomy and purposiveness be meaningfully studied.

A final tenet of organismic theories, and perhaps an ultimate dividing line between reductionistic and organismic thinking, concerns the fundamental question of what being purposive itself entails. A nonliving machine can have a "purpose," but that occurs only if

an animate being has programed into it the heuristic that creates the purpose. Organisms, on the other hand, have purposes with internal origins; they have purposes that originate in their innate needs. As Jonas (1966) argued, "Only living things have needs and act on needs" (p. 126). Needs are based in organisms' necessity for continuous self-renewal and their elemental urge to maintain and extend themselves. Human needs operate on both metabolic (Rosenberg, 1985) and psychological (Ryan, 1995) levels as fundamental motivators of regulatory processes. In contrast to organismic theories, cybernetics, while containing some heuristically valuable principles derived from systems thought, fails at this final turn to be a comprehensive approach to animate development, as it provides no basis for addressing the question of needs.

Although the emergence of the organismic principles of negentropy, holism, self-regulation, and needs neither resolved nor completed the debates about the nature or meaning of life, their introduction changed forever scientific discourse in the life sciences (Jacob, 1973; Bertalanffy, 1968). Indeed, organismic thinking has as its great merit that it provides a theory of totality between the extreme alternatives of reductionism and vitalism (Piaget, 1971), and in so doing it provides biology with a raison d'être, a focus on processes not wholly reducible to material–causal principles (Mayr, 1982). Similarly, organismic thought provides developmental psychology with its own mandate to focus on the organism's inherent tendencies toward differentiation and integration (Overton, 1991). This includes coming to grips with the trajectory of individuals toward increased self-regulation over time, understood as a process that, itself, must be located within both the lower order biological mechanisms through which it is enacted and the higher order social organizational processes that influence its represented aims and purposes.

Organization and Self-Regulation in Psychological Theories

Many previous psychological theorists (e.g., Loevinger, 1976; Piaget, 1971; Rogers, 1963; Werner, 1948) have embraced the organismic paradigm in order to understand the dynamics of human behavior and personality functioning. In doing so, each has assumed that psychological development entails a natural tendency toward greater differentiation (growth, self-extension) and integration (coherence, self-regulation, unity). The organismic framework has been applied to both cognitive growth, as in the assimilation of new knowledge structures, and personality growth, as in the assimilation of social values and behavioral regulations (Greenspan, 1979; Overton, 1991).

Typically, organismic theories in psychology account for this developmental trajectory by positing a broad construct that describes a general function subserving growth and integration. Psychoanalytic theorists posit a *synthetic function* derived from Eros, the life force, that is the basis of ego development (Freud, 1923/1962). Loevinger (1976) suggested that the "striving to master, to integrate, to make sense of experience, is the essence of the ego itself" (p. 59). Humanistic psychologists posit an *actualizing tendency* (Goldstein, 1939; Maslow, 1943), a striving toward maintenance and enhancement that Rogers (1963) argued "is the very nature of the process we call life" (p. 3). Jung posited individuation as a core construct to account for unifying processes in development, which for him reflected "the peculiar and autonomous quality of living matter, i.e., to a law inherent in life itself" (Jung, 1923, p. 557). And Piaget (1952) assumed organization to be a "functional invariant" in cognitive development, reflecting the fact that "life, at whatever level shows a continual tendency to extend itself" (Piaget, 1971, p. 204). These statements illustrate just how basic the idea of organization is in such theories, being equated with the very nature of life itself.

While recognizing the importance of such general constructs, it is also critical to consider the inherent dangers in positing "natural" functions or "invariant" tendencies that operate in psychological development (or similarly, in evolution, social history, or any other organizational process). Abstract functions or tendencies can easily become reified

(Ryle, 1949). Furthermore, once assumed, they can be mistakenly considered automatic or nonproblematic. Thus, to the extent that the processes underlying the "unfolding" of development are simply presumed, there is likely to be too little focus on (a) the specific component or "modular" structures through which these processes operate and that therefore constrain their operation (Kuhl, 1996); (b) individual differences in the rate and dynamics of the functioning of such processes and in the structures that result from them (Edelstein, 1995; Flavell, 1977); and (c) variations in the social conditions that facilitate versus inhibit both the functioning of these processes and the agentic activity entailed in their operation (Broughton, 1987; Ryan, 1995). Put differently, the organizational tendencies that nature provides, including the movement toward greater autonomy, do not just occur. Rather, to come to fruition they require specific neurobiological capacities (Kuhl, 1996), social nutriments, and motivation (Deci & Ryan, 1991). Lacking these, they will be delayed or disrupted. Linking social, psychological, neurobiological, and evolutionary levels of analysis in the conceptualization of autonomy can thus help us explicate the multiple levels of support required for optimal development of autonomy, as well as the multiple pathways by which the disturbance of autonomy contributes to psychopathology.

A meaningful conceptualization of autonomy can capitalize on the historical lessons from the vitalist–reductionist debates by recognizing that a full understanding of self-regulation cannot be obtained either from a purely top-down psychological approach which ignores underlying biological mechanisms that provide constraints and affordances or from a purely bottom-up reductionist approach which ignores the regulatory influences of psychological processes such as needs, self-reflections, and internalized social values. An organismic approach, properly applied, examines its phenomena at multiple levels of analysis, while at the same time considering the interpenetrating influences among hierarchically arranged systems. It thus provides a conceptual rudder by which one can avoid both the Scylla of reductionism and the Charybdis of transcendental thought.

Self-Regulation Versus Controlled Regulation

Self-regulation and autonomy concern the processes through which an organism initiates, coordinates, and governs its behavior. As we use the term *autonomy* it is not equivalent to either independence or freedom from external influences (Ryan, 1995) but rather refers to the holistic integrated functioning through which action is centrally regulated. Autonomy is an instance of organization par excellence, because autonomy entails the higher order gathering together of component systems into a relative unity and acting from that organized vantage point. Although self-regulatory processes are evident in all animate systems, the cases of most relevance herein are those involving relatively central, nonencapsulated, coordinating processes associated with cortical regulation. These are manifest in a number of species, particularly mammals. The functional roles of autonomy include stabilizing and boosting adaptation and action, for example, by facilitating the identification and efficient expression of goals related to predominant needs and shielding such goals from competing impulses. The origins of autonomy are thus located in the more general problem of the development of behavioral regulation, which concerns the organism's selecting and sustaining behaviors that are intended to meet its ongoing needs.

In humans the study of autonomy has classically involved both functional and phenomenological considerations. For example, organismic perspectives on human development typically attribute the phenomenological locus of initiation and regulation to the self (Deci & Ryan, 1991; Eagle, 1991; Kuhl & Beckmann, 1994; Loevinger & Blasi, 1991; Stern, 1985; Winnicott, 1965). In contrast to social-cognitive approaches in which the self is typically defined as a concept, as the object that is perceived by oneself or another, organismic models use the term *self* to refer to a central process that regulates behavior and experi-

ence, in other words, to self-as-subject (McAdams, 1990).

Furthermore, organismic theories distinguish regulation by the self, which is based in those aspects of the person's psychic makeup that have been well integrated, from regulation by isolated component processes, coercive external forces, or partially assimilated goals. Clearly, not all emitted action is self-regulated, precisely because many types of behavior occur without the cohesive endorsement or participation of one's self, as when a nonintegrated component process controls behavior. This is true, for example, in many cases of neurobiological disruptions, particularly those implicating prefrontal cortical areas (e.g., Goldman–Rakic, 1987; Luria, 1973). Neuropathology offers dramatic examples of how, when prefrontal cortical processes are disrupted, component processes can drive behavior without self-endorsement, and intentions are seemingly disconnected from the component systems required for their implementation (Kuhl, 1996). Furthermore, psychological variables can also disrupt self-regulatory functioning, as when behaviors stem from coercive external controls or rigid, internalized demands (introjects) reflecting only part of one's personality (Greenwald, 1982; Meissner, 1981; Ryan, 1982). In such instances one might better speak of controlled rather than self-regulation, because the integrated self neither initiates nor fully stands behind such behaviors. Many forms of psychopathology are associated with the feeling that behavior, even when intentional, is compelled, automatic, or in other ways not self-determined (Ryan et al., 1995). Thus, in a general sense, controlled regulation is evidenced to the extent that component systems, whether conceived of psychologically or neuroanatomically, execute behavior without it being processed, coordinated, or endorsed by the self (Kuhl & Fuhrmann, in press; Deci & Ryan, 1991).

The extent to which a behavior is self-regulated versus controlled is important because it greatly affects the quality of action that ensues. For example, whereas self-regulated action will be sustained in the face of competing tendencies or demands (Deci & Ryan, 1985; Kuhl, 1992), controlled action, which may even appear on the surface to be chosen or decided upon, lacks the backing of a cohesive commitment, such that there is a diminished likelihood that one's full resources will be brought to bear to carry out the intention. In philosophical language, this consequence of regulatory failure is referred to as *akrasia* or "weakness of will" (Mele, 1987). Research has repeatedly shown that goals enacted through controlling rather than autonomous regulation are likely to suffer from akrasia (e.g., Greenstein & Koestner, 1996; Kuhl & Kazen, 1994; Sheldon & Elliot, in press; Williams, Grow, Freedman, Ryan, & Deci, 1996). Furthermore, decrements in creativity and cognitive flexibility have been associated with controlled (vs. self-regulated) behavior (Amabile, 1996; Grolnick & Ryan, 1987; Koestner, Ryan, Bernieri, & Holt, 1984).

Given that self-regulated (i.e., autonomous) and controlled forms of regulation exist and have both distinct etiologies and consequences, we now turn to a more detailed account of their phenomenological, developmental, neurobiological, sociobiological, and social bases, as each of these levels of analysis has an essential place within an organismic perspective.

Experience of Autonomy: Phenomenological and Attributional Perspectives

Phenomenologists in the Husserlian tradition have long distinguished autonomous acts from non-self-regulated forms of striving. For instance, Pfander (1911) proposed that what he called a "self-determined" or "willed" action is distinguishable from other intentional acts in that it is experienced "precisely *not* as an occurrence caused by a different agent but as an initial act of the ego-center itself" (p. 20). He added that an external input (such as social pressure) may supply the "grounds" for action, and yet an action could still be autonomous if it is characterized by a directly felt endorsement of those grounds by the self or "ego-center." Similarly, Ricoeur (1966) pointed out that an autonomous action does not need to occur in the absence of strong external

pressures (e.g., from parents or social institutions) to act in that way. The issue is, rather, the degree to which one fully assents to the actions prescribed by such forces or inputs. One can be autonomous even when behaving in accord with an external force as long as one fully and meaningfully concurs with it. Thus, autonomy does not in any way entail being independent of external influences; it only means not being *caused* by those influences. Phenomenologists also apply this logic to inner forces such as drives or impulses. Autonomy concerns whether one wholly and reflectively accepts an inner urge (e.g., to eat, to hit) rather than experiences the urge as compelling or controlling one's behavior.

Recent analytical approaches to the problem of autonomy point in similar directions (e.g., Benson, 1987; Hill, 1991; Pritchard, 1991; Wolff, 1990). Dworkin (1988), for example, argued that autonomy cannot, and does not, mean behaving without constraint. Clearly, one can assent to certain constraints, and in doing so still be autonomous. One might feel constrained, for example, to stop one's car at a particular red light. But, at the same time one may assent to the idea that traffic laws are useful in insuring one's own and everyone else's safety. One therefore may willingly consent to follow such laws, and in so doing lose no autonomy. Indeed, one enacts autonomy through such higher order, reflective commitments. For Dworkin, Benson, Pritchard, and others, in fact, autonomy entails endorsement of one's actions at the highest order of reflection.

These philosophical perspectives have direct application to clinical phenomena from obsessive compulsive disorders to schizophrenia. In many forms of severe psychopathology persons experience their behavior as being driven by forces beyond their control and with which they do not concur. Similarly, in many behavioral problems, from acting out to bulimia, persons often complain that they cannot help but in engage in a behavior, even though they do not "want" to (see Ryan et al., 1995; Shapiro, 1981).

Although these traditions seem disparate from empirical psychology, they have nonetheless gained entrance to it through the attributional theories of Heider (1958). Heider, who was highly conversant in phenomenological philosophy (Spiegelberg, 1972), was concerned with the nature of everyday perceptions of interpersonal events and how the phenomenal construction of such events plays a determinative role in social behavior. Accordingly, he sought to articulate the common sense principles or naive psychology by which people understand their own and others' actions. In Heider's view, it is this naive psychology that "we use to build up our picture of the social environment and which guides our reactions to it" (p. 5). Among the core constructs in Heider's theory was that of the *perceived locus of causality* (PLOC). He argued that among the most salient features of naive psychology is one's judgment about whether an action or outcome is *personally caused*, or is a result of *impersonal causes*. The critical feature of personal causation is intentionality, which is implied by behavioral equifinality, meaning that both ability and effort appear to be directed toward a particular end. In contrast, *impersonal causation* is marked by a perceived absence of intentionality. For example, an action would be attributed to impersonal causes if the perceiver believes the actor showed no evidence of trying to bring it about or lacked the capacity to prevent it. The verbal outbursts seen in Tourette's syndrome provide a classic example of an impersonally caused behavior.

DeCharms (1968) extended Heider's work, arguing that even intentional or personally caused actions are not always experienced as self-regulated. In fact, he argued, people often perform intentional actions precisely because they feel pressured or coerced to do so. A parent makes the child go to his room, or a boss demands that a worker do some task. DeCharms thus proposed a distinction within Heider's global category of personal causation. Some intentional acts, he argued, are accompanied by an *internal perceived locus of causality* (I-PLOC) in which the self is perceived to be the origin of action and thus the action is autonomous. Others are characterized by an *external perceived locus of causality* (E-PLOC), in which forces outside the self are perceived to be the cause of the action. In

deCharms' terms, the person is a *pawn* when the PLOC is external.

These two types of self-attributions regarding intentional actions are exemplified in manifold everyday occurrences. Think of a girl who intentionally engages in cooperative play in her classroom. In one scenario she feels compelled to do so by social pressure from the teacher, who disapproves of noncooperation. Here, her "cooperative" sharing of toys or taking turns would not, phenomenally, emanate from her self. Instead, she would experience herself as a pawn. In a second scenario, she willingly cooperates and views such play as an expression of herself. Here, she would feel herself to be the origin of her actions. This contrast represents nothing less than the distinction between alienated and fully volitional forms of behavior—a contrast relevant to every behavioral domain.

DeCharms stated that people have a "primary motivational propensity" to be origins of behavior and indeed are "constantly struggling against being confined and constrained by external forces—against being moved about like a pawn" (1968, p. 273). Being an origin versus a pawn can be viewed as a continuum (Ryan & Connell, 1989). As deCharms stated, "a person feels more like an Origin under some circumstances and more like a Pawn under others" (1968, p. 274). Additionally, unlike behaviorally inclined attribution theorists (e.g., Bem, 1967), deCharms held the view that knowledge of one's relative autonomy need not be derived from taking oneself as an object of social perception. It can instead be directly known, an aspect of personal knowledge (Polanyi, 1958). Typically, we need not infer self-motivation from our behavior; we know when we have originated an action and when we have been coerced or pressured into an action precisely because self-regulation is a different act, involving different processes and different experiences, from mere compliance or self-control. Indeed, even within the first 3 months of age, infants appear to discriminate between voluntary and involuntary actions; they seem to know the difference between what is self- versus non-self-initiated (Stern, 1985).

It is important to reiterate that, theoretically, one can be a pawn not only with respect to other people but also with respect to controlling forces within one's personality. One can be as coerced or controlled by oneself (or, more technically, by forces within oneself) as by others. This is the case, for example, with adherence to ego involvements (deCharms, 1968; Nicholls, 1984; Ryan, 1982), introjects (Meissner, 1981; Perls, 1973; Ryan & Connell, 1989), or other rigid standards (Kuhl, 1996; Shapiro, 1981) in which internalized, but poorly integrated, regulations are experienced as controls that are external (or alien) to the self. They thus have an E-PLOC. Similarly, one would have either an external or impersonal PLOC when internal desires, drive states, or impulses control action without self-endorsement. In such cases, people often report feeling "out of control." Again, this phenomenal construct applies to multiple forms of psychopathology that entail behaviors characterized by an E-PLOC (see Ryan et al., 1995).

The PLOC construct of Heider and deCharms offers an operational route into the study of agency and autonomy. By instantiating conditions that add salience to external forces or reasons for acting (such as controlling rewards, threats, or pressuring evaluations) experimental researchers beginning with Deci (1971) have been able to facilitate shifts in PLOC from internal to external, thus inducing the functional experience of being a pawn. With this shift in PLOC comes a variety of motivational deficits, such as reductions in self-initiation, creativity, and task persistence (Amabile, 1996; Deci & Ryan, 1985; Lepper & Greene, 1978; Ryan, Koestner, & Deci, 1991). Conversely, conditions that facilitate an I-PLOC (such as empathy, support for reflective choice, or nonevaluative feedback) enhance the quality and sometimes the quantity of motivation (e.g., Deci, Eghrari, Patrick, & Leone, 1994). The functional impact of the I-PLOC versus E-PLOC continuum has also been shown in numerous field studies in classrooms (Ryan & Grolnick, 1986; Vallerand & Bissonette, 1992), families (Grolnick, Deci, & Ryan, in press), workplaces (Deci, Connell, & Ryan, 1989), and clinical settings (Ryan, Plant, & O'Malley, 1995; Williams et

al., 1996) among others. Specifically, these effects occur because of the relations between an I-PLOC and the processes of intrinsic motivation and internalization to which we now turn.

Autonomy as Developmental Process: Intrinsic Motivation and Internalization

Organismic conceptions of human nature assume an inherent tendency toward growth and assimilation. Perhaps no phenomenon illustrates the self-directed, organizationally extending activity of life better than that of *intrinsic motivation*. Intrinsically motivated activities are those that occur for the inherent satisfactions that accompany them and which, therefore, are not dependent for their occurrence on separable rewards or reinforcement. Intrinsically motivated actions are spontaneous and done for their own sake; they are *autotelic* (Csikszentmihalyi, 1975) and represent the organism's natural tendency to exercise and elaborate its capacities by taking interest in and actively pursuing challenges in both the internal and external world (White, 1963; H. Heckhausen, 1991; Deci & Ryan, 1985). Prototypical examples of intrinsic motivation include play, exploration, and curiosity-oriented behaviors.

Intrinsic motivation is pervasively evident in humans. In our healthiest states, we are inquisitive, playful, and active creatures. The renowned ethologist Lorenz (1955) applied to humans the label Neugierwesen, or "curiosity creature," in recognition of this robust propensity to learn. He also argued that humans were not alone in this tendency; the more unspecialized a creature (i.e., the more wide-ranged its potential niche), the more prominent are its curiosity and exploratory tendencies. Lorenz and Leyhausen (1973), Polanyi (1958), and other commentators have even speculated that the "amount of knowledge" inherent in the living system and the general direction of evolution towards sentience may be the result of the adaptive benefits of the exploratory tendency.

The phenomenon of intrinsic motivation is of great significance for developmental outcomes (Krapp, 1994; Ryan, 1993). It represents a primary behavioral manifestation of the organization process through which the organism endeavors to incorporate ever more complex aspects of the world into its own organization. In the context of a protective envelope provided by caregivers, intrinsically motivated processes in infancy are typically fluid and wide ranging (Krapp, Hidi, & Renninger, 1992), thus facilitating the acquisition of diverse competencies, the discovery of specific talents, and the differentiation of interests (Deci, 1975). Regarding subsequent development, White (1963), Greenspan (1979), Harter (1983), and others have recognized the importance of intrinsic or effectance motivation for the acquisition of social competence and for the overall process of personality development, including the exploration and mastery of the internal worlds of impulse, fantasy, and drives. Elkind (1971), Hunt (1965), and others similarly acknowledged the significance of intrinsic motivation for cognitive growth. As Flavell (1977) argued, external factors may modify this "natural bent," but they do not create it.

Intrinsically motivated behaviors occur, however, only under certain conditions. As a large body of literature now attests (see Connell & Wellborn, 1990; Deci & Ryan, 1985; Deci, Ryan, & Williams, 1996; Koestner & McClelland, 1990; Lepper, Keavney, & Drake, 1996; Ryan, 1993), intrinsic motivation tends to occur only when the person experiences an I-PLOC, perceived competence, and relational responsiveness and security. In other words, any factors, whether they be in the external environment or in the person, that detract from experienced autonomy, competence, or relatedness diminish intrinsically motivated behavior.

Fitting with this formulation is the fact that a key element in the early development of intrinsic motivation is the presence of a sensitive, contingently responsive caregiving matrix (Ainsworth, Blehar, Waters, & Wall, 1978). Indeed, during the first few months of life the establishment of a sense of self—of being an internal locus of causality—is linked closely to how well caregivers support the nascent intrinsic motivation of the infant. This support of spontaneous initiations is seem-

ingly an intrinsic feature of maternal behavior as well—an evolved intuitive interest and capacity to be in synchrony with the infant emotionally and behaviorally (Papousek & Papousek, 1987). Attachment researchers use the term *sensitivity* to refer to this supportive, contingently responsive style of relating to the child. Bretherton (1987) for example described sensitivity as "maternal respect for the child's autonomy." Sensitivity entails the direct and open responsiveness to the infant's signals and initiations which gradually strengthens the sense of agency, coherence, and volitional competence. By contrast neglect and intrusive responding (i.e., lack of support for relatedness or autonomy) fail to strengthen the inner sense of self, thus undermining the development and expression of self-regulation, including the tendency toward intrinsically motivated activity.

In our theoretical formulations, the early development of intrinsic motivation is viewed as especially dependent upon autonomy support and relatedness from caregivers (Ryan, 1993). The child must experience responsive supports for self-initiations in the context of a secure connection to others. Thus, controlling or neglecting caregivers lead to a fragmented volitional organization and impoverished intrinsic motivation. In turn, these negative effects on volitional organization can have cascading influences on the subsequent development of both intellectual and social competence and, through them, on overall adjustment. Numerous studies support the connection between controlling and unresponsive parenting and deficits in intrinsic or mastery motivation of infants and toddlers (e.g., Arend, Gove, & Sroufe, 1979; Egeland & Farber, 1984; Grolnick, Frodi, & Bridges, 1984; Morgan, Harmon, & Maslin–Cole, 1990). Less studied are the irradiating effects of these motivation deficits on subsequent development.

It is also important to note that the effects of variations in supports for autonomy and relatedness on intrinsic or mastery motivation are not restricted to infancy, but continue across the life span, and across different life domains (Ryan et al., 1995; Vallerand, in press). It has been found in both laboratory and field studies that intrinsic motivation is undermined by factors associated with feeling controlled (e.g., surveillance, pressured evaluating, and the controlling use of rewards, punishments, and praise) or with feeling disconnected (e.g., lack of empathy, care, or concern) across domains as varied as sports, education, health care, and relationships, and across developmental periods from infancy to adulthood. It seems that when heteronomous forces attempt to direct intrinsic motivation, the organism no longer wants to play.

It is also the case that the development of intrinsic motivation depends upon an environment filled with optimal challenges or opportunities to experience competence. Intrinsic motivation flourishes only when challenges are optimal and feedback (whether task-inherent or interpersonal) is positive or constructive. Tasks that are unchallenging or easy elicit boredom; those that are too difficult elicit either amotivation or anxiety (Csikszentmihalyi, 1975; Deci, 1975; Koestner & McClelland, 1990).

Danner and Lonky (1981) provided a classic experimental demonstration of how opportunities for both autonomy and optimal challenge are linked to intrinsic motivation within the domain of cognitive development. They preclassified children on a variety of Piagetian tasks, and showed that when children were offered a variety of task levels in a "free choice" framework (i.e., a circumstance conducive to an I-PLOC) they chose tasks that stretched their current range of skills. Yet, as predicted by cognitive evaluation theory (Deci & Ryan, 1980), they further showed that children who were extrinsically rewarded for task engagement (conducing toward an E-PLOC) instead choose tasks that were already within their established range of skills. This illustrates how the intrinsically motivated elaboration of existing structures can often be diminished by controlling factors.

The theoretical link between intrinsic motivation and an I-PLOC is important to developmental theory in several respects. First, the fact that intrinsic motivation is manifest from the earliest moments of infancy, as evidenced in the spontaneous and active striving for effects and responsiveness in one's environ-

ment, suggests that the nascent core of the self-as-subject is also present from infancy. In other words, the roots of the agentic self are prereflective, as recognized by some developmentalists (e.g., Loevinger & Blasi, 1991; Stern, 1985) and comparative biologists (Slavin & Kreigman, 1992). This is consistent with the view that the self, as an organizer of action and an integrative center of experience, is a natural endowment of the organism and must be nurtured within a social context. What becomes identified or understood as the self of self-regulation is thus inexorably intertwined with that vital activity characterized by interest, curiosity, and coordinated striving.

Research on intrinsic motivation has helped to identify specific social–environmental factors that can facilitate versus diminish the tendency toward organization within a variety of developmental contexts. It thus contributes to our understanding of differential rates of activity and growth, both within and between domains of competency and behavior, and of phenomena such as decalage and "gaps" in ego development (Ryan, 1995). By understanding the influences of interpersonal settings on natural developmental processes we can achieve a fuller social psychology of cognitive and personality development. It is this understanding that is notoriously lacking from most structural frameworks and that leads to the tendency to view natural developmental processes as being automatic (Broughton, 1987; Schroeder & Edelstein, 1991). The field of developmental psychopathology particularly requires such analyses, insofar as identifying the effects of social conditions on developmental processes is one of its central missions (Cicchetti, 1991).

Internalization

The self-extension tendency represented by intrinsic motivation is but one expression of autonomous regulation in development. A second manifestation is a process referred to as internalization, which is the tendency of individuals to assimilate into the realm of self-regulation those behaviors and values that are extant in the social context and have been externally motivated (Deci & Ryan, 1985; Kuhl & Kazen, 1994; Ryan & Connell, 1989).

The preponderance of our daily activities—from work, to school, to family maintenance—are instrumental activities; they are done not for their inherent satisfactions but because the outcomes they yield have value. Such behaviors are classified as extrinsically motivated because they are done to attain consequences separable from, or extrinsic to, the experience of the activity itself. Thus, a woman may try to excel at work not because of the spontaneous sense of accomplishment but because she wants to acquire material riches. A boy may do homework not for its inherent challenges but because he desires his parents' approval. A person may exercise not for enjoyment or challenge but for health benefits. All of these represent examples of extrinsic motivation.

Although many theorists have assumed that extrinsic motivation invariantly represents heteronomously driven activity (e.g., deCharms, 1968), this is not the case. While some extrinsic activities are clearly coerced, others are done choicefully and are grounded in self-accepted values and beliefs. For example, a father may perform an activity that aids his child (e.g., changing a diaper) because he clearly see its importance and necessity for his loved one. In this case, he would be doing the activity autonomously, for self-endorsed reasons, even though he is not intrinsically motivated. This was the point so clearly made by philosophers such as Pfander and Dworkin cited earlier, who argued that people can be fully free in pursuing externally prompted activities that, reflectively, have value and importance to the self.

Of course, many extrinsically motivated activities are poorly assimilated to the self—that is, they are ambivalently valued and motivated by forces such as guilt or shame that are phenomenally "outside" (Ricoeur, 1966) the self. An extrinsically motivated (instrumental) behavior can thus be regulated with either an internal or an external PLOC (Deci & Ryan, 1985; Ryan, Connell, & Deci, 1985). Put differently, extrinsic motivation varies considerably in its relative autonomy or the degree to which it is truly self-regulated. The concept of internalization describes a

continuum reflecting the extent to which the regulation of a behavior has been integrated with the self versus the extent to which it has remained anchored in and determined by heteronomous forces.

Figure 1 depicts this continuum, which has been variously modeled by different researchers (e.g., Chandler & Connell, 1987; Kuhl & Kazen, 1994; Ryan & Connell, 1989; Sheldon & Kasser, 1995; Vallerand, in press). At the left of the figure are actions over which one feels no personal control—those that we label *amotivated* (Deci, 1980) and that Heider (1958) described as being associated with the perception of impersonal causation. As one moves into the realm of personal causation, which requires the perception of control over outcomes, the most heteronomous forms of action are externally regulated. Although intentionally done, externally regulated activities are directly controlled by forces outside the person (usually through contingent rewards and punishments). By contrast, introjected regulation represents behavior performed because of a press within the person to gain approval or avoid disapproval from oneself or from generalized others. With introjected regulation, it is as if one part of the personality were attempting to control other parts (Perls, 1973) by highlighting well anchored standards adopted from others or by using threats of guilt or shame. Introjected controls are thus regulations that are within the person, but nonetheless are experienced phenomenally as external to the self. Furthermore, introjection often entails the "as if" belief that the values underlying one's action are one's own (Rogers, 1963). Kuhl and Kazen (1994), for example, showed how introjection can involve *self-infiltration*, in which one misattributes to oneself goals that have actually been assigned by others.

A yet more fully internalized, and therefore more autonomous, form of extrinsic motivation is represented by identified regulation, in which the individual consciously accepts the value of the activity and assents to it as being personally important. Finally, the most autonomous form of extrinsic motivation is integrated regulation, wherein identifications are coordinated within the totality of one's self-related beliefs and values. Integrated regulation thus represents actions with which one has not only identified but has also made congruent with one's psychological needs and other identifications.

When a regulation has been integrated, internalization has been completed as a manifestation of the fundamental developmental process of organismic integration (Deci & Ryan, 1985). Koestner and Losier (1996) expanded on this in their research on reflective autonomy, described in terms of the processes by which one fully considers interests, needs, and outside influences in a nonreactive appraisal of behavioral options. Kuhl and Fuhrmann (in press) recently described a similar process of acting when one has accessed holistic self representations in the context of the action. However described, it is this synthetic process in which one compares the "fit" of potential actions with self-related beliefs, values, and needs that is involved in integrated self-regulation.

At the right side of Figure 1 is intrinsic motivation, which shares the quality of autonomy with integrated regulation, but is different in that integrated regulation is a form of extrinsic motivation that is performed because of its personal importance to the individual, whereas intrinsic motivation is performed because the activity itself is interesting.

The relations of this continuum with developmental psychopathology are manifold. Amotivation has been directly linked to anxiety and depressive outcomes, marked as it is with a perceived absence of control over desired outcomes (e.g., Deci & Ryan, 1987; Strauss & Ryan, 1987). External regulation has clear relationships with conduct disorders and social adjustment difficulties insofar as the only motivation at work herein is that of avoiding punishment or gaining rewards (Ryan et al., 1995). In a sense, external regulation (the only kind of regulation recognized by operant theory) represents a failure of internalization. Introjection is associated with a variety of disorders of an intrapunitive sort, as well as difficulties with self-esteem, stress, and the potential for somatization (e.g., Ryan, Rigby, & King, 1993). Finally, identifications, while they have many advantages over

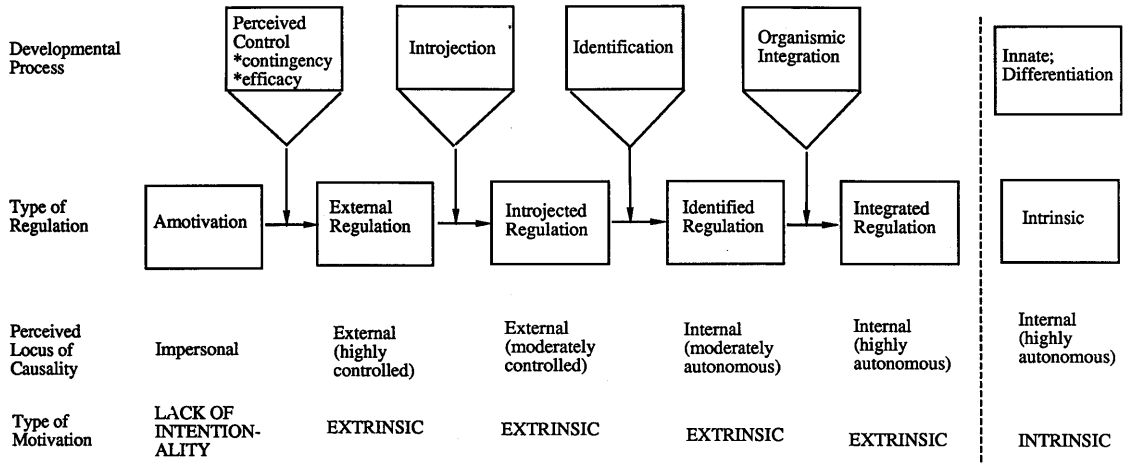

Figure 1. The concept of continualization continuum.

less internalized forms of regulation, can still be poorly integrated with one another and pose developmental constraints. Thus, the analysis of how one regulates behavior is intimately connected with the more holistic concept of mental health (Ruble & Thompson, 1992; Ryan, 1995).

Just as intrinsic motivation requires contextual nutriments, the natural tendency to internalize and integrate extrinsic regulations is dependent upon particular contextual supports. In fact, we suggest that the tendency to integrate socially prescribed regulations can itself be thought of as being an intrinsically motivated process, and therefore, like other intrinsically motivated processes, it requires supports for autonomy, competence, and relatedness in order to operate robustly (Deci & Ryan, 1985, 1991). Environments that are excessively controlling, for example, are expected to forestall internalization, fixating regulation at external or introjected styles. A child who is highly controlled by parents will, at best, introject their demands and thus not experience an I-PLOC for the compliant behavior (Grolnick et al., in press). Excessive controls can also lead to less internalization of parental values and more peer-oriented socialization (Fuligni & Eccles, 1993). Similarly, a child who is detached from parents (i.e., lacks a sense of relatedness) will likely fail to fully internalize their values and regulations (Ryan & Lynch, 1989; Ryan, Stiller, & Lynch, 1994). By contrast, autonomy support conduces toward more active assimilation and identification with parental values and regulations, and toward a greater experience of autonomy when acting on these identifications (Grolnick et al., in press; Ryan & Stiller, 1991).

Finally, the practices that parents or cultures demand must be calibrated to the existing competencies of the child if full integration is to occur. Demands for an action whose basis cannot yet be grasped or understood because of cognitive immaturity could at best be introjected, as when parents demand sharing behaviors from a 13-month-old child or expect social amenities to be exhibited by a toddler. Social learning must occur at an optimally challenging pace relative to developmental capacities if it is to be internalized in a way that facilitates relative autonomy and a sense of social competency. In short, like intrinsic motivation proper, the integration of extrinsic regulations depends upon opportunities to experience autonomy (freedom from excessive control), relatedness (involvement and belongingness), and competence (conquering of optimal challenges).

We have examined the self-determination model of parenting in several settings and with varied methodologies. For example, in one study (Deci, Driver, Hotchkiss, Robbins, & Wilson, 1993) mothers and their 5- to 6-year-old children were videotaped in a free play situation with a target activity. Children's intrinsic motivation for the activity was measured at the end of that play period, and mothers' vocalizations were subsequently analyzed in terms of autonomy support versus control. Results showed that when mothers were more autonomy supportive in these interactions their children displayed greater intrinsic motivation. In another study, Grolnick and Ryan (1989) extensively interviewed parents regarding their styles of care and discipline, and then examined both teacher and child reports concerning the child's motivation in school. Parents who used more autonomy-supportive techniques of socialization had children who reported a greater I-PLOC for doing schoolwork, performed better, and were viewed by teachers as more self-motivated and competent. In addition, positive parental involvement (i.e., the conveyance of relatedness) also contributed to greater internalization. Thus, supports for both autonomy and relatedness were associated with children's more autonomous engagement in school.

Similar results attesting to the association between internalization processes and supports for autonomy, competence, and relatedness have been obtained in studies ranging over diverse domains including education (e.g., Connell & Wellborn, 1990; Vallerand & Bissonette, 1992), health care (Williams et al., 1996), religion (Ryan et al., 1993; Strahan, 1995), and work (Deci, Connell, & Ryan, 1989). Together they detail the specific factors associated with variations in regulation, from external to self-regulation.

Autonomy, Internalization, and Social Organization

The concept of internalization is critical to a developmental analysis of extrinsic motivation because it conveys how behaviors that are originally socially transmitted can become more or less assimilated to the self of the individual, and thereby become regulated in a relatively autonomous manner. Insofar as individuals are able to integrate the reasons for acting in accord with social prescriptions or constraints, they can become more fully coordinated within groups and cultures without experiencing alienation. Furthermore, as individuals become more autonomous in carrying out transmitted practices, they are in turn helping the group or culture become more stable and integrated.

Cultures, groups, and families—indeed, all social organizations—can themselves be characterized in terms of how well their members are coordinated or integrated. A stable social organization is one whose members have fully assimilated its rules and guidelines and who therefore experience transmitted social practices as autonomous activities. By contrast, unstable social groups are characterized, in part, by members who have only an external or introjected basis for enacting transmitted values. Internalization and integration therefore represent mediating processes between the organization processes of the individual that yield greater self-regulation and those at the level of the group that yield greater social cohesion (Kuhl & Fuhrmann, in press; Leontiev, 1932; Ryan, 1995; Vygotski, 1978).

We offer two broad considerations for understanding the degree of volitional fit between individuals and the social groups whose norms and values they must internalize. The first concerns the process of socialization. As outlined above, when socializing agents provide autonomy support and optimal challenges and convey a sense of belongingness, individuals will be more likely to internalize and integrate regulations. These factors operate both synergistically and configurally to determine the degree to which the process of socialization succeeds. For example, controlling methods of socialization, even if accompanied by a sense of belongingness, are expected to foster introjection rather than integration, and thus result in more ambivalent and less adjusted group members.

The second broad consideration concerns the content of socialization. Some transmitted contents are themselves inimical to the basic human needs for autonomy, competence, and relatedness and, thus, even under optimal socializing conditions, would never be fully assimilated by group members (Ryan et al., 1996). Walker and Parmar (1993) recently provided a provocative example of this in their interviews with mothers who subjected their daughters to a cultural practice of genital mutilation. The interviews revealed the regulation underlying this to be either heteronomous ("we have to do this") or introjected ("it is something we should do if we are to be accepted"). Similarly, socialized emotional suppression, (e.g., "men should never cry") can also, at most, be partially assimilated to the self because essential features of human nature are in conflict with such beliefs, at both physiological and psychological levels. Finally, Kasser and Ryan (1993, 1996) have investigated the relations of various transmitted values common in market economies to psychological integration. They found that holding very strong extrinsic aspirations consistently correlated with indicators of poor psychological health, suggesting that they are not, typically, well integrated motivations.

In sum, our view is that human behavior is quite plastic, but human autonomy is not. Humans can be controlled to do almost anything, but when acting autonomously they are far from infinitely malleable (Ryan, 1993). This reflects our position that autonomy, which we view as a holistic expression of "nature in context," will not result either from coercive forms of socialization or from transmitted practices or values that are inherently in conflict with basic psychological needs. Furthermore, when humans are autonomous, they are in touch with their true needs and are able to act in accord with them. Developmental conditions that are pathogenic include those that disrupt access to psychological needs and thus facilitate maladjustment and

misinformed goal structures (see Kuhl & Fuhrmann, in press; Ryan, 1995).

One further note concerns the fact that "social organization" is itself neither a unified structure nor a homogeneous influence. In modern life, individuals typically participate in multiple cultures, which in turn compete for the individual's allegiance and complicate the problem of integration (Gergen, 1993). Coordinating one's multiple identifications is an organizational challenge with many ramifications for mental health and well-being (Sheldon & Kasser, 1995; Sheldon, Ryan, Rawsthorne, & Ilardi, in press).

Neurobiology of Self-Regulation and Self-Control

Within an organizational view, autonomy, or any other behaviorally relevant process, must be related to the biological substrates through which it operates and which it, in turn, influences. Yet, most theories concerned with autonomy have traditionally avoided specific linkages with biological mechanisms (Crawford, 1987) as if a concern with mechanisms inevitably entails reductionism (Kuhl, 1996).

It is indeed the case that many neurobiological models are reductionistic (Cicchetti & Tucker, 1994), often axiomatically considering behavior and experience to be "accounted for" by elemental, material- or efficient-causal mechanisms that are said to operate in a unidirectional, bottom-up manner. The essential role of higher order regulatory processes (e.g., the dynamic goal structures that lead one to initiate or sustain behaviors involving lower order biological mechanisms) is neglected. Equally problematic, however, has been the corresponding tendency of many psychological theorists to leave the physical organism completely out of the picture, as if the higher order determinants of action were unconstrained by the machinery of the brain. Organizational thought avoids both types of myopia by recognizing that the regulatory processes underlying intentional action require a consideration of both biological and psychological processes, as well as their interaction.

Regarding behavioral regulation, one should expect that, in principle, actions characterized by autonomy versus control would involve different biological underpinnings. The reasons for this are straightforward. First, autonomous regulation draws upon information that is different from the information necessary for controlling regulation. Neural networks involved in self-regulatory processes are clearly experience-dependent, and thus may have distinct operating loci and dynamics. Specifically, autonomous regulation requires greater access to higher order reflective processes (Dworkin, 1988), holistic representations (Kuhl & Kazen, 1994), or the integrated set of feelings, desires, memories, values, and prior learnings that constitute the self (Deci & Ryan, 1991). For controlled regulation, however, the actor's task involves suppressing or inhibiting access to holistic representations and instead focusing on control-relevant information from the environment or its introjected structures. Second, autonomous versus controlling regulatory processes have different means through which component systems interact. In autonomy, there will be more cooperative involvement of relevant neurological component systems than in controlling regulation where suppression of many components is necessary. With autonomy, for example, there would be less top-down inhibition than would be required to control oneself. Accordingly, one would expect the processes of neural activation to be different in self-regulated versus controlled goal pursuits.

Kuhl and Fuhrmann (in press), after reviewing experimental and clinical evidence regarding neurobiological mechanisms that subserve self- versus controlled regulation, have begun to describe a general model of the biological and psychological processes in these different types of regulation. They emphasized the role of the prefrontal cortex as the functional locus of executive or coordinating functions that would be necessary for autonomous regulation. The prefrontal region has a rich network of both afferent and efferent connections with various systems of the brain that are essential to the regulation of action. Based on EEG and imaging data, Kuhl and colleagues have inferred that the right prefrontal cortex is highly activated in tasks requiring broad self-relevant information (e.g.,

Knight & Grabowecky, in press; Nakagawa, 1991), whereas it is inhibited in tasks requiring the execution of simple, response dispositions (cf. Pribram & McGuiness, 1992). This suggests then that the right prefrontal cortex may be particularly integral for autonomous regulation. Kuhl and colleagues have identified, for example, an inhibition effect, represented as slow positive potential shifts over the prefrontal region for people with a high "state orientation" (which is an individual difference involving a high level of controlled regulation) when they are in stress inducing situations (Haschke, Tennigheit, & Kuhl, 1994; Rosahl, Tennigheit, Kuhl, & Hascke, 1993). Similarly, they have cited research showing that patients with lesions of the prefrontal cortex often display severe deficits in volitional control, even when intellectual and motor functions remain intact, and also that, in stressful situations, individuals diagnosed with a wide variety of psychiatric disorders (which, presumably, involve diminished autonomy) display greater attenuation of higher order coordinating processes in the prefrontal cortex, relative to nondiagnosed controls (e.g., Knight, 1991; Luria, 1973). Taken together, this research provides evidence, albeit preliminary, that operation of the right prefrontal cortex is integral to autonomous regulation.

The particular importance of right prefrontal cortical processing to autonomous regulation is, according to Kuhl & Fuhrmann (in press), due to its being the locus of operation of holistic self-representations. This region is involved in retrieval from episodic memory (Nyberg, Cabeza, & Tulving, 1996), remote associations (Beeman et al., 1994, Nakagawa, 1991), and making judgments or decisions about emotional preferences (Damasio, Tranel, & Damasio, 1991), all of which involve the type of semantic networks that are necessary for access to holistic self information. Because autonomous self-regulation entails formulating intentions by processing information about one's current organismic state in relation to holistic self-representations (i.e., the integrated self), this reasoning also argues for the right prefrontal cortex being involved in such regulation.

Kuhl and colleagues (Kuhl, 1996; Kuhl & Fuhrmann, in press) theorize that activation of autonomous self-regulation and the corresponding access to holistic self-representations may be facilitated by increases in positive, global, and long-lasting (i.e., tonic) affect (or decreases in comparable negative affect). Accordingly, when individuals are exposed to optimally challenging or personally meaningful situations an elevation in positive, tonic affect would facilitate the necessary right prefrontal activity. In contrast, overly stressful situations can prompt elevation of negative, global, and tonic affect, which would in turn inhibit the integrative processes upon which such representations are dependent, particularly in individuals high in state orientation.

The neurobiological mechanisms theorized to underlie this affective globality are based on slow-acting, subcortical, neuromodulatory networks that emanate from the brain stem and limbic system and have widespread effects on cortical processes. This bottom-up modulation can be reciprocally stabilized by the effects of top-down modulation that originates in neocortical networks and influences the subcortical arousal systems. It is therefore possible that the extended semantic networks of the right prefrontal cortex that are necessary for integrated self-representations (Beeman et al., 1994; Derryberry & Tucker, 1991; Knight & Grabowecky, in press; Kuhl & Fuhrmann, in press; Nakagawa, 1991) would also help to stabilize positive emotional states. Thus, for example, this top-down modulation (Luria, 1973) could account for individuals' capacity to better recruit arousal and positive affect (e.g., interest) when they perceive an activity to be meaningful in terms of the integrated set of needs, values, and affects that represent *self*. Conversely, environmental stressors may have substantial impact on brainstem neuromodulatory systems, sensitizing activity control systems and behavioral reactivity, such that such integrative cognitions are circumvented (see also Cicchetti & Tucker, 1994).

The experience of autonomy, which involves knowing that one's behavior originated with the integrated self, could, accordingly, be explained in terms of a feed-forward signal emanating from processes in the right prefron-

tal cortex. In other words, positive, tonic affective states could function as experiential markers associated with regulation involving the semantic networks of holistic self-representation (Damasio et al., 1991).

It is important to recognize that only the global, tonic type of affect (as opposed to local, phasic affect) can have a substantial modulatory impact in either an upward or downward direction, because phasic affect cannot reach the wide neocortical networks theorized to contribute to self-representations and self-regulation. Although speculative, such models could help to explain the developmental significance of involved, autonomy-supportive parental styles discussed earlier. The positive emotional exchange resulting from autonomy-supportive parenting (Cohn & Tronick, 1987; Grolnick et al., in press; Keller & Gauda, 1987; MacDonald, 1992; Papousek & Papousek, 1987) involves participation of right-hemispheric cortical and subcortical systems that participate in global, tonic emotional modulation (Wittling, 1990) and of the broad semantic networks that are necessary for the representation of warm, autonomy-supportive social interactions (Beeman et al., 1994; Knight & Grabowecky, in press; Nakagawa, 1991). In sum, warm, autonomy-supportive social interactions may facilitate the integration of positive emotionality in ever more complex representations of the relation of self to others. The facilitating effect that positive emotionality has for gaining access to integrated self-representations (Kuhl & Fuhrmann, in press) could therefore be understood in terms of the early integration of positive emotionality with extended semantic networks that represent needs, values, and other self-related meanings.

In addition to being a developmental precursor to self-integrated positive emotionality, autonomy-supportive parenting could facilitate development of the ability to cope with negative emotionality elicited by threats and nonoptimal challenges in the environment. As mentioned, Kuhl and Fuhrmann (in press) proposed that unattenuated negative emotionality inhibits access to integrated self-representations resulting in the symptoms of controlled regulation, including alienation, self-infiltration, and unwanted ruminations (Kuhl & Beckmann, 1994; Kuhl & Kazen, 1994). However, autonomous activity prompted by involved, autonomy-supportive parenting could initiate downward regulation of this emotionality which would to some extent counteract the anxiety, a process that has been described on both the phenomenological (Freud, 1927/1962) and neurobiological levels (Bischof, 1993; Luiten et al., 1985). Because of the antagonism between negative emotionality and the integrated processing involved in autonomous activity, autonomy-supportive parenting, which provides comfort and security in stressful situations, is essential for children to develop the ability to maintain access to integrated self-representations in such situations.

In threatening situations when negative emotionality is not attenuated by autonomous activity, it would be necessary for greater use of downward inhibition, which is a costly top-down strategy for deactivation of competing tendencies (Kuhl & Fuhrmann, in press). Indeed, as we have mentioned, introjected control (as opposed to self-regulation) is characterized by a "shutting off" of subcognitive systems and their efferent feedback to the prefrontal cortex. Kuhl (1996) argued that the breakdown in goal maintenance (i.e., the akrasia) so often associated with introjected or controlled regulation is partially explained by the difficulties entailed in effecting such inhibition.

We have argued that people will at times autonomously self-regulate and at times be self-controlling because different social contexts conduce toward different regulatory processes. However, individuals can also develop chronic tendencies to execute behavior in one mode versus the other. Deci and Ryan (1985) used the concept of autonomous and controlled causality orientations to capture this distinction, and Kuhl and Fuhrmann (in press) proposed the concept of action orientation and state orientation to convey a somewhat related distinction. It is interesting to speculate how such individual differences in regulatory styles develop, especially those associated with psychopathology (Ryan et al., 1995). One set of sociogenetic speculations suggests that children exposed to cold, controlling, or other

aversive developmental contexts may adapt to their circumstances with neural inhibition of processes necessary for self-regulation, and in so doing gain enhanced capabilities for detecting external cues related to threats, controls, or stressors (Kuhl, 1984). Given the self-regulatory deficits of children exposed to neglect or abuse (e.g., Shields, Cicchetti, & Ryan, 1995) there is considerable value in understanding the neural as well as psychological processes underlying their adaptation.

Our brief discussion of the possible neurobiological aspects of autonomy is not intended to be comprehensive or definitive. Rather, it offers some preliminary findings and some speculative extrapolations that may relate to the biology of autonomy in order to highlight the conceptual point that self-regulation is a biological, as well as a psychological, phenomenon. In essence, that means nothing more than that autonomy is a descriptor of the fact that real, living, material entities engage in behaviors that vary in the degree to which they are self-determined, as a function of enduring dispositions, biological supports, and perceptions of social contexts. There is nothing antithetical about mechanistic models of the brain processes that subserve autonomous regulation, so long as one does not mistake them for complete accounts of the central, executive function which is subject to influences and constraints from higher order as well as lower order processes.

Autonomy as Evolved Capacity: Sociobiological Foundations

An organismic viewpoint on autonomy, to provide a full account of the concept, must consider not only the ontogenesis and social psychology of autonomy but also the basis by which such a central process of behavioral integration might have evolved as a species attribute. Minimally, this would entail considering the selective advantages that the capacity for autonomy might yield, but ideally it would also consider why humans evolved so as to possess both a phenomenological sensitivity to the difference between autonomous and heteronomous states and a preference for the former. Clearly, if autonomy does not provide selective advantages or enhance inclusive fitness, this sensitivity would not be a common characteristic in individuals across widely varying cultures and developmental epochs. To address this issue we separately consider the adaptive significance of intrinsic motivation (which is invariantly autonomous) and the tendency to integrate extrinsic motivation to the self (which yields autonomy).

Intrinsic motivation

The adaptive advantages of intrinsic motivation are most obvious for organisms facing changing circumstances or environments (Lorenz & Leyhausen, 1973). Curiosity plays a critical role in the acquisition of diverse adaptive competencies (Piaget, 1971; White, 1963) and therefore enhances capacities to cope with unforeseen challenges. As J. Heckhausen (1995) recently argued, diversity provides the "raw material" upon which unprecedented developmental advancements and adaptations are made. The seeking of new challenges and the pursuit of novel interests also help the individual avoid the high risks of too narrow a specialization (Heckhausen & Schultz, 1995). By the same token, intrinsic motivation promotes not only widespread exploration but also increased differentiation and refinement of specific skills (Deci, 1975). A relatively unexplored issue is the role of intrinsic motivation with respect to genetic predispositions toward strong interests or specific talents. Intrinsic motivation may play a critical role in facilitating the discovery of, and selective investment in, such areas, and in so doing aid the expression of individual genetic variability, which is an important aspect of selective processes in evolution. Intrinsic motivation, then, in the most general sense, yields selective advantages by supplying a built-in or natural motor for the acquisition of competencies and knowledge (White, 1963).

It is important to reiterate, however, that people do not, from a phenomenological viewpoint, explore or play because it is adaptive. They do so because it feels fun and vitalizing. Nonetheless, organisms that can find inherent pleasure in exercising and expanding their functioning may simply be more likely

to do so, suggesting that the positive feelings of vitality and interest that attend intrinsic motivation may themselves be selectively evolved features of human nature. The selective advantages conferred by being intrinsically motivated are thus the likely distal causes of its selection as a salient species attribute, even though such advantages are seldom the proximal reasons why such behaviors are performed in daily life. A further caveat is that, although intrinsic motivation is pervasive in humans, primates, and other species with protracted postnatal development, it is not an attribute shared equally by all living forms (Wilson, 1975). Specifically, some species are hatched more or less fully developed and their survival depends less on acquired knowledge than on a functional design well fit for their niche. Such species show less tendency toward intrinsic motivation (Lorenz & Leyhausen, 1973).

Internalization

Processes of internalization are critical at many levels of functioning, biological as well as psychological (Edelman, 1987; Magnusson, 1992). However, the specific tendency to integrate to the self socially transmitted regulations may afford particularly compelling functional advantages for creatures with a protracted developmental course. Internalization with regard to behavioral regulations enhances the fit of the individual within a social niche, which may have importance for purposes of both protection and inclusion. An included member benefits from reciprocal altruism within the group and gains access to resources, including mates (Tivers, 1971). Internalization also has implications for competency, as internalized regulations function to anticipate social situations and challenges and thus may result in greater efficacy.

Internalization processes also serve the aims of the social organization. They represent an instance of vertical coactions (Gottlieb, 1992) between the social organization (e.g., a cultural subgroup) and the individuals' developing personality structure. Clearly, a social organization can coordinate its members only if they are prepared to take on its regulations and thereby anchor themselves within it. Insofar as cultural evolution, which operates by its own transformational laws (Durham, 1990), results in institutional values or regulatory practices that enhance an individual's inclusive fitness, then having a robust tendency to internalize would be advantageous to a social animal.

In some ways, a readiness to introject might alone serve some of these adaptive functions. Clearly, introjection helps an individual to appear coordinated with the group, which in social animals has adaptive benefits (Hamilton, 1975; Tivers, 1971). False internalizations or self-infiltrations (Kuhl & Kazen, 1994) would exemplify this tendency because they represent a way that people deceive themselves and, as a result, are less detectable as outgroup members (Alexander, 1982). However, we argue that functionally well assimilated, centrally coordinated regulation of behavior—namely regulation through integration—is associated with less fractionated functioning, less need for inhibition of competing tendencies, and therefore smoother, less costly performance than regulatory processes based on introjection or compartmentalized identifications. Integration, when possible, is simply more efficient and effective, so the preference for autonomy may have evolved as a bootstrapping incentive for generating these more adaptive modes of functioning. Furthermore, evidence is emerging that more integrated regulatory functioning may be associated with a number of health and energy benefits, including less risky behaviors and greater energy (e.g., Ryan & Frederick, in press; Williams, Deci, & Ryan, in press). Finally, the integration of behavioral regulations provides an individual the freedom of functioning that permits purposeful activity aimed at need satisfaction and survival while at the same time participating actively as a member of the group. Integration means the individual is a member of the group without being subjugated by it: The I identifies with the We.

And what about the phenomenal feeling of autonomy? We have argued, along with deCharms (1968), that people typically have both direct personal knowledge of being an

origin versus pawn and a great sensitivity to the functional significance of environmental events with regard to their own autonomy (Deci & Ryan, 1985). Further, philosophers and writers have perennially been occupied with the meaning of such issues as freedom and control, attesting to the prominence of autonomy as an experiential issue. How might this sensibility regarding autonomy have evolved and/or conveyed adaptive advantage?

First, being able to detect autonomous versus heteronomous origins of action is an important means through which the organism can keep from having its needs or aims subverted by authorities or "parasites." If behavior were easily entrained by outside agents without ready detection, organisms would be at great risk for being used by others. Thus the sense of knowing whether one is an origin versus pawn and being sensitive to the functional significance (Deci & Ryan, 1985) of external inputs has an important cuing function with potential adaptive value. An additional and perhaps more important advantage, from a selective standpoint, derives from the fact that individuals vary considerably in their characteristic propensities and attributes. Phenotypically expressed variability is the basis by which evolutionary selection processes operate (Alexander, 1982). It has therefore been argued that an aspect of the functional design of the psyche which would be universally adaptive is some process through which the individual's expression of unique attributes could be known, integrated, and maximally employed in the pursuit of inclusive fitness (Slavin & Kreigman, 1992). The organismic integrative process through which this occurs is precisely what allows autonomous action. Thus, there are multiple reasons why the sensitivity to being an origin versus pawn, which supports the general function of self-regulation, may have evolved.

In our view, the capacity for autonomy, which includes the ability to self-direct behaviors in uncharted directions, is itself a biological feature of the human psyche. The tendencies to be intrinsically motivated, to internalize and integrate external regulations, and, more generally, to have what one does be centrally coordinated and endorsed have evolved precisely because they provide significant selective advantages. That is, autonomy (i.e., top-down influences based on integrated representations of a variety of needs and propensities of the organism) provides a functional basis for satisfaction of multiple challenges and constraints in a comprehensive way. Autonomy enables the organism to identify actions that provide optimal satisfaction of its needs.

In sum, the need for autonomy, like the need for relatedness (e.g., Baumeister & Leary, 1995; Ryan, 1995), is a deeply functional propensity. Although these considerations of adaptive advantage are neither complete nor definitive, they suggest that an evolutionary account of autonomy need not be incompatible with ontogentic and social-psychological analyses.

Autonomy as Central Construct in Study of Developmental Psychopathology

Throughout this paper we have suggested that both phenomenological and functional accounts of psychopathology implicate disturbances of autonomy and integration. For example, many internalizing disorders entail a sense of being controlled by introjects or compelled toward certain standards, whether reachable or not. Externalizing disorders, on the other hand, often involve failures of internalization and/or a sense of being unable to control impulses or desires. Failures of internalization, as in amotivation and external regulation, can be similarly related to global types of pathology, such as depression and conduct disorder, respectively. For these reasons a plethora of clinicians have placed disturbances of autonomy at the heart of both mental illness and social alienation (e.g., Bruch, 1973; Jahoda, 1958; Kuhl & Beckmann, 1994; Lerner, 1988; Meissner, 1981; Ryan et al., 1995; Shapiro, 1981).

Our organismic view of autonomy has suggested several reasons for the broad significance of autonomy in both optimal and nonoptimal developmental outcomes. First, autonomy represents a "deep structure" in the

evolved design of the human psyche (Slavin & Kreigman, 1992). Its disruption is therefore likely, from a psychological perspective, to have a broad array of effects. Second, autonomy is a central feature of the processes through which individuals get their needs met (Ryan, 1995). People lacking autonomy cannot access the holistic knowledge necessary to identify what they need (Kuhl & Fuhrmann, in press), so they are vulnerable to falling victim to goals and aims that actually detract from development and health (e.g., Sheldon & Kasser, 1996; Ryan et al., 1996). Finally, the etiological factors associated with deficits in autonomous functioning are wide ranging, and include genetic, neurobiological, psychological, and social variables.

Because autonomy is a broad developmental process that can be disrupted or facilitated by multiple types of factors operating on different levels of analysis, variations in it will have wide-ranging irradiating impact both temporally and functionally. For example, disruptions in the early development of autonomy can be expected to have cascading effects, with implications not only for cognitive and emotional regulation but also for the acquisition of social competencies and identities. Equally so, disruptions of cognitive capacities or their neurobiological underpinnings can impact upon autonomous regulation, as we have detailed, and even upon the social environmental treatment of the individual, which in turn affects the further development of autonomy in and across life domains. This is only to say that autonomy, like any other broad developmental line subserving growth and adaptation, is deeply embedded in multicasual networks which require equally multifaceted conceptual models to be understood. The organizational viewpoint espoused by developmental psychopathogists (e.g., Cicchetti & Cohen, 1995; Cicchetti & Tucker, 1994) seems particularly apt for this task.

Nonetheless, the study of autonomy and its relations to psychopathology will entail a continual interplay between investigation of healthy individuals and of those who manifest various forms of developmental psychopathology. A plethora of studies have shown that greater relative autonomy at various stages of development is associated with multiple aspects of optimized personal functioning, crossing both cognitive and social domains, and studies of the contexts surrounding such optimal functioning have told us much about facilitating factors that contribute to growth and well-being. Conversely, the study of disrupted self-regulation informs the study of autonomy, not only in terms of the mechanisms through which it operates, and the contextual risk factors that can undermine its development, but also the multiple systems upon which it is dependent and in which it is implicated.

Historically, autonomy has been considered by some to be a transcendent human quality, and by others a mere epiphenomenon that is reducible to lower order mechanisms. An organizational view renders neither of these alternatives viable. Instead, within the organismic paradigm, autonomy is a natural phenomenon with corporeal and mental manifestations. Autonomy is not an irreducible philosophical concept but rather an empirically definable construct concerning the processes through which behavioral propensities are coordinated, regulated, and unified in action and experience. Autonomy does not represent a freedom from determinants but rather an attunement and alignment of the organism toward some determinants rather than others. Viewed in this way it makes sense that autonomy would be reflected in distinct types of brain functioning and distinct types of experience and would emerge robustly only in the presence of specific social nutriments. Finally, autonomy is itself not simply a human attribute but one with a deep history among living systems. Self-regulating humans can thus be viewed as members of an evolving social species that has a deeply structured psychological need to be the origin of behavior and that can, under very specific conditions, synthesize new ways of behaving and, at times, even envision and construct a better environment for meeting their needs. However, under conditions of need deprivation, organic perturbation, or deleterious cultural demands, self-regulation can be undermined, resulting in diverse forms of psychopathology.

References

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment*. Hillsdale, NJ: Erlbaum.

Alexander, R. D. (1982). *Darwinism and human affairs*. Seattle, WA: University of Washington Press.

Amabile, T. M. (1996). *Creativity in context*. New York: Westview Press.

Arend, R., Gove, F., & Sroufe, L. A. (1979). Continuity of adaptation from infancy to kindergarten: A predictive study of ego-resiliency and curiosity in preschoolers. *Child Development, 50,* 950–959.

Augros, R., & Stanciu, G. (1987). *The new biology: Discovering the wisdom in nature*. Boston: New Science Library.

Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist, 44,* 1175–1184.

Bartley, W. W., III. (1987). Philosophy of biology versus philosophy of physics. In G. Radnitzky & W. W. Bartley III (Eds.), *Evolutionary epistemology, rationality, and the sociology of knowledge* (pp. 7–45). La Salle, IL: Open Court.

Baumeister, R., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117,* 497–529.

Beeman, M., Friedman, R. B., Grafman, J., Perez, E., Diamond, S., & Lindsay, M. B. (1994). Summation priming and coarse coding in the right hemisphere. *Journal of Cognitive Neuroscience, 6,* 26–45.

Bem, D. J. (1967). Self-perception: An alternative interpretation of cognitive dissonance phenomena. *Psychological Review, 74,* 183–200.

Benson, P. (1987). Freedom and value. *Journal of Philosophy, 9,* 465–487.

Bertalanffy, L. von (1968) *General Systems Theory*. New York: G. Braziller.

Bergson, H. (1911). *Creative evolution* (A. Mitchell, Trans.). New York: H. Holt & Co.

Bichat, X. (1815). *Physiological researches on life and death* (F. Gold, Trans.). London: Longman.

Bischof, N. (1993). Untersuchungen zur systemanalyse der sozialen motivation I: Die regulation der sozialen distanz—Von der feldtheorie zur systemtheorie. *Zeitschrift fuer Psychologie, 201,* 5–43.

Bretherton, I. (1987). New perspectives on attachment relations: Security, communication and internal working models. In J. Osofsky (Ed.), *Handbook of infant development* (pp. 1061–1100). New York: Wiley.

Broughton, J. M. (1987). *Critical theories of psychological development*. New York: Plenum.

Bruch, H. (1973). *Eating disorders*. New York: Basic Books.

Campbell, D. T. (1974). Evolutionary epistemology. In P. A. Schilpp (Ed.), *The philosophy of Karl Popper* (pp. 413–463). LaSalle, IL: Open Court.

Chandler, C. L., & Connell, J. P. (1987). Children's intrinsic, extrinsic and internalized motivation: A developmental study of children's reasons for liked and disliked behaviours. *British Journal of Developmental Psychology, 5,* 357–365.

Cicchetti, D. (1991). Fractures in the crystal: Developmental psychopathology and the emergence of self. *Developmental Review, 11,* 271–287.

Cicchetti, D. & Cohen, D. J. (1995). Perspectives on developmental psychopathology. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental psychopathology: Vol. 1. Theory and methods* (pp. 3–20). New York: Wiley.

Cicchetti, D., & Tucker, D. (1994). Development and self-regulatory structures of the mind. *Development and Psychopathology, 6,* 533–549.

Cohn, J. F., & Tronick, E. Z. (1987). Mother–infant face-to-face interaction: The sequence of dyadic states at 3, 6, and 9 months. *Developmental Psychology, 23,* 68–77.

Connell, J. P., & Wellborn, J. G. (1990). Competence, autonomy and relatedness: A motivational analysis of self-system processes. In M. R. Gunnar & L. A. Sroufe (Eds.), *The Minnesota Symposium on Child Psychology: Vol. 22. Self-processes in development* (pp. 43–77). Hillsdale, NJ: Erlbaum.

Crawford, C. (1987). Sociobiology: Of what value to psychology? In C. Crawford, M. Smith, & D. Krebs (Eds.), *Sociobiology and psychology* (pp. 3–30). Hillsdale, NJ: Erlbaum.

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety*. San Francisco: Jossey–Bass.

Damasio, A. R., Tranel, D., & Damasio, H. C. (1991). Somatic markers and the guidance of behavior: Theory and preliminary testing. In H. S. Levin, H. M. Eisenberg, & A. L. Benton (Eds.), *Frontal lobe function and dysfunction* (pp. 217–229). Oxford: Oxford University Press.

Danner, F. W. & Lonky, E. (1981). A cognitive–developmental approach to the effects of rewards on intrinsic motivation. *Child Development, 52,* 1043–1052.

deCharms, 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. (1975). *Intrinsic motivation*. New York: Plenum.

Deci, E. L. (1980). *The psychology of self-determination.* Lexington, MA: D. C. Heath.

Deci, E. L., Connell, J. P., & Ryan, R. M. (1989). Self-determination in a work organization. *Journal of Applied Psychology, 74,* 580–590.

Deci, E. L., Driver, R. E., Hotchkiss, L., Robbins, R. J., & Wilson, I. M. (1993). The relation of mothers' controlling vocalizations to children's intrinsic motivation. *Journal of Experimental Child Psychology, 55,* 151–162.

Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality, 62,* 119–142.

Deci, E. L., & Ryan, R. M. (1980). The empirical exploration of intrinsic motivational processes. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 13, pp. 39–80). New York: Academic Press

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Deci, E. L., & Ryan, R. M. (1987). The support of autonomy and the control of behavior. *Journal of Personality and Social Psychology, 53,* 1024–1037.

Deci, E. L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. In R.

Dienstbier (Ed.), *Nebraska Symposium on Motivation: Vol. 38. Perspectives on motivation* (pp. 237–288). Lincoln, NE: University of Nebraska Press.

Deci, E. L., Ryan, R. M., & Williams, G. C. (1996). Need satisfaction and the self-regulation of learning. *Learning and Individual Differences, 8,* 165–183.

Derryberry, D., & Tucker, D. M. (1991). The adaptive base of the neural hierarchy: Elementary motivational controls on network function. In R. Dienstbier (Ed.), *Nebraska Symposium on Motivation: Vol. 38. Perspectives on motivation* (pp. 289–342). Lincoln, NE: University of Nebraska Press.

Dreisch, H. (1908). *The science and philosophy of the organism*. London: Black.

Durham, W. H. (1990). Advances in evolutionary culture theory. *Annual Review of Anthropology, 19,* 187–210.

Dworkin, G. (1988). *The theory and practice of autonomy*. New York: Cambridge University Press.

Eagle, M. N. (1991). Psychoanalytic conceptions of the self. In J. Strauss & G. R. Goethals (Eds.), *The self: Interdisciplinary approaches*. New York: Springer–Verlag.

Edelman, G. (1987). *Neurodarwinism*. New York: Basic Books.

Edelstein, W. (1995). The social construction of cognitive development. In W. Edelstein et al. (Eds.), *Developmental dynamics: The effects of internal and external constraints on development* (pp. 78–93). Berlin: Max Planck Institute.

Egeland, B., & Farber, E. (1984). Infant–mother attachment: Factors related to its development and changes over time. *Child Development, 55,* 753–771.

Elkind, D. (1971). Cognitive growth cycles in mental development. In J. K. Cole (Ed.), *Nebraska Symposium on Motivation* (Vol. 19, pp. 1–31). Lincoln, NE: University of Nebraska Press.

Flavell, J. (1977). *Cognitive development*. Englewood Cliffs, NJ: Prentice–Hall.

Fodor, J. A. (1983). *The modularity of mind*. Cambridge, MA: MIT Press.

Freud, S. (1962). *The ego and the id*. New York: Norton. (Original work published 1923)

Freud, S. (1962). Inhibitions, symptoms and anxiety. In J. Strachey (Ed. and Trans.), *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 20, pp. 87–174). London: Hogarth Press. (Original work published 1927)

Fuligini, A. J., & Eccles, J. S. (1993). Perceived parent–child relationships and early adolescents' orientation toward peers. *Developmental Psychology, 4,* 622–632.

Gergen, K. J. (1993). *The saturated self*. New York: Basic Books.

Goldman–Rakic, P. S. (1987). Circuitry of primate prefrontal cortex and regulation of behavior by representational knowledge. In F. Plum & V. Mountcastle (Eds.), *Handbook of physiology* (Vol. 5, pp. 373–417). Bethesda, MD: American Physiological Society.

Goldstein, K. (1939). *The organism*. New York: American Book Company.

Gottlieb, G. (1992). *Individual development and evolution: The genesis of novel behavior*. New York: Oxford University Press.

Greenspan, S. I. (1979). *Intelligence and adaptation*. New York: International University Press.

Greenstein, A., & Koestner, R. (1996). *Success in maintaining new year's resolutions: The value of self-determined reasons*. Paper presented at the International Congress of Psychology, Montreal, Ouebec, Canada.

Greenwald, A. G. (1982). Ego task analysis: An integration of research on ego-involvement and self-awareness. In A. H. Hastorf & A. M. Isen (Eds.), *Cognitive social psychology* (pp. 109–147). New York: Elsevier.

Grolnick, W. S., Frodi, A., & Bridges, L. (1984). Maternal control styles and the mastery motivation of one-year-olds. *Infant Mental Health Journal, 5,* 72–82.

Grolnick, W. S., Deci, E. L., & Ryan, R. M. (in press). Internalization within the family: The self-determination theory perspective. In J. E. Grusec & L. Kuczynski (Eds.), *Parenting strategies and children's internalization of values: A handbook of theoretical and research perspectives*. New York: Wiley.

Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: An experimental and individual difference investigation. *Journal of Personality and Social Psychology, 52,* 890–898.

Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children' self-regulation and competence in school. *Journal of Educational Psychology, 81,* 143–154.

Hamilton, W. D. (1975). Innate social aptitudes of man: An approach from evolutionary genetics. In R. Fox (Ed.), *Biosocial anthropology* (pp. 133–155). New York: Wiley.

Harter, S. (1983). Developmental perspectives on the self-system. In E. M. Hetherington (Ed.), *Handbook of child psychology: Vol. 4. Socialization, personality and social development* (4th ed., pp. 275–386). New York: Wiley.

Haschke, R., Tennigkeit, M., & Kuhl, J. (1994). Personality and task-related slow potential shifts. In J. Kuhl & J. Beckmann (Eds.), *Volition and personality* (pp. 475–483). Seattle, WA: Hogrefe and Huber.

Heckhausen, H. (1991). *Motivation and action*. Berlin: Springer–Verlag.

Heckhausen, J. (1995). *Developmental regulation in adulthood: Age-normative and sociocultural constraints as adaptive challenges*. Berlin: Max Planck Institute.

Heckhausen, J. (1997). Developmental regulation across adulthood: Primary and secondary control of age-related challenges. *Developmental Psychology, 33,* 176–187.

Heckhausen, J., & Schulz, R. (1995). A life-span theory of control. *Psychological Review, 102,* 284–304.

Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.

Helmholtz, H. L. (1861, April). On the application of the law of conservation of force to organic nature. *Notice of the Proceedings of the Royal Institute of Great Britain*.

Hill, T. E. (1991). *Autonomy and self-respect*. Cambridge, MA: Cambridge University Press.

Hunt, J. McV. (1965). Intrinsic motivation and its role in psychological development. In D. Levine (Ed.), *Nebraska Symposium on Motivation* (Vol. 13, pp. 189–282). Lincoln, NE: University of Nebraska Press.

Jacob, F. (1973). *The logic of life: A history of heredity*. New York: Pantheon.

Jahoda, M. (1958). *Current concepts of positive mental health*. New York: Basic Books.

Jonas, H. (1966). *The phenomenon of life: Toward a philosophical biology*. New York: Dell.

Jung, C. G. (1923). *Psychological types: The psychology of individuation* (H. Godwin Baynes, Trans.). New York: Harcourt Brace.

Kasser, T., & Ryan, R. M. (1993). A dark side of the American dream: Correlates of financial success as a central life aspiration. *Journal of Personality and Social Psychology, 65,* 410–422.

Kasser, T., & Ryan, R. M. (1996). Further examining the American dream: Differential correlates of intrinsic and extrinsic goals. *Personality and Social Psychology Bulletin 22,* 80–87.

Keller, H., & Gauda, G. (1987). Eye contact in the first months of life and its developmental consequences. In H. Rau & H. C. Steinhauser (Eds.), *Psychobiology and early development* (pp. 129–143). Amsterdam: Elsevier.

Knight, R. T. (1991). Evoked potential studies of attention capacity in human frontal lobe lesions. In H. S. Levin, H. M. Eisenberg, & A. L. Benton (Eds.), *Frontal lobe function and dysfunction* (pp. 139–153). Oxford: Oxford University Press.

Knight, R. T., & Grabowecky, M. (in press). Escape from linear time: Pre-frontal cortex and conscious experience. In M. S. Gazzaniga (Ed.), *The cognitive neurosciences.* Cambridge, MA: MIT Press.

Koestner, R., & Losier, G. F. (1996). Distinquishing reactive versus reflective autonomy. *Journal of Personality, 64,* 465–494.

Koestner, R., & McClelland, D. C. (1990). Perspectives on competence motivation. In L. A. Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 527–548). New York: Guilford Press.

Koestner, R., Ryan, R. M., Bernieri, F., & Holt, K. (1984). Setting limits on children's behavior: The differential effects of controlling versus informational styles on intrinsic motivation and creativity. *Journal of Personality, 52,* 233–248.

Krapp, A. (1994). Interest and curiosity. The role of interest in a theory of exploratory action. In H. Keller, K. Schneider, & B. Henderson (Eds.), *Curiosity and exploration* (pp. 79–99). Berlin: Sringer–Verlag.

Krapp, A., Hidi, S., & Renninger, K. A. (1992). Interest, learning and development. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development* (pp. 3–24). Hillsdale, NJ: Erlbaum.

Kuhl, J. (1984). Motivational aspects of achievement motivation and learned helplessness. In B. A. Mahler & W. B. Mahler (Eds.), *Progress in experimental personality research* (Vol. 13, pp. 99–171). New York: Academic Press.

Kuhl, J. (1992). A theory of self-regulation: Action versus state orientation, self-discrimination, and some applications. *Applied Psychology, 41,* 95–173.

Kuhl, J. (1996). *Personality and volition: Centrally organized patterns of motivation–cognition interactions*. Unpublished manuscript, University of Osnabrück.

Kuhl, J., & Beckmann, J. (1994). Alienation: Ignoring one's preferences. In J. Kuhl & J. Beckmann (Eds.), *Volition and personality* (pp. 475–483). Seattle: Hogrefe and Huber.

Kuhl, J., & Fuhrmann, A. (in press). Decomposing self-regulation and self-control: The theoretical and empirical basis of the Volitional Components Checklist. In J. Heckhausen & C. Dweck (Eds.), *Motivation and control across the life-span*.

Kuhl, J., & Halle, P. (1994). Motivational and volitional determinants of depression: The degenerated-intention hypothesis. In J. Kuhl & J. Beckmann (Eds.), *Volition and personality: Action versus state orientation* (pp. 283–296). Seattle: Hogrefe & Huber.

Kuhl, J., & Kazen, M. (1994). Self-discrimination and memory: State orientation and false self-ascription of assigned activities. *Journal of Personality and Social Psychology, 66,* 1103–1115.

La Mettrie, J. O. (1961). *Man as machine*. La Salle, IL: Open Court. (Original work published 1748)

Laszlo, E. (1987). *Evolution: The grand synthesis*. Boston: New Science Library.

Leontiev, A. N. (1932). The development of voluntary attention in the child. *Journal of Genetic Psychology, 40,* 52–83.

Lepper, M. R., & Greene, D. (1978). *The hidden costs of reward*. Hillsdale, NJ: Erlbaum.

Lepper, M. R., Keavney, M., & Drake, M. (1996). Intrinsic motivation and extrinsic rewards: A commentary on Cameron and Pierce's meta-analysis. *Review of Educational Research, 66,* 5–32.

Lerner, H. G. (1988). *Women in therapy*. Northvale, NJ: J. Aronson.

Loeb, J. (1906). *The dynamics of living matter*. New York: Columbia University Press.

Loevinger, J. (1976). *Ego development*. San Francisco: Jossey–Bass.

Loevinger, J., & Blasi, A. (1991). Development of the self as subject. In J. Strauss & G. R. Goethals (Eds.), *The self: Interdisciplinary approaches* (pp. 150–167). New York: Springer–Verlag.

Lorenz, K. (1955). *Man meets dog*. London: Methuen.

Lorenz, K., & Leyhausen, P. (1973). *Motivation of human and animal behavior; An ethological view* (B. A. Tonkin, Trans.). New York: Van Nostrand Reinhold.

Luiten, P., Koolhaas, J., de Boer, S., & Koopmans, S. (1985). The corticomedial amygdala in the central nervous system organization of agonistic behavior. *Brain Research, 332,* 283–297.

Luria, A. R. (1973). *The working brain*. London: Penguin.

MacDonald, K. (1992). Warmth as a developmental construct: An evolutionary analysis. *Child Development, 63,* 753–773.

Magnusson, D. (1992). Back to the phenomena: Theory, methods, and statistics in psychological research. *European Journal of Personality, 6,* 1–14.

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review, 50,* 370–396.

Mayr, E. (1982). *The growth of biological thought: Diversity, evolution, and inheritance*. Cambridge, MA: Harvard University Press.

McAdams, D. P. (1990). *The person: An introduction to personality psychology*. New York: Harcourt Brace Jovanovich.

Meissner, W. W. (1981). *Internalization in psychoanalysis*. New York: International Universities Press.

Mele, A. R. (1987). *Irrationality: An essay on akrasia, self-deception, and self-control*. New York: Oxford University Press.

Mischel, W., & Shoda, Y. (1995). A cognitive-affective system of personality: Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review, 102,* 246–268.

Morgan, G. A., Harmon, R. J., & Maslin–Cole, C. A. (1990). Mastery motivation: Definition and measurement. *Early Education and Development, 1,* 318–339.

Nakagawa, A. (1991). Role of anterior and posterior attention networks in hemisphere asymmetries during lexical decisions. *Journal of Cognitive Neuroscience, 3,* 313–321.

Nicholls, J. G. (1984). Conceptions of ability and

achievement motivation. In R. Ames & C. Ames (Eds.), *Research on motivation in education: Student motivation* (pp. 39–73). New York: Academic Press.

Nicolis, G., & Prigogine, I. (1977). *Self-organization in nonequilibrium systems: From dissipative structures to order through fluctuation.* New York: Wiley.

Nyberg, L., Cabeza, R., & Tulving, E. (1996). PET studies of encoding and retrieval: The HERA model. *Psychonomic Bulletin & Review, 3,* 135–148.

Overton, W. F. (1991). The structure of developmental theory. In P. Van Geert & L. P. Mos (Eds.), *Annals of theoretical psychology* (Vol. 7, pp. 191–235). New York: Plenum.

Papousek, H., & Papousek, M. (1987). Intuitive parenting: A dialectic counterpart to the infant's integrative competence. In J. D. Osofsky (Ed.), *Handbook of infant development.* New York: Wiley.

Perls, F. S. (1973). *The Gestalt approach and eyewitness to therapy*. Ben Lomond, CA: Science and Behavior Books.

Pfander, A. (1911). Motive und motivation. In A. Pfander (Ed.), *Munchener philosophische abhandlungen (Festschrift fur Theodor Lipps)* (pp. 163–195). Leipzig: Barth.

Piaget, J. (1952). *The origins of intelligence in children*. New York: International Universities Press.

Piaget, J. (1971). *Biology and knowledge*. Chicago: University of Chicago Press.

Polanyi, M. (1958). *Personal knowledge*. Chicago: University of Chicago Press.

Pribram, K. H., & McGuiness, D. (1992). Attentional and para-attentional processing: Event-related brain potentials as tests of a model. *Annals of the New York Academy of Sciences, 658,* 65–92.

Pritchard, M. S. (1991). *On becoming responsible*. Lawrence, KS: University of Kansas Press.

Ricoeur, P. (1966). *Freedom and nature: The voluntary and the involuntary* (E. V. Kohak, Trans.). Chicago: Northwestern University Press.

Rogers, C. (1963). The actualizing tendency in relation to "motives" and to consciousness. In M. R. Jones (Ed.), *Nebraska Symposium on Motivation* (Vol. 11, pp. 1–24). Lincoln, NE: University of Nebraska Press.

Rosahl, S. K., Tennigheit, M., Kuhl, J., & Hascke, R. (1993). Handlungskontrolle und langsame hirnpotentiale: Untersuchngen zum einfluss subjectiv kritischer worter. *Zeitschrift fur Medizinische Psychologie, 2,* 1–8.

Rosenberg, A. (1985). *The structure of biological science*. Cambridge: Cambridge University Press.

Ruble, D. N., & Thompson, E. P. (1992). The implications of research on social development for mental health. In D. Ruble, P. Costanzo, & M. Oliveri (Eds.), *The social psychology of mental health* (pp. 81–125). New York: Guilford.

Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology, 43,* 450–461.

Ryan, R. M. (1993). Agency and organization: Intrinsic motivation, autonomy and the self in psychological development. In J. Jacobs (Ed.), *Nebraska Symposium on Motivation: Vol. 40. Developmental perspectives on motivation* (pp. 1–56). Lincoln, NE: University of Nebraska Press.

Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality, 63,* 397–427.

Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology, 57,* 749–761.

Ryan, R. M., Connell, J. P., & Deci, E. L. (1985). A motivational analysis of self-determination and self-regulation in education. In C. Ames & R. E. Ames (Eds.), *Research on motivation in education: The classroom milieu* (pp. 13–51). New York: Academic Press.

Ryan, R. M., Deci, E. L., & Grolnick, W. S. (1995). Autonomy, relatedness, and the self: Their relation to development and psychopathology. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental psychopathology: Vol. 1. Theory and methods* (pp. 618–655). New York: Wiley.

Ryan, R. M., & Frederick, C. M. (in press). On energy, personality and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality*.

Ryan, R. M., & Grolnick, W. S. (1986). Origins and pawns in the classroom: Self-report and projective assessments of individual differences in children's perceptions. *Journal of Personality and Social Psychology, 50,* 550–558.

Ryan, R. M., Koestner, R., & Deci, E. L. (1991). Ego-involved persistence: When free-choice behavior is not intrinsically motivated. *Motivation and Emotion, 15,* 185–205.

Ryan, R. M., & Lynch, J. (1989). Emotional autonomy versus detachment: Revisiting the vicissitudes of adolescence and young adulthood. *Child Development, 60,* 340–356.

Ryan, R. M., Plant, R. W., & O'Malley, S. (1995). Initial motivations for alcohol treatment: Relations with patient characteristics, treatment involvement and dropout. *Addictive Behaviors, 20,* 279–297.

Ryan, R. M., Rigby, S., & King, K. (1993). Two types of religious internalization and their relations to religious orientations and mental health. *Journal of Personality and Social Psychology, 65,* 586–596.

Ryan, R. M., Sheldon, K. M., Kasser, T., & Deci, E. L. (1996). All goals are not created equal: An organismic perspective on the nature of goals and their regulation. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (pp. 7–26). New York: Guilford.

Ryan, R. M., & Stiller, J. (1991). The social contexts of internalization: Parent and teacher influences on autonomy, motivation and learning. In P. R. Pintrich & M. L. Maehr (Eds.), *Advances in motivation and achievement: Vol. 7. Goals and self-regulatory processes* (pp. 115–149). Greenwich, CT: JAI Press.

Ryan, R. M., Stiller, J., & Lynch, J. H. (1994). Representations of relationships to teachers, parents, and friends as predictors of academic motivation and self-esteem. *Journal of Early Adolescence, 14,* 226–249.

Rychlak, J. F. (1975). Psychological science as a humanist views it. *Nebraska Symposium on Motivation, 23,* 205–279.

Ryle, G. (1949). *The concept of mind*. London: Hutchinson.

Schroeder, E., & Edelstein, E. (1991). Intrinsic and external contraints on the development of cognitive competence. In M. Chandler & M. Chapman (Eds.), *Criteria for assessment: Controversies in the conceptualization and assessment of children's abilities* (pp. 131–152). Hillsdale, NJ: Erlbaum.

Shapiro, D. (1981). *Autonomy and rigid character*. New York: Basic Books.

Sheldon, K. M., & Elliot, A. J. (in press). Not all personal goals are personal: Comparing autonomous and controlled reasons for goals as predictors of effort and attainment. *Personality and Social Psychology Bulletin.*

Sheldon, K. M., & Kasser, T. (1995). Coherence and congruence: Two aspects of personality integration. *Journal of Personality and Social Psychology, 68,* 531–543.

Sheldon, K. M., Ryan, R. M., Rawsthorne, L., & Ilardi, B. (in press). "True" self and "trait" self: Cross-role variation in the Big Five traits and its relations with authenticity and well-being. *Journal of Personality and Social Psychology*.

Shields, A. M., Cicchetti, D., & Ryan, R. M. (1994). The development of emotional and behavioral self-regulation and social competence among maltreated school-age children. *Development and Psychopathology, 6,* 57–75.

Sinnott, E. W. (1958). *Mind, matter and man*. London: Allen & Unwin.

Skinner, E. A. (1996). A guide to constructs of control. *Journal of Personality and Social Psychology, 71,* 549–570.

Slavin, M., & Kreigman, D. (1992). *The adaptive design of the human psyche*. New York: Guilford.

Sperry, R. W. (1969). A modified concept of consciousness. *Psychological Review, 76,* 532–536.

Sperry, R. W. (1977). Bridging science and values: A unifying view of mind and brain. *American Psychologist, 32,* 237–245.

Spiegelberg, H. (1972). *Phenomenology in psychology and psychiatry*. Evanston, IL: Northwestern University Press.

Stern, D. N. (1985). *The interpersonal world of the infant*. New York: Basic Books.

Strahan, B. J. (1995). *Marriage Family and Religion*. Sydney, Australia: Adventist Institute of Family Relations.

Strauss, J., & Ryan, R. M. (1987). Autonomy disturbances in subtypes of anorexia nervosa. *Journal of Abnormal Psychology, 96,* 254–258.

Tivers, R. L. (1971). The evolution of reciprocal altruism. *Quarterly Review of Biology, 46,* 35–37.

Vallerand, R. J. (in press). Toward a hierarchical model of intrinsic and extrinsic motivation. *Advances in experimental social psychology*.

Vallerand, R. J., & Bissonnette, R. (1992). Intrinsic, extrinsic, and amotivational styles as predictors of behavior: A prospective study. *Journal of Personality, 60,* 599–620.

Vygotski, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge: Harvard University Press.

Walker, A., & Parmar, P. (1993). *Warrior marks: Female genital mutilation and the sexual blinding of women*. New York: Harcourt Brace.

Werner, H. (1948). *Comparative psychology of mental development*. New York: International Universities Press.

White, R. W. (1963). *Ego and reality in psychoanalytic theory*. New York: International Universities Press.

Williams, G. C., Deci, E. L., & Ryan, R. M. (in press). Building health-care partnerships by supporting autonomy. In P. Hinton–Walker, A. L. Suchman, & R. Botelho (Eds.), *Partnerships, power and process: Transforming health care delivery*. Rochester, NY: University of Rochester Press.

Williams, G. C., Grow, V. M., Freedman, Z., Ryan, R. M., & Deci, E. L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology, 70,* 115–126.

Wilson, E. O. (1975). *Sociobiology: The new synthesis*. Cambridge, MA: Belknap.

Winnicott, D. W. (1965). *The maturational process and the facilitating environment*. New York: International Universities Press.

Wittling, W. (1990). Psychophysiological correlates of human brain asymmetry: Blood pressure changes during lateralized presentation of an emotionally laden film. *Neuropsychologia, 28,* 457–470.

Wolff, S. (1990). *Freedom within reason*. New York: Oxford University Press.