

Antecedents of Self-Regulation: A Developmental Perspective

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The emerging ability to comply with caregivers' dictates and to monitor one's own behavior accordingly signifies a major growth of early childhood. However, scant attention has been paid to the developmental course of self-initiated regulation of behavior. This article summarizes the literature devoted to early forms of control and highlights the different philosophical orientations in the literature. Then, focusing on the period from early infancy to the beginning of the preschool years, the author proposes an ontogenetic perspective tracing the kinds of modulation or control the child is capable of along the way. The developmental sequence of monitoring behaviors that is proposed calls attention to contributions made by the growth of cognitive skills. The role of mediators (e.g., caregivers) is also discussed.

During the second year of life, children increasingly demonstrate signs of selfhood and autonomy. This growing sense of identity, coupled with the ability to recall the dictates of caregivers, leads to a new dimension in behavior. Children begin to appraise the requirements of social and nonsocial situations and to monitor their own behavior accordingly. Slowly and precariously they move toward self-regulation, an achievement that Flavell (1977) describes as being "one of the really central and significant cognitive-developmental hallmarks of the early childhood period" (p. 64).

Self-regulation, studied extensively with older children and adults (see Kanfer & Karoly, 1972; Mischel & Patterson, 1979), merits consideration by students of early development. It has implications for understanding the nature of transitions from sen-

sorimotor levels of functioning to those organized around reflective thought, task-oriented behaviors, and social interactions. However, the topic has received only sporadic attention in the literature devoted to late infancy and early childhood, and little has been written about precursors or antecedents.

This article has two goals: (a) to examine briefly the literature about young children, pinpointing themes and issues of interest, and (b) to cast the antecedents of self-regulation into a developmental perspective. Encompassing a major portion of this article, this theoretical and speculative discussion highlights cognitive phenomena that occur prior to the emergence of self-regulation and describes the kinds of monitoring behaviors the child is capable of along the way. It is hoped that this formulation will provide an organizational framework for further research.

Self-Regulation and the Young Child

Self-regulation, a complex construct, has been variously defined as the ability to comply with a request, to initiate and cease activities according to situational demands, to modulate the intensity, frequency, and duration of verbal and motor acts in social and educational settings, to postpone acting upon a desired object or goal, and to generate socially approved behavior in the absence of

This article is an adapted and expanded version of a paper presented at the biennial meeting of the Society for Research in Child Development, San Francisco, March 1979. This work is supported by Contract No. 300-77-0306, from the U.S. Office of Education, Bureau of Education for the Handicapped.

Appreciation is extended to Joanne Krakow and Brian Vaughn for their continuing interest and comments about the ideas expressed in this article, to Deborah Stipek, John Weisz, and anonymous reviewers for thoughtful critiques of earlier drafts of the manuscript, and to E. H. Kopp for editorial advice.

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external monitors (Block & Block, 1979; Fenichel, 1945; Greenacre, 1950; Luria, 1959, 1960, 1961; Masters & Binger, 1978; Meichenbaum & Goodman, 1971; Mischel, 1973; Mischel & Patterson, 1979; Parke, 1974; Block & Block, Note 1; Mischel & Mischel, Note 2). Notwithstanding these differences in emphases (and ideology), it is generally agreed that self-regulation demands awareness of socially approved behaviors and thus represents a significant aspect of the socialization of children.

Theoretical perspectives addressing the early development of self-regulation are shown in Table 1. Primary features of each view are presented along with the approximate ages relevant behaviors are presumed to appear; mediators and influences upon

self-regulation are also noted. The material summarized in Table 1 suggests that a component of voluntary control over behavior emerges in the latter part of the first year and takes the form of infant compliance to a caregiver's request. The second and third years are emphasized for the onset of other control behaviors that implicitly or explicitly relate to the child's adoption of family and social standards. It is evident, however, that the constructs that have been proposed are either very narrow or very broad in scope, that they do not intersect with one another, and that the ages of interest represent only a portion of the infancy period.

Examination of the mediating factors identified in Table 1 shows that with increasing age, there is a shift in emphasis from

Table 1
Views of Early Forms of Self-Initiated Regulation

Topic	Features	Developmental trends	Mediators
Control and system organization ^a	Modulation of state of arousal, activation of early behaviors	Developmental agenda for late prenatal period to 3 mo.	Neurophysiological maturation, parent interactions and routines (feeding, sleeping, etc.)
Compliance ^b	Responsivity to warning signals	Emergence 9-12 mo.	Bias toward social behavior; quality of mother-child relationship
Impulse control ^c	Growth of ego, balance between action and verbalization	Emergence in the second year of life	Maturation factors (e.g., growth of language), availability of means for tension reduction, caregiver sensitivity to child's needs and attributes
Self-regulation ^d	Interiorization of social conduct, motor inhibition	Reaction in the second year to adult commands, auto-regulation to the child's own overt speech at 3-4 yrs., to covert speech (semantic meaning) at 6 yrs.	Communicative and social interactions, growth of language and the directive function of speech
Self-regulation ^e	Adoption of contingency rules that guide behavior irrespective of situational pressures	Preschool period onward	Cognitive processes (e.g., attentional strategies, plans, diversionary tactics); social class factors

^a Als, 1978. ^b Stayton, Hogan, & Ainsworth, 1971. ^c Fenichel, 1945; Greenacre, 1950; Mahler, Pine, & Bergman, 1975; Malone, 1978; Rexford, 1978. ^d Luria, 1960, 1961; Vygotsky, 1962. ^e Mischel, 1973, 1979; Mischel & Patterson, 1979; Mischel & Mischel, Note 2.

external sources of control to internal child factors. Both the psychodynamically oriented and the Russian views underscore these external sources as origins of control; however, the former stress affective-motivational origins embedded in the infant-parent relationship, whereas the latter highlight verbal communications inherent in parent-child interactions. Both theoretical approaches share the view that the progression from external to internal regulation is also influenced by maturational and experiential processes, although the specification of processes is largely uncharted.

Table 1 also shows that the conceptualization of self-regulation offered by Mischel and associates (Mischel & Patterson, 1979; Mischel & Mischel, Note 2) places strong emphasis on cognitive mediators that arise from within the child. Since Mischel has been primarily concerned with tracing the growth and organization of self-regulation after the preschool years (Mischel & Mischel, Note 2), neither origins nor specific social influences have received much attention.

Overall, the picture that emerges from the perspectives outlined in Table 1 is of children being socialized by others, and from this interactional process the capacity for self-regulation, in part, emerges. Language and cognition also play a role after a certain point in development is reached. What is unclear is how these processes and influences come together. What is also unclear is the role of early cognition and its impact on the child's being able to think in terms of self-initiated monitoring of behavior.

The questions and issues that have arisen because of gaps in the literature have prompted this attempt to cast the growth of early self-initiated control into a developmental framework. Congruent with others, this formulation emphasizes cognitive controls in the guidance of behavior (Klein, 1951, 1954; Mischel, 1973; Santostefano, 1980); however, the thesis is extended to very young children by suggesting that a fundamental level of cognition has to be obtained before the child can internalize caregiver expectations for self-initiated controls. Given

this, external influences become increasingly relevant.

An Ontogenetic Perspective

Several philosophical and organizational perspectives underlie the conceptualization to be presented in subsequent paragraphs. First, the scope of self-regulation is limited to behaviors manifested by pre-school-aged children (e.g., compliance, delay, self-monitoring in the absence of adults). This does not imply that preschoolers have attained an optimal level of maturity in self-regulatory processes but rather that they have reached a point where they are at least capable of manifesting a set of recognizable behaviors encompassed by self-regulation constructs. This significant achievement is therefore taken as a developmental end point. Accordingly the goal is to trace the younger child's progression to this level of functioning.

Second, the antecedents of self-regulation are described in terms of discontinuous developmental phases, each successive one signifying a qualitative change indicating higher levels of behavior. This approach is consonant with current perspectives that view much of early development as the emergence of new abilities or the reorganization of previous ones (Emde, Gaensbauer, & Harmon, 1976; Flavell, 1972; McCall, 1979; Piaget, 1952, 1954). The term *phase* rather than *stage* was selected to suggest gradual transitions rather than sharp boundaries.

Third, a specific terminology for each phase is used to call attention to distinguishing characteristics. Described more fully below, the phases consist of *neurophysiological modulation*, *sensorimotor modulation*, *control*, *self-control*, and *self-regulation*. The first signifies neurophysiological and reflexive adaptations to the environment, the second denotes sensorimotor adaptations in response to perceptual or motivational cues. The third, fourth, and fifth phases represent instances in which children use their cognitive abilities to intentionally control their own behavior with an awareness of caregiver wishes and expectations. However, as shown in Table 2, important features distinguish

Table 2
Phases of Control

Phases	Approximate ages	Features	Cognitive requisites
Neurophysiological modulation	Birth to 2-3 mo.	Modulation of arousal, activation of organized patterns of behavior	
Sensorimotor modulation	3 mo.-9 mo.+	Change ongoing behavior in response to events and stimuli in environment	
Control	12 mo.-18 mo.+	Awareness of social demands of a situation and initiate, maintain, cease physical acts, communication, etc. accordingly; compliance, self-initiated monitoring	Intentionality, goal-directed behavior, conscious awareness of action, memory of existential self
Self-control	24 mo.+	As above; delay upon request; behave according to social expectations in the absence of external monitors	Representational thinking and recall memory, symbolic thinking, continuing sense of identity
Self-regulation	36 mo.+	As above; flexibility of control processes that meet changing situational demands	Strategy production, conscious introspection, etc.

each of these from one another; they are discussed more fully below. The emphasis of this presentation is primarily focused upon the phases from neurophysiological modulation to self-control. As appropriate, caregiving practices or motivational considerations, are discussed throughout.

Developmental Phases

1. Neurophysiological Modulation (Birth to 2-3 Months)

Long before the young child is capable of self-regulation, there is a form of control in which arousal states are modulated and reflex movements are exhibited as organized patterns of functional behavior (e.g., the hand-to-mouth movement that the neonate utilizes for thumb-finger sucking). To recognize this type of control, it is proposed that the first phase be called neurophysiological modulation, signifying activation of neurophysiological mechanisms (Als, 1978; Brazelton, 1962, 1978) and reflex operations (Peiper, 1963; Piaget, 1952, 1954, 1970).

The term neurophysiological modulation subsumes processes that safeguard the immature organism from intrusive or strong stimulation. For example, incomplete neu-

rodevelopment in the central nervous system is presumed to restrict processing of many kinds of stimuli; thus protection is conferred by means of a "passive stimulus barrier" (Benjamin, 1965). Young infants also employ more active types of stimulus modulators such as species-typical adaptive responses (e.g., non-nutritive sucking) that reduce their arousal levels and body movements (Kessen & Mandler, 1961).

Wide variations exist in the capacity to self-soothe, or be soothed in response to external stimuli. Some infants have exceedingly low thresholds, become highly aroused and are quieted with difficulty. This variability has been attributed to overall integrity of the organism (Als, 1978; Brazelton, 1978; Howard, Parmelee, Kopp, & Littman, 1976; Parmelee, 1975) and to caregiver style (Sander, Stechler, Burns, & Julia, 1972). The long-term implications of these individual differences are not known.

In addition to individual variability, there are hints that neurophysiological modulation may be periodically unsettled because of developmental phenomena that emerge subsequent to maturational changes. For example, improved state control leads to increased sensitivity to visual and auditory

stimuli. However, the infant has to develop ways of handling more input (e.g., shutting out stimuli when the system becomes overloaded). In the interim, behavioral disruptions may occur that take the form of obligatory attention in which infants seem glued to a visual stimulus, or of a marked increase in fussiness that signals overload (Brazelton, 1962; Stechler & Latz, 1966; Tennes, Emde, Kisley, & Metcalf, 1972).

In this first phase the caregiver's role is viewed as an assisting one, a perspective shared by Als (1978). Although precarious states of arousal primarily give way because of maturational forces, state control is considerably aided by caregivers' social interactions and routines. Interactions help infants focus on salient features of the environment when they are alert and awake; routines provide an external buttress for endogenous control of sleep and wakefulness (Als, 1978).

By 3 months of age, infants show the emergence of clearly defined cycles of wakefulness that are relatively congruent with social definitions of day and night. This growth is accompanied by other maturational changes reflected by electroencephalogram patterns and habituation (Cohen & Salapatek, 1975; Emde et al., 1976). All of these changes signal the beginning of a new developmental period for infancy and, concomitantly, the mechanisms by which behavior will be modulated.

2. *Sensorimotor Modulation (3 to 9-12 Months)*

Sensorimotor modulation signifies the child's ability to engage in a voluntary motor act (e.g., reach and grasp) and change the act in response to events that arise. Modulation cannot occur until component aspects (e.g., the reaching part of prehension) of a sequence are coordinated and performed nonreflexively (Bruner, 1970; Kopp, 1979). Modulation does not involve consciousness, prior intention, or awareness of the *meaning* of a situation. This singular limitation is why the term *modulation* rather than *control* is used.

There is no doubt that by midpoint of the first year, infants actively use their sensori-

motor repertoire and modulate attention (Cohen & Salapatek, 1975; Haith, 1966; Salapatek, 1975), social exchanges (Brazelton, Koslowski, & Main 1974; Stern, 1977), and some aspects of prehension (Halverson, 1931). A nice illustration of modulation is found in Ratner and Bruner's (1978) description of a 7-month-old's responses that "came at particular junctures" in a social game played with the caregiver.

However, modulated responses are tied either to an immediately preceding interaction or to motivational and perceptual sets that arise as a function of stimuli characteristics: "At eight months the infants were simply attracted to the mother's activity and drawn to take up the object" (Hublely & Trevarthen, 1979, p. 71). Thus pleasure, interest, and desire emanate from people and objects and elicit infant behavior rather than cognitively derived intent, meaning, or consequence. There is action but not conscious reflection about the act (Collins & Hagen, 1979).

That perception is a stimulus to activity has long been a tenet of psychology (Lewin, cited in Vygotsky 1933/1976; Piaget, 1952, 1954; Vygotsky, 1933/1976), as has been the thesis that it is difficult to separate motivation from perceptual processes in the young child (Piaget, 1952, 1954; Vygotsky, 1933/1976). Considering motivation as a determinant of behavior is hardly novel; the developmental literature is replete with arguments of similar kind advanced by White (1959), Hunt (1963), Lewis and Goldberg (1969), Yarrow, Rubenstein, and Pedersen (1975), and others.

In all probability, the ability to modulate sensorimotor acts reflects individual differences related to biological predispositions (e.g., tempo and activity level) as well as to conditions external to the child, such as caregiver sensitivity and salience of objects in the caregiving environment (Ainsworth & Bell, 1974; Escalona, 1968; Lewis & Goldberg, 1969; Yarrow et al., 1975). Caregiver responsiveness would seem to be especially important for apathetic or highly inactive infants who need prodding to activate and sustain activities (Escalona, 1963). Because of the infant's dependence on percepts, the absence of objects or limited caregiver sen-

sitivity could lead to infant behaviors that are inappropriate for a given situation.

As an example, consider the apathetic, bland, uncoordinated behavior of infants reared by adequate but insensitive caregivers (Provence & Lipton, 1962). Although the infants could, if repeatedly encouraged, initiate a smiling interaction, reach out for a person, or touch a toy, most of the time they did nothing. Because of their depressed state, the infants' awareness of situational demands was erratic, and their actions were often unrelated to events that occurred nearby. Thus sensorimotor modulation was problematic.

In sum, sensorimotor modulations help provide a basis for later achievements in control by helping infants economically organize their object and social world. Moreover, modulations help infants become aware of *their own* actions in holding, reaching, playing, and so forth. When infants differentiate their own actions from those of others, the potential for control emerges.

3. Control (9-12 to 18+ Months)

The third phase, called control, characterizes the emerging ability of children to show awareness of social or task demands that have been defined by caregivers, and to initiate, maintain, modulate, or cease physical acts, communication, and emotional signals accordingly. As such, control represents an important transition period along the path to self-regulation.

Indeed, the first manifestations of behaviors that bear resemblance to self-regulation constructs appear early in this phase. They are compliance to commands and self-initiated monitoring of behavior. Compliance, recognized as a landmark in development (Gesell & Amatruda, 1945) and described by Luria (1959), was also studied by Stayton, Hogan, and Ainsworth (1971), who related it to the quality of the mother-child relationship. The rationale underlying the motive to obey parents has been debated extensively (Freud, 1915/1963; Sears, 1960) but is beyond the scope of this article. Whatever its basis, compliance as the signal heralding the onset of control is a behavior tied to the here and now of a parent command (e.g., "Don't touch," "No!").

The term *control* rather than *regulate* is purposely used to describe these initial forms of monitoring. This approach follows dictionary definitions of *control* and *regulate* in which the former is defined as "command" or "hold in check," whereas the latter is characterized by "control by rule . . . subject to restrictions . . . adapt to requirements" (*Oxford Dictionary*, 1964). In the psychological sense, control is seen as being less flexible and adaptive than regulation. This point is discussed further in later paragraphs.

Control is viewed as a derivative of the dramatic qualitative and quantitative changes in cognitive processing abilities that occur during the last part of the first year of life and extend into the second. These have been variously designated as a shift from a purely sensorimotor type of functioning to adaptive responsiveness (Werner, 1957), the emergence of problem solving (Piaget, 1952, 1954), and the appearance of hypothesis testing (Kagan, 1971, 1972).

In the following paragraphs, cognitive phenomena linked to this period are highlighted. This is followed by additional discussion of characteristics of control.

Cognitive phenomena. Current theoretical formulations suggest that at least one and possibly two distinct periods of cognitive growth occur between 9 and 18 months of life (Kagan, 1971; McCall, Eichorn, & Hogarty, 1977; Piaget, 1952, 1954). Numerous empiric data attest to the first group of qualitative and quantitative changes including refined recognition of the invariant form of objects (Ruff, 1978), improved spatial discrimination (Millar & Schaffer, 1972), cross-modal recognition memory (Gottfried, Rose, & Bridger, 1978), and the emergence of elementary forms of categorization (Ricciuti, 1965). Other studies also corroborate changing abilities including increased awareness of familiar and unknown individuals (Schaffer, 1971, 1974), and exploration and use of the inherent properties of various toys and objects (Uzgiris, 1967). Learned aversions emerge at this age (Bronson, 1978), as does the ability to take another's perspective by imitating social behaviors (McCall, Note 3), or by being involved in complementary acts (Hubley & Trevarthen, 1979). Early stages of object permanence are clearly observed

(Corman & Escalona, 1969; Kopp, Sigman, & Parmelee, 1974; Uzgiris & Hunt, 1975), as is the use of tools in controlled problem-solving tasks (Kopp et al., 1974; Uzgiris & Hunt, 1975).

The terms used to characterize infant skill at this age include *intentionality*, *goal-directedness*, *use of means*, and beginning signs of *conscious awareness* (Collins & Hagen, 1979; McCall, 1979; Piaget, 1952, 1954). McCall noted, however, that the infant's world is still known only by action; moreover, images are short term and require the presence of stimuli (Fraiberg, 1969; Gratch, 1975).

A second cognitive growth spurt (presumably occurring between 12 and 18 months) has less documentation than the aforementioned. Piaget (1952, 1954) suggested it was manifested by trial and error exploration. Alternatively Nelson (1979) indicated that growth might be characterized by the integration of cognitive, social, and communicative abilities. In any event, data indicate that some capacities such as memory are expanded. In object-permanence situations, children visually follow displacements while continuously monitoring the object's existence (Kopp et al., 1974). A similar phenomenon is observed in caregiver interactions; children move away from close proximity to their caregivers, provided they can visually check the caregiver's location periodically.

The shifts noted for the first form of cognitive reorganization are paralleled by striking qualitative and quantitative changes in locomotor abilities. The upright position is assumed, and walking begins. These changes have profound significance for children because they allow new planes of visual awareness, expanded spatial locales for exploration, and increased awareness of body functioning (Mahler, Pine, & Bergman, 1975).

One immediate consequence of this parallel cognitive and motor growth is the child's increasing differentiation of self from others and differentiation of self from objects. As children move freely they differentiate where they have been and plan where they are going. They notice the effects of their activities on their environment. Slowly they construct a memory of the existential

self (Lewis & Brooks, 1978), but they do not have a sense of continuing identity. This kind of sense of identity is attained from representational thinking (Lewis & Brooks, 1978), a developmental skill that emerges at about 18 months (Piaget, 1952, 1954).

Features of control. Control, characterized by compliance and self-initiated inhibition of a previously prohibited behavior, subsumes intent, appraisal of differential features of the environment, and an elementary awareness of what is acceptable and not acceptable to caregivers. This awareness and elementary categorizing is, however, highly dependent on the presence of key signals because the child does not have the capacity to recall events. The cognitive capacity for reflection also does not exist; thus there is little appreciation of the reasons that make one set of behaviors more appropriate than another for any given situation.

Self-initiated inhibition is a more complex and interesting form of control than compliance. First, by definition it means that children take an active role in guiding their own behavior. Second, it involves an approach to a desired object, recognition that the object was previously associated with a prohibition and, finally, inhibition of the prohibited act. Thus, this ability requires that the child sequentially organize an input code, a memory match, and then provide self-instruction. An example of this sequence was provided by a 13-month-old who was observed to reach for a plant, shake her head, say "no," and withdraw her hand (Krakow, Note 4). Inferentially at least, observations made of infants at play, while demonstrating empathy, and during acts of sharing (Mueller & Lucas, 1975; Rheingold, Hay, & West, 1976) suggest that by 15-16 months of age, children are capable of producing patterns of situationally appropriate self-initiated behavioral controls.

The origins of self-initiated monitoring may stem from reciprocal patterns of communication and interaction that evolve between infants and their caregivers when the former are about 1 year of age (Hubley & Trevarthen, 1979; Ratner & Bruner, 1978). In reciprocal interactions, first one and then the other partner assumes an active initiating role. These kinds of episodes appear to direct the infants' attention to caregiver acts

and consequences, and then to their own (Hubley & Trevarthen, 1979).

Intuitively, it seems reasonable to expect that the more opportunities infants have to notice the effects of their own acts in social interactions, the more they will attend to their own acts when alone. Accordingly, when attention to behavior is combined with awareness of prohibition experiences and the motivation to accede to caregiver's wishes, self-initiated monitoring should be the result.

Limitations in control arise as a function of memory constraints (e.g., the need to have signals that help the child reconstruct an awareness of appropriate behaviors) as well as from pleasurable input that competes with awareness of "correct" behavior. This form of competition often stems from burgeoning locomotive skills. Movement—walking, running, climbing—becomes an end in itself and is practiced repeatedly (Freud & Burlingham, 1944; Mittlemann, 1954). Children often become so mesmerized by their interest in locomotion that their physical activities seem mindless, innervated solely by pleasure seeking. In these situations control is fragile and signals of caregiver prohibitions are overlooked.

Delight in movement appears to be a normal developmental phenomenon, probably reaching a peak around 2 years of age and then tapering off. In the long term, what makes locomotor activity potentially vulnerable is an inability to apply cognitive "brakes" such that gross motor activities compete with other kinds of behavior demanded in social or task-oriented situations. At this point, movement may seem to be obligatory in the sense that visual fixation was at a younger age (Stechler & Latz, 1966). From the psychoanalytic perspective, one could say there is difficulty with impulse control (Rexford, 1978).

It is likely that caregiver sensitivity to a child's preferred style of interacting with the world of objects and people is a crucial facilitator or deterrent to growth of control. Given a child with very high energy levels and great enthusiasm for movement, the fact that caregivers repeatedly call attention to expectations for acceptable forms of child behavior should be helpful. Similarly, verbal

communications that specify acts for the child to do or that focus child activity into specific channels of play (Schaffer & Crook, 1978) should also foster control.

Thus far the theme of self, in terms of the child having awareness of a continuing identity, has not been part of the discussion of control because it has not been germane. Although children increasingly appreciate the meaning of an independent existence and body parts that move on command, this awareness is not fully internalized until there is a way to represent it symbolically. Similarly, children cannot freely appreciate the link between self and the meaning of self-generated behavioral control until parent prohibitions and acceptances can also be represented mentally. This is the focus of the next section.

The Emergence of Self-Control and the Progression to Self-Regulation (24+ Months)

The phase immediately preceding self-regulation is defined as *self-control*. Its distinguishing features include compliance, and emergent abilities to delay an act on request and to behave according to caregiver and social expectations in the absence of external monitors. These and similar behaviors have been described, implicitly or explicitly, by Golden, Montare, and Bridger (1977), Mahler et al. (1975), Luria (1960, 1961), and Malone (1978).

Self-control differs from control by virtue of the appearance of representational thinking and evocative (recall) memory. Linked to one another, both appear at approximately 18 months of age (Piaget, 1952, 1954). With representational thought, the child uses a symbol to stand for an object; with recall memory the child evokes and sustains the image of the absent object. Representational thought and recall memory are the necessary cognitive mechanisms that allow children to formulate an integrated understanding of their own continuing, independent identity and therefore to associate their own acts with caregivers' dictates about acceptable and nonacceptable forms of behavior. Consequently, the child's pattern of motor and verbal acts begins to reflect

knowledge of social rules as well as the demand characteristics of particular situations, even in the absence of caregivers. Self-control, however, implies more than awareness; the term signifies self-initiated modification of behavior as a result of remembered information. Self-control also signifies a major shift to an internally generated monitoring system.

What sets self-control apart from self-regulation is a difference in degree, not in kind. Self-control and self-regulation are linked conceptually because both depend on the development and use of representational thinking and recall memory. However, the term *self-control* means that the child has limited flexibility in adapting acts to meet new situational demands and a limited capacity for delay and waiting. In contrast, self-regulation is considered to be adaptive to changes. It is a distinctly more mature form of control and presumably implicates the use of reflection and strategies involving introspection, consciousness, or metacognition (Flavell, 1977; Pope & Singer, 1978).

The cognitive phenomena that foster development of self-control are discussed in the following paragraphs. Then features of self-control are described and speculations offered about possible influences.

Cognitive phenomena. Studies of play, imitation, object permanence tasks, and use of language provide support for the emergence of representational thinking and recall memory. Transitions in children's play with inanimate objects have been well documented (Bruner, 1972; Fenson, Kagan, Kearsley, & Zelazo, 1976; Inhelder, Lèzine, Sinclair, & Stambak, 1972; Piaget, 1962; Uzgiris, 1967; Zelazo & Kearsley, Note 5). Moreover, representation and recall memory can be inferred when particular kinds of pretend behaviors are observed (e.g., the child makes believe an absent entity is present; Fein, 1975).

Similarly, deferred imitation (Piaget, 1962)—the ability to reproduce accurately an event or sequence seen earlier—is considered by McCall to involve the perception of an act over time and context (McCall, Parke, & Kavanaugh, 1977). These authors' data suggest that the conclusive appearance of deferred imitation is observed near the

end of the second year of life. Furthermore, studies of object permanence performance also provide evidence of recall memory. Children at around 18 months of age systematically and sequentially search several places for an object hidden using invisible displacements (Corman & Escalona, 1969; Kopp et al., 1974; Uzgiris & Hunt, 1975).

Evidence from social transactions, though not plentiful, also documents the emergence of representational thought and recall memory. For example, Bronson (1974) noted that the incidence of toddlers' "visual checks" to their mothers declined appreciably between 12 and 24 months. In a similar vein, Mahler et al. (1975) reported that persistent "shadowing" of the mother observed at 15–16 months diminished a few months later. Both instances suggest that children do not need continued assurance of maternal presence when the ability to maintain her image is in their repertoire.

The most extensive series of studies of children in the second year of life are found in the literature on language development (see Bloom & Lahey, 1978; Brown, 1973; Menyuk, 1971; Nelson, 1973, 1979). Here, too, there is excellent documentation of representational thought. For example, children use words about classes of objects that have perceptual and functional similarity. Moreover, words are applied to different contexts; in so doing, children often attempt to apply a word to a situation or event that is not quite appropriate. Gestural communication also expands dramatically and is used to convey intent, desires, refusals, and sharing (Bretherton & Bates, 1979).

Finally, a sense of self begins to become more solidified at this age (Bertenthal & Fischer, 1978; Lewis & Brooks-Gunn, 1979). In the early stages of representational thinking, a sense of identity is reflected by children classifying their own body parts and their own possessions. Identity is also reflected by the emergence of self-conscious-like behavior as children view their mirror images (Amsterdam & Greenberg, 1977). This suggests that self-consciousness is an affective response to being the focus of one's own or another's attention.

By implication, one could argue that self-consciousness appears in the repertoire when

children can begin to recall positive and negative feelings associated with their own actions as well as others' behavior toward them. A sense of identity is also reflected by the child's struggles for autonomy. "Me do it" or "I do it" are phrases heard repeatedly. Autonomy is coupled with ambivalence about dependence and is also linked to the beginnings of positive self-evaluation (Sroufe, 1979).

The most common description of the child approaching the second half of the second year denotes a child in transition, moving from the sensorimotor mode to symbolic functioning (Piaget, 1952, 1954), from being a child bound by action and concrete results to being one who will be concerned with abstract knowledge, time dimensions, others, and the self (Flavell, 1977). However, it is also recognized that the 2-year-old is limited in information processing skills (Case, 1978) as well as in memory (Myers & Perlmutter, 1978). Memory is best under situations where meaningful, realistic semantic cues are present and called to the child's attention because the child's ability to generate strategies is limited (Myers & Perlmutter, 1978).

Although research on the 2- to 3-year-old child is relatively sparse compared with that devoted to early infancy, sufficient data exist to show that the 3-year-old is a knowledgeable child who begins to use strategies for remembering (Brown, 1975), but children of this age do not generate a broad array of strategies on their own (Bem, 1967), nor do they provide rules for scientific reasoning (Siegler, 1978). Moreover, they cannot predict the consequences of an act, check and monitor their own actions, or modify their behavior as might be appropriate (Brown & DeLoache, 1978).

Translated into Piagetian terminology, these young children are preoperational (Piaget, 1952) in the sense that their thinking behavior is "interior," but they find it difficult to "manipulate" an idea and think of it from different perspectives. Clearly, alternatives cannot be pursued if thinking is bound by the overriding salience of a single viewpoint. The implications for self-control will be readily apparent.

Features of self-control and beginning

self-regulation. As noted earlier, the phase of self-control emerges when the child shows evidence of the ability to comply with requests, to delay specific activities due either to self-instruction or another's demand, and to monitor his or her own behavior according to caregiver expectations but in the absence of the caregiver. Monitoring implicates the ability to inhibit motor and language acts that are inappropriate to a particular setting or situation.

The child who manifests self-control is aware of a network of conventions that govern behavior when eating, playing, dressing, going to the store, or being left on one's own for a short while. Observations of children around 2 years of age indicate that they understand routines of caregivers, are knowledgeable about where they are expected to play and what objects can be played with, and about what they are supposed to do in a store, a playground, or in the homes of friends or relatives.

However, one has only to spend a short time observing young children to appreciate the very real limitations of their self-control. Given a strong stimulus, for example, a desired ball rolling in the street, or the desire to explore an interesting place or to exercise autonomy, they become heedless of safety, rules, or exhortations. In addition, compliance at this age seems more firmly tied to levels of pleasure than to reasoned logic or need. The command, "Stop playing and put your toys away" is often ignored, but when coupled with a favored activity, the command is readily acceded to.

Problems with self-control also arise in the context of delay. In instances where children are requested to wait, many appear to be stimulus bound and thus cannot produce diversionary strategies. Mothers report, for example, that when 2-year-olds are confronted with an unexpected delay (e.g., going out), children seize upon one single behavior such as whining or following upon mother's heels, and use it repeatedly. This behavior has parallels in the child's inability to perceive more than a single salient dimension in conservation tasks (Piaget, 1970).

These constraints are balanced by major growth in the child's awareness of self and

its role in control. Manifested in subtle ways, the self as an independent controller appears, for example, in family routines where a young child proudly announces a self-initiated toy cleanup. An alternative form is observed in compliance situations where a child uses his or her body to erect an invisible barrier against the person issuing the command. The scenario involves a caregiver's request and the child's response of turning around (i.e., the back of the body faces the caregiver) and then doing something other than the requested act. This use of the body as a social tool, albeit a noninteractive and noncompliant one, can only occur when the child has a fairly well-formulated sense of physical body and psychic identity. Self-awareness also arises in other control situations. A plea for help from a caregiver occurs frequently when children are faced with onerous demands. Similarly, the self emerges when children transgress and reflect their awareness of their transgression with facial expressions, tears, and denial.

In keeping with the dominant theme of this conceptualization, the preceding focused extensively on cognitive mediators of self-control. At this point, however, the points of view expressed by the Russian and the psychodynamic theorists (see Table 1) are discussed again. These positions warrant a closer examination because they bear on other factors that may influence the developmental course of self-control or foster individual differences at a given point in time. Language is an example of a process that has been presumed to be influential in both realms.

From a developmental perspective, Vygotsky (1962) and Luria (1960, 1961) suggested that speech could not be used as an inner mode of mental organization or for self-regulation until the child was about 4 years of age. At first, Luria (1960, 1961) suggested that the child's speech was restricted and closely linked to nonverbal communication because of its limited meaning and its tie to specific acts. Later, with beginning internalization of parent commands, the child could use overt speech to monitor behavior. At best, however, this was only partially successful. It was not until speech

itself was internalized that it played an effective role in self-regulation. Luria's laboratory data, although focused on a relatively narrow aspect of the child's repertoire, corroborated this developmental view of the directive function of speech.

In contrast, psychodynamic perspectives suggest that language is one of several important determinants of individual differences in control, specifically impulse control. Poorly developed linguistic functions, minor neurological abnormalities, maturational imbalances, as well as caregiver insensitivity have been identified as causal factors in distorted impulse control (Mahler et al., 1975; Malone, 1978; Rexford, 1978). Spoken language appears to be a critical feature even in its beginning stages.

Preliminary observations in my laboratory are more congruent with Luria's developmental position than with psychoanalytic view of individual differences. Specifically, the data I and my colleagues have collected thus far suggest that even advanced verbal development does not affect the early operation of self-control. Two-year-old children who have language production skills consonant with those of 3-year-olds show self-control abilities and limitations more similar to their chronological age peers than to the older children.

If additional findings corroborate these initial observations, then it may be due to the fact that early language is tied to the salience of here and now (Luria, 1959) or is highly figurative and depends extensively on symbolic material (Furth, 1970). And, as Furth stated, "The understanding of a symbol can not exceed the available level of operative understanding" (p. 247). Thus until language transcends its figurative dependency, it may not influence self-control in any substantive way. Fortunately, the issue of language and control lends itself to additional theorizing and research.

Another theoretical and research issue that bears on control has to do with the role of the caregiver. Earlier I noted that theorists attributed early forms of control to external sources acting upon the child. Similarly, research with older individuals that is embedded in social learning theory and be-

havioral tenets attests to the importance of models, parents, and others in the growth of self-regulation (Bandura, 1971; Kanfer & Karoly, 1972; Meichenbaum & Goodman, 1971). Intuitively it would seem that caregivers and other social influences have a continuing and major role in the overall progression to self-regulation. But it is argued that the influence is a facilitating rather than a causative one.

Although only a few studies exist, findings indicate that caregivers (and other social forces) are important mediators of individual differences in self-control. For example, Lytton (1976) found parents' use of language and their general approach to caregiving related to 2-year-olds' compliance skills. In a study of somewhat younger children, compliance was negatively associated with maternal warmth and positively related to punishment that followed noncompliance (Bailey, 1978). A study of pre-school-aged females suggested that intrusive, controlling, and critical mothers had daughters who manifested less control than their peers (Ross, 1978). Finally, parent expectations along with use of verbal techniques were presumed to be influential factors in the ability of young children to delay their own behavior in a laboratory task (Golden et al., 1977).

Stressful events are also associated with changes in level of control. Divorce is a potent example. When recently divorced mothers decreased their demands for child independence and offered less communication and reasoning, child control was impaired (Hetherington, Cox, & Cox, Note 6). Findings from this study prompt questions related to the level and kind of family disruption that change parent control techniques and to how much self-control the child can still exhibit while disruptions occur. Overall, these intriguing data plead for replication, additional specification of processes, and even a unifying conceptual model that will permit a more systematic study of caregiver influences on child control.

Although there are gaps in our knowledge about specific influences of language and caregivers, many young children do in fact move beyond self-control. When self-control

becomes more adaptive and flexible, the transition to self-regulation occurs. Self-regulation in contrast to self-control involves the ability to use numerous contingency rules to guide behavior, to maintain appropriate monitoring for appreciable lengths of time and in any number of situations, and to learn to produce a series of approximations to standards of expectations. The shift from self-control to self-regulation, though probably quite subtle and gradual, parallels the growth of cognitive skills that is also gradual in the early preschool period.

By whatever means children use to consolidate processes involved in self-regulation into their behavioral repertoires, self-regulation, once achieved, can be utilized in very challenging as well as more mundane situations. An example was provided by Holmes (1976), who described a 5-year-old suddenly hospitalized because of a debilitating condition. Numerous strategies were produced by the child to maintain her composure in the face of stressful and intrusive treatments. During one painful injection she said, "let me get control." This remarkable sizing up of one's needs truly indicates internalization of social expectations for behavior.

Conclusion

This account of the antecedents of self-regulation is speculative, although theory and research have been extensively used to strengthen its underpinnings. The formulation clearly owes much to Piaget and to other theorists who argue for qualitative views of development. As such, it also shares the advantages and shortcomings associated with discontinuous developmental perspectives.

If the antecedents of self-regulation are largely accepted as outlined above, then goals of future research will be to describe the phases more fully, to specify cognitive constituents with greater detail, and to identify external influences with additional precision.

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Received June 16, 1981 ■

Manuscripts Accepted for Publication

- Fantasy Play of Toddlers and Preschoolers. Tiffany Field (Department of Pediatrics and Psychology, Mailman Center for Child Development, P.O. Box 016820 (D-820), University of Miami, Miami, Florida 33101), Louis De Stefano, and John H. Koewler III.
- Lexical Access in Children and Adults. Frank M. Cirrin (Department of Speech Pathology & Audiology, Idaho State University, Pocatello, Idaho 83209).
- Processing of Multiple Codes in Memory by 5- and 10-Year-Olds. Sadie A. Grimmett (Institute for Child Study, Indiana University, Bloomington, Indiana 47401).
- Rules in Children's Moral Judgments: Integration of Intent, Damage, and Rational Information. Manuel Leon (Department of Psychology, University of California, Los Angeles, California 90024).
- A Multi-Method Comparison of Popular and Unpopular Children. Barbara Vosk, Rex Forehand (Department of Psychology, University of Georgia, Athens, Georgia 30602), James B. Parker, and Kathy Rickard.
- Preferences for Familiar or Novel Toys: Effects of Familiarization in 1-Year-Olds. Michael A. Hunter (Psychology Department, University of Victoria, Victoria, British Columbia, Canada, V8W 2Y2), Hildy S. Ross, and Elinor W. Ames.
- Auditory Frequency Discrimination in Infancy. Lynne Werner Olsho (Virginia Commonwealth University, 901 West Franklin Street, Richmond, Virginia 23284), Ron Kakai, Robin Turpin, and Vincent Sperduto.
- The Relationship Between Cognitive Style and Cognitive Development: A 2-Year-Longitudinal Study. David M. Brodzinsky (Department of Psychology, Douglass College, Rutgers University, New Brunswick, New Jersey 08903).
- Joint Bookreading as a Multiple Vocabulary Acquisition Device. Anat Ninio (Department of Psychology, The Hebrew University of Jerusalem, Jerusalem, Israel 91905).
- The Role of Vision in Maternal Attachment: Giving 2-Year-Olds a Photograph of Their Mother During Separation. Richard H. Passman (Department of Psychology, The University of Wisconsin, P.O. Box 413, Milwaukee, Wisconsin 53201) and Kathleen P. Longeway.
- Chronic Malnutrition and Child Behavior: Effects of Early Calorie Supplementation on Social-Emotional Functioning at School Age. David E. Barrett (The Children's Hospital Medical Center, 333 Longwood Avenue, Boston, Massachusetts 02115), Marian Radke-Yarrow, and Robert Klein.
- Determinants of Young Children's Search Strategies in a Large-Scale Environment. Linda J. Anoshian (Department of Psychology, Trinity University, 715 Stadium Drive, San Antonio, Texas 78284), Susan R. Hartman, and Joy S. Scharf.
- Dimensions and Types of Social Status: A Cross-Age Perspective. John D. Coie (Department of Psychology, Duke University, Durham, North Carolina 27706), Kenneth A. Dodge, and Heide Coppotelli.