

**ADULT COGNITIVE DEVELOPMENT AND THE NEED FOR COGNITION SCALE:
IDENTIFYING ADULTS MOST LIKELY TO DEVELOP CHARACTERISTICS OF
POSTFORMAL THOUGHT**

by

Peter A. Kindle, M. Div., B. B. A.

THESIS

**Presented to the Faculty of
The University of Houston Clear Lake
In Partial Fulfillment
Of the Requirements
For the Degree of**

MASTER OF ARTS

THE UNIVERSITY OF HOUSTON CLEAR LAKE

May, 2002

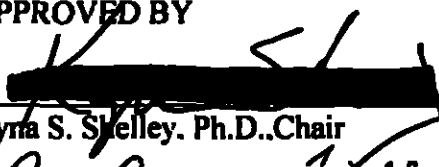
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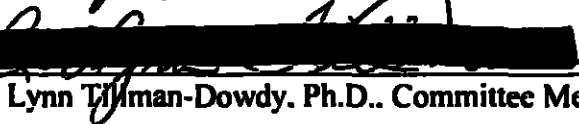
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Peter A. Kindle

APPROVED BY


Kyna S. Shelley, Ph.D., Chair


B. Lynn Tillman-Dowdy, Ph.D., Committee Member


Howard C. Eisner, Ph.D., Associate Dean


Emily Sutter, Ph.D., Interim Dean

ACKNOWLEDGEMENTS

To Karen who loves me enough to let my chase my dreams.

ABSTRACT

ADULT COGNITIVE DEVELOPMENT AND THE NEED FOR COGNITION SCALE: IDENTIFYING ADULTS MOST LIKELY TO DEVELOP CHARACTERISTICS OF POSTFORMAL THOUGHT

**Peter A. Kindle, M.A.
The University of Houston Clear Lake, 2002**

Thesis Chair: Kyna S. Shelley, Ph.D.

The Need for Cognition scale is proposed as a capable measure for identifying those adults most likely to develop characteristics of postformal thought. Two new instruments are utilized to measure postformal characteristics. The bisociative thinking subscale in Mode of Problem-Solving Scale measures innovative cross-disciplinary construction of problem space. The evaluativism subscale of the Scale of Adult Intellectual Development measures epistemological style. A convenience sample of adults (N = 110), age 18 to 74, completed these 3 self-report instruments. Results indicate that need for cognition is a discriminating variable for these postformal characteristics and suggests that postformal development is most likely in high cognizers.

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Chapter 1

INTRODUCTION

Adult cognitive development is a relatively small field of study sandwiched between more robust domains of study. Differential psychology, the psychometric study of individual intellectual differences, places significant empirical constraints on theorists who suggest an adult cognitive advance with age. In like fashion, life span developmental psychology suggests that monomorphic explanations for adult developmental patterns are unlikely to be persuasive. Both are discussed in more detail below.

Differential psychology

Discussions of adult cognitive development must contend with an immense body of research from differential psychology (for a summary see Jensen, 1998). With a century-long record of empirical studies that involves hundreds of thousands of participants, the measurement and assessment of intelligence may be the most analyzed field in human psychology. With regard to patterns of adult cognitive development, the single most significant empirical conclusion from the psychometric literature is the performance decline with increased age during the adult life span (Berg, 1992, 2000; Cerella, 1990; Denney, 1984; Dixon & Hultsch, 1999; Jensen, 1998; Salthouse, 1982, 1991; Schaie, 1994, 1996; Schaie & Willis, 1996; Schultz & Salthouse, 1999). Attempts to refute this conclusion have included identification of specific categories of intellectual abilities that tend to withstand the aging decrement (Horn & Cattell, 1967; Horn & Hofer,

1992), analysis of longitudinal studies that appear to attribute decline to cohort differences (Hertzog & Schaie, 1988a, 1988b; Schaie, 1993, 2000), and revision of the meaning of intelligence during adulthood (Davidson & Downing, 2000).

Alternative definitions of intelligence and intellectual abilities have produced a variety of constructs that include *everyday problem solving* (Berg & Calderone, 1994; Willis, 1996), *practical intelligence* (Berg & Klaczynski, 1996; Sternberg & Wagner, 1986; Sternberg, Wagner & Okagaki, 1993; Wagner, 2000), *multiple intelligences* (Gardner, 1983, 1999), *everyday cognition* (Poon, Welke, & Dudley, 1993; Puckett, Reese, Cohen & Pollina, 1991; Sinnott, 1993), *wisdom* (Sternberg, 1990, 2000), and *tacit knowledge* (Wagner & Sternberg, 1985, 1986). Other researchers have focused on the inclusion of non-intellectual attributes in the definition of intelligence (Ackerman & Heggestad, 1997; Berg & Sternberg, 1985; Reeve & Hakel, 2000; Sternberg, 1988). Each approach has been unsuccessful in countering the argument that general intellectual performance declines with age (Berg, 2000; Jensen, 1998; Lindenberger & Baltes, 1994; Salthouse, 1991). Psychometric studies provide a context in which the adult lifespan is more readily conceived as one of impairment rather than enhancement.

In contrast, postformal theorists are quite optimistic regarding adult development and propose qualitative improvement in thought along the adult life span (Dixon, 1999a).

Life span developmental psychology

In a similar fashion, life span developmental psychology has influenced postformal theorists (Dittmann-Kohli & Baltes, 1990). Several life span theories explain adult development as “a process of optimization of developmental resources in the face of changing goals and capacities” (Ryan & La Guardia, 2000, p. 146). This means that adult

development is thoroughly contextual. Goal selection, specialization of resource allocation, and optimization of expertise are individual strategies designed to cope with the vagaries of age. The *selective optimization with compensation* strategy (Baltes, Dittmann-Kohli & Dixon, 1984, p. 33) adapts to biological deterioration, including cognitive decline, by compensatory mechanisms that consist primarily of increased utilization of cultural and social resources (Baltes, 1998; Baltes, et al., 1984; Baltes, Staudinger & Lindenberger, 1999; Dixon & Baltes, 1986; Hoyer & Rybash, 1994; Marsiske, Lang, Baltes & Baltes, 1995; Schultz & Heckhausen, 1996). Because life span developmental psychology assumes a contextual orientation, the selective optimization with compensation model is largely compatible with Piagetian antecedents to postformal theories.

Postformal theorists, especially those that are the focus of this paper, have tended to disregard some of the major implications of life span theory. Specifically, there has been a tendency to neglect the variety of individual developmental patterns that constitute adult development (Dittmann-Kohli & Baltes, 1990).

While it may be impossible to comprise an exhaustive list of alternative developmental patterns, the aging literature does provide a good starting point (Dixon & Backman, 1995a). Explications of the *compensation* construct have identified six related concepts that are applicable. Each represents an adaptive strategy for coping with self-discrepant events or information (Brandtstadter, 1999). Dixon & Backman (1995b) list assimilation, accommodation, selection, remediation, and substitution. Brandtstadter (1999) adds immunization. Assimilation refers to instrumental activity to maintain an individual's self-concept (Brandtstadter, 1999; Brandtstadter & Wentura, 1995), whereas

accommodation refers to the modification of self-concept or individual goals (Brandtstadter, 1999; Brandtstadter & Wentura, 1995b). Selection refers to a new choice of goal or direction, and remediation to increased personal effort to maintain performance (Dixon & Backman, 1995b). Substitution involves compensating for a specific loss by activating a specific alternative ability (Dixon & Backman, 1995b). Immunization refers to avoidance of discrepancy (Brandtstadter & Wentura, 1999).

When applied to adult cognitive development, these six compensatory strategies may represent alternative developmental patterns. The assimilative and accommodative strategies have a close correspondence to Piaget's use of the same terms, as discussed below. Selection and remediation relate to individual choice and exertion rather than cognitive change. Substitution is a noncognitive alternative, and may include reliance on social networks (Cartensen, Hanson & Freund, 1995), social compensation (Ferraro & Farmer, 1995), or collaborative cognition (Dixon, 1999b) for problem resolution. The immunizing strategy involves avoidance of self-discrepant events or information and includes selective socialization and attributional errors (Brandtstadter, 1999; Ferraro & Farmer, 1995). Assimilation, selection, remediation, substitution, and immunization are unlikely to result in individual cognitive change. Only individuals electing an accommodating style are likely to exhibit characteristics of postformal thought.

Postformal theories

Postformal theorists refer primarily to researchers who participated in two Beyond Formal Operations Symposia sponsored by Lawrence Kohlberg at Harvard University in the 1980s (proceedings published as, Commons, Richards & Armon, 1984; Commons, Sinnott, Richards & Armon, 1989; Commons, Armon, Kohlberg, Richards, Grotzer &

Sinnott, 1990). Following Kohlberg's death, Oxford published a companion volume (Alexander & Langer, 1990) that was designed to provide an overview of the existing theories and suggestions for future research.

Taxonomies vary between these volumes. The first symposium, indebted to Kohlberg's attempt to expand on Piagetian stages of development, reported 13 different developmental sequences (Richards, Armon & Commons, 1984). The second branched out to complementary researchers who were not specifically identified with expansion of Piaget's ideas, and accordingly, had a greater emphasis on empirical analysis and nonstructural schemes of development (Commons et al., 1989; Commons et al., 1990). With the publication of Alexander and Langer (1990), the number of theories had expanded to the point that the field required groupings for simplification. The resulting taxonomy included four distinct categories: (1) hierarchical theories of adult development, (2) nonhierarchical theories of adult development, (3) theories of advanced moral development, and (4) theories of consciousness and self development (Alexander, Druker & Langer, 1990).

Even though the list of postformal theories is somewhat truncated by this taxonomy, preceding major contributors (e.g., Baltes & Staudinger, 2000; King & Kitchener, 1994; Sinnott, 1998b) and minimizing others (e.g., Arlin, 1975; Basseches, 1984a; Blanchard-Fields, 1989; Labouvie-Vief, 1980), it remains useful. This paper is concerned with those postformal theories that are most likely to be classified in the hierarchical category.

Those postformal theories labeled hierarchical have many characteristics in common. Most tend to accept Piaget's *standard theory* without reference to the changes

in Piaget's thought that are reported in the last two decades of his work (Beilin, 1992). Most tend to accept the need for universal developmental stages uncritically (see Brainerd, 1994 for a brief description of the stage debate), and to equate formal operational thought with adolescence and early adulthood despite evidence to the contrary (see Broughton, 1977, 1984; Demetriou & Efklides, 1979; Hooper, Hooper & Colbert, 1985; Keating, 1990; King, 1985; Kuhn, Langer, Kohlberg & Haan, 1977; Lawson, 1985; Neimark, 1975, 1982). Most tend to maintain Piaget's emphasis on logic and problem solution, while avoiding schemes that emphasize ego development (e.g., Armon, 1984; Kegan, 1982; Labouvie-Vief, 1985; Loevinger, 1976; Pascual-Leone, 1990), affective development (e.g., Benack, 1984; Irwin, 1991), moral development (e.g., Kohlberg, 1987; Murphy & Gilligan, 1980), religious development (e.g., Fowler, 1981), transcendental forms of consciousness (e.g., Cook-Greuter, 1990; Koplowitz, 1984, 1990; Miller, 1994), and social development (e.g., Meacham, 1991; Rankin & Allen, 1991).

Piaget's standard theory holds that cognitive development is intrinsically motivated, that cognitive development is primarily an adaptation to environmental complexity, and that this adaptation is accomplished through the mechanisms of assimilation and accommodation; that is, cognitive development is assimilating new environmental stimuli into existing cognitive structures or modifying existing cognitive structures to accommodate new environmental stimuli (Inhelder & Piaget, 1958). To Piaget, cognitive development is the modification of inner cognitive structures in response to external, environmental events (Flavell, 1963, 1996; Gray, 1990; Piaget, 1972).

Piaget noted four equilibrium stages in these cognitive structures with the last

being the formal operational stage reached in adolescence (Inhelder & Piaget, 1958; Piaget & Inhelder, 1969). Formal operational thought is abstract, idealistic, and logical (Ginsberg & Oppen, 1988); encompasses both deductive and inductive logics (Gray, 1990); and prefers the possible to the concrete (Piaget, 1972). It does not consist of a specific set of behaviors, but of the general tendency to organize data within a structured framework in which variables can be controlled, hypotheses can be formulated, and logical proofs tested (Flavell, 1963).

The classic illustration of formal operational thought involves the comparison of two propositions (p and q), the hypothetical development of the negation of each proposition (p' and q'), and the comparison of the four resulting propositions (p , q , p' , and q') in a matrix that exhausts the range of binary possibilities (Flavell, 1963; Ginsberg & Oppen, 1988; Inhelder & Piaget, 1958). Each of the resulting sixteen binary combinations is assessed along four functions - integration, negation, reciprocity and correlation - that are traditionally denoted as the INRC group. This exhausts the possible relational connections, and represents a minimal information base for rational problem solving (Gray, 1990; Piaget, 1972; Piaget & Inhelder, 1969).

Piaget's standard theory is uniquely concerned with problem solving strategies and the underlying cognitive structures the strategies reveal (Beilin, 1992). While demonstrations and development of formal operational thought can be expressed only in specific knowledge domains, the cognitive structures integral to the implementation of formal operations are domain-free (Beilin, 1992; Inhelder & Piaget, 1958; Piaget, 1972). Piaget did not conceive of formal operational thought as the most commonly demonstrated problem solving strategy in adolescence. Instead, formal operational

thought occurs only in situations calling for the most rigorous effort by adolescents.

(Inhelder & Piaget, 1958; Lourenco & Machado, 1996). In the standard theory, adult development was limited to generalization of formal operations to additional domains of knowledge (Piaget, 1975).

Herein lies the point of separation between Piaget and postformal theorists.

Postformal theorists posit qualitative enhancement of adult cognition beyond the structures suggested by formal operations. The standard theory calls for only quantitative expansion of formal operations through increased frequency and breadth of use.

Postformal theories comprising the hierarchical category are quite likely to include Arlin's problem finding stage (1975, 1977, 1984, 1989, 1990), Sternberg's higher-order reasoning (1984), systematic/multisystematic thought (Commons, Richards & Kuhn, 1982; Commons, Richards, Ruf, Armstrong-Roche & Bretzius, 1984b; Demetriou, 1990; Kallio & Helkama, 1991; Richards, 1990; Richards & Commons, 1984), Sinnott's relativistic thought (1984, 1989, 1998b), skill theory (Fischer, 1980; Fischer, Hand & Russell, 1984; Fischer, Kenny & Pipp, 1990), dialectical thought (Basseches, 1984a, 1984b; Benack & Basseches, 1989; Riegel, 1973, 1975), and reflective judgment (King & Kitchener, 1994; Kitchener & King, 1981, 1990). Each of these theories comprises an alternative to Piaget's formal operational thought as the terminus of adult cognitive development. While this list of seven theories is unlikely to be exhaustive, it is certainly representative of the variety of approaches taken to operationalize the qualitative change hypothesized in postformal theories.

These seven theories fall conveniently within two categories – those that extend Piaget's stages by the addition of at least a single stage in adulthood and those that

suggest an alternative stage structure that may parallel or supplant Piaget's.

Additional stage structures

Problem finding theory. Arlin's problem finding stage (1975) is a "progressive change in thought structure" (p. 603) that suggests a paradigm shift following the development of formal operational thought. This shift is from problem solution to problem definition and indicates that asking the right questions may prove more important than answering them in adult development (Arlin, 1984). Csikzentmihalyi (1994) summarizes problem finding as a "higher-order mental function . . . somewhat related to divergent-thinking abilities" (p. 839). In this context, divergent thinking refers to the rearrangement of problem sets in a unique way even though the problem set may be applicable in only one instance or context.

Arlin exhibits the common eclecticism of most postformal theorists by likening problem finding to relativistic thought, dialectical thought, and multisystematic reasoning (1984, 1989). Others have linked it to creativity (Smilansky, 1984) or talent (Starko, 2000). In comparing the characteristics of problem finding with wisdom (Arlin, 1990), problem finding is identified as contextual rather than hypothetical and abstract, relativistic rather than idealistic, and concerned with uncertainty rather than logical proof.

Higher order reasoning theory. Sternberg (1984) proposes the possibility of a postformal stage of logical thinking he terms *third-order reasoning*. First-order reasoning consists of "individual stimulus-response relations" (p. 74) that may be more commonly thought of as rote learning.

Second-order reasoning is abstract, consists of relations among relations, and is crucial to the development of analogical reasoning ability. To Sternberg, this is formal

operational thinking. Second-order reasoning infers a connection between items A and B that is the analogy of the connection between items C and D (Sternberg, 1984). Sternberg imagines a third-order level of reasoning may exist that would infer a connection between AB and CD that would be the analog of a new second-order analogical pair. (e.g., EF and GH). Sternberg calls this “relations between relations” (p. 82).

Sternberg does not expand significantly on the difference between second-order and third-order reasoning, preferring diagrams and symbolic notation to explanation (Sternberg, 1984). Kramer (1983, 1989) contends that the distinction between the hypothesized formal and postformal operations does not consist of difference between logical operations. She writes that “. . . structural change cannot be posited solely on the basis of the degree of abstraction of the elements” (1983, p. 99). Because the primary distinction between second-order and third-order reasoning is the degree of analogical complexity and abstraction, Kramer would deny that Sternberg presents a new stage in logical thinking.

Systematic/multisystematic theory. Like the theory of higher order reasoning, the theory of systematic/multisystematic reasoning (Commons, et al., 1982, 1984b; Richards, 1990; Richards & Commons, 1984) attempts to define the change in adult cognition in logical terms. This theory proposes three levels of cognitive development beyond the formal level – the systematic, the metasystematic, and the cross-paradigmatic. Formal operations are perceived as a closed system operating on a set of variables contained within that system. Systematic reasoning operates on a pair of closed systems and the possible relations between them. Metasystematic reasoning extends systematic operations to sets of systems. Cross-paradigmatic reasoning extends systematic reasoning

to even more complex fields of thought.

Kramer (1989) points out that formal operations are described as a closed system for short-term simplicity's sake, with expansion implicit in every reformulation of the initial propositional definitions. She (1983, 1989) concludes that there is no difference in the logical structure of systematic, metasytematic, and cross-paradigmatic thought and formal operational thought, merely a preference in the former for more complicated definition of the initial operations. Linn and Siegel (1984) concur.

In so far as the evidence has been reviewed, no clear indication of a logical Piagetianlike stage of postformal reasoning has been identified. Moreover, such a stage seems impossible since there is no logic more logical than formal-operational logic. Postformal reasoning should therefore, in the view expressed here, be constructed as a contextual, not a logical, phenomenon (p. 247).

Relativistic theory. Relativistic thought (Sinnott, 1984, 1989, 1998b) seeks to find a logic beyond that of formal operations. In Sinnott's view, the logic of formal operations is too objective and too abstract for application to interpersonal relationships (Sinnott, 1984). Abstract logic alone does not contain the "necessary subjectivity" (p. 299) to apply abstract logic selectively, a skill she contends is essential in adulthood (1984). Accordingly, she views relativistic thought as capable of selecting between alternative closed formal systems to enhance the social, relational, and everyday demands of adulthood. Essential to relativistic thought is the acceptance of contradiction, conscious manipulation of a priori rules, partial creation of reality by the knower, and pragmatic choice by the knower between alternative problem solutions (1984).

In later explications, Sinnott reduces the essence of relativistic thought to *self-*

reference and the ordering of formal operations (1989, 1998b). Sinnott describes self-reference in this manner:

The essential notions are that we can never be completely free of the built-in limits of our systems of knowing, and that we come to know this and to know that this is true. This means that we take into account, in all our decisions about truth, the fact that all knowledge has a subjective component and that it is, of necessity, incomplete (Sinnott, 1989, p. 240).

The ordering of formal systems is based on Sinnott's contention that there are closed logic systems that compete for adoption (1989). Each "is somewhat subjectively chosen and imposed on data" (p. 241). The knower is both aware of the alternatives and selects the closed logic system deemed most suitable for the problem or situation at hand.

Perhaps the most eclectic of postformal theories, relativistic thought encompasses elements of the problem finding, dialectical, multisystematic, and reflective judgment constructs which tends to confuse the precise definition of the qualitative change posited in this theory. A checklist of postformal characteristics (Sinnott, 1998b, p. 37) suggests a gradual process of movement toward a form of postformal logic that culminates in an epistemological shift to relativism.

Kramer and Woodruff (1986) found no evidence that relativistic thought increased with age. In her critique of relativistic and dialectical thought, Kramer (1983) concludes that while formal thought and the suggested forms of postformal thought may have "... different sets of assumptions about reality, it is still premature to conclude that one transcends the other. They may represent polar manifestations of the same phenomenon" (p. 101). In other words, the preference of one for the other may be a function of a third

variable (e.g., worldview, philosophical preference, or educational context), rather than a sequential development in cognitive structure.

Parallel or replacement theories

Skill theory. *Skill theory* is a structural theory of cognitive development (Fischer, 1980). It defines a skill as a “transaction of organism and environment” (p. 478), that is, a skill is a behavioral adaptation to environmental demands. Skill theory may be pictured as a behavioral parallel or alternative to Piaget’s cognitive structures.

Fischer has identified ten hierarchical skills placed within three tiers: sensory-motor skills, representational skills, and abstract skills (1980). “In skill theory, cognition refers to the process by which the organism exercises operant control over sources of variation in its own behavior” (p. 481). Accordingly, skill theory assumes idiosyncratic development that is heavily context dependent, and it explains idiosyncratic behavior that results from subjective preference for use of lower skills rather than optimal skills.

The applicability of skill theory to this study is found in its explanation of the development of the tier of abstract skills (Fischer et al., 1984; Fischer et al., 1990). The theory presents four skill levels in abstraction, from the simplest abstractions that include interactional concepts (e.g., responsibility or intention) to the most complex level of abstraction that includes principle definition and ideological formation. Intervening steps include the differentiation of interactional concepts and their synthesis into systematic and complex relations. Fischer et al. claim that most discourse on postformal thought is concerned with the synthesis skill level that follows differentiation of interactional concepts but precedes principle and ideological formation (1984, p. 52.).

Dialectical theory. Originally conceived as a single postformal stage of logical

thought (Riegel, 1973, 1975), dialectical thought is better viewed as a parallel or alternative to Piaget's problem-solving formal operations (Kramer, 1983, 1989). Rather than identifying the development of logical thinking by reference to problem resolution, dialectical thought identifies 24 dialectical schemata (Basseches, 1984a, 1984b) of increasing complexity by which contradiction is resolved across the life span. Empirical research tends to support increased usage of dialectical schemata with age (Kramer & Woodruff, 1986), but fails to convincingly distinguish dialectical logic from formal operations (Kramer, 1983, 1989).

Reflective judgment. Reflective judgment, based on the pioneering work of Perry (1970) and substantiated by numerous empirical studies conducted over a 20 year period (King & Kitchener, 1994), is a theory of epistemological development with age. Epistemologies shift from external verification of truth claims in adolescence to an externally free relativism to a committed form of relativism with self-referential values and priorities. Reflective judgment is best viewed as a parallel to Piaget's cognitive structures.

Other epistemological alternatives to logical cognitive developmental theories include Broughton's developmental epistemology (1978), Chinen's modal development (1990), and Koplowitz's unitary stage (1984, 1990). Broughton's epistemological approach involves the integration of conceptions of "mind self, reality, and knowledge" (1978, p. 78). Modal development involves interpretation of personal experience and an increase in self-awareness (Chinen, 1990). Both Broughton's and Chinen's theories are associated with ego development rather than problem resolution. The terminus of Koplowitz's unitary stage (1990) is a form of transcendent consciousness and is only

peripherally associated with problem resolution. Accordingly, these epistemological theories are not considered further in this study.

Overview of empirical evidence

Empirical studies of formal operational thought provide little evidence supporting generalization of formal operations during adulthood (Broughton, 1977, 1984; Demetriou & Efklides, 1979; Hooper, Hooper & Colbert, 1985; Keating, 1990; King, 1985; Kuhn, Langer, Kohlberg & Haan, 1977; Lawson, 1985; Neimark, 1975, 1982). Hierarchical postformal theories are weakened by evidence suggesting the nonnormative nature of a formal operational stage of development. The evidence suggests that hard stage constructs may be less likely than soft ones (Kohlberg & Armon, 1984). On the other hand, there is a high degree of intentional complementarity between postformal constructs. While this complementarity may weaken the individual theories, it tends to support the claim that cognitive development does not end with formal operations.

Empirical studies of postformal constructs have provided only general support. Most indicate that formal operations are a necessary but not sufficient prerequisite for postformal characteristics (Arlin, 1975, 1977, 1989; Commons et al., 1982; Demetriou, 1990; Richards & Commons, 1984). Others indicate that the postformal construct can be empirically distinguished from characteristics of formal thought (Commons et al., 1982; Smilansky, 1984). Another trend is the attempt to distinguish or identify postformal constructs from one another (e.g., Basseches, 1984b; Benack & Basseches, 1989; Richards, 1990; Sinnott, 1989, 1998a, 1998b). Replication studies are rare (Kallio & Helkama 1991; Kramer & Woodruff, 1986; Worthen, 2000) and tend to disprove as often as support earlier assertions.

Reflective judgment has developed the most substantial empirical base (see King & Kitchener, 1994, for a comprehensive review) and suggests, with support from both cross-sectional and longitudinal studies, that the sequential development posited in reflective judgment can be supported and that epistemological advance is highly correlated with increased educational exposure. Accordingly, the bulk of research on reflective judgment tends to support its classification as a measure of educational advance rather than as a life span cognitive development model.

Three criticisms of this empirical support for postformal constructs seem justified. First, a methodological criticism may be warranted. Almost universally, postformal theorists have limited their studies to an interview/assessment format. The complex nature of the type of reasoning being assessed, the complexity of the interview questions themselves, the potential for the interviewer to impose iatrogenic effects, and the scarcity of replication studies weaken the empirical evidence. The second criticism is the lack of discussion of the problem of exemplars in the postformal literature. No developmental theory can effectively suggest a normative pattern that relies heavily on an analysis of outstanding individuals alone (e.g., Chinen, 1990; Fowler, 1981). While hierarchical postformal theorists do not explicitly acknowledge dependence on exemplars, the complementarity between constructs and inadequate replication of study results indicate that theoretical constructs may be anticipating exceptional, rather than typical, results. The third criticism is that postformal theorists may be guilty of a neglect of life span developmental research, specifically, the heterogeneity of adult development. The variety of options available to adults, as suggested earlier, may preclude a normative cognitive developmental pattern in adulthood. Postformal theorists have yet to address

discriminating variables that may identify those adults most likely to develop postformal characteristics.

The Present Study

This study attempts to address these weaknesses. Self-report instruments are utilized instead of interviews. A tool is proposed for identifying adults most likely to exhibit characteristics of postformal thought. Finally, this study attempts to assess two key characteristics of postformal constructs.

The first characteristic to be assessed may be simply described as the broadening of cognitive perspective, that is, the tendency to apply unconventional approaches to problem definition and resolution. This tendency is an implied component of each of the hierarchical theories discussed above, and explicitly integral to problem finding theory, systematic/multisystematic theory, relativistic theory, skill theory, and reflective judgment. The second characteristic to be assessed is epistemological change. Epistemology here is used in a limited sense, that is, as "the context within which knowledge claims are evaluated and seen as more or less warranted" (Martin et al., 1994, p. 617). Epistemological development is integral to relativistic theory and reflective judgment, and implied in discussions of problem finding, systematic/multisystematic theory, skill theory, and dialectical theory.

Chapter II

METHOD

Participants

Participants (N = 110) were community dwelling adults over 18 years of age recruited in convenience samples primarily from the Houston, Texas area. Solicitations to participate were distributed at the University of Houston-Clear Lake and at four small companies located in Houston. In addition, the researcher solicited participation from extended family members and personal friends. Effort was made to obtain a diverse sample of participants that is generally representative of all ages, genders, and educational levels; however, sampling bias remained high. For example, all participants had graduated from high school and only four reported the high school diploma as terminal.

Instruments

Need for Cognition Scale (NCS). Existing in the original 45-item form (Cacioppo & Petty, 1982), a 34-item form (Cacioppo & Petty, 1982), and an 18-item form (Cacioppo, Petty & Kao, 1984), the NCS has proven useful in identifying individual differences in the “tendency to engage in and enjoy thinking” (Cacioppo & Petty, 1982, p.16) or “effortful cognitive endeavors” (Cacioppo et al., 1984, p. 306). In a later review of research related to *need for cognition*, the continuum from low to high is described, as follows:

Individuals high in need for cognition were proposed to naturally tend to seek, acquire, think about, and reflect back on information to make sense of stimuli,

relationships, and events in their world. Individuals low in need for cognition, in contrast, were characterized as more likely to rely on others (e.g., celebrities and experts), cognitive heuristics, or social comparison process to provide this structure (Cacioppo, Petty, Feinstein & Jarvis, 1996, p. 198).

This study proposes the NCS as an effective instrument to identify those individuals most likely to develop characteristics of postformal thought.

The 18-item NCS was utilized in this research. Respondents are asked to identify their disagreement or agreement to 18 statements on a 9-point scale, from a value of -4 that is described as "very strongly disagree" to a value of +4 that is described as "very strongly agree." A value of 0 is identified as "neither agree nor disagree." It is additive and counterbalanced with nine items reverse scored (Cacioppo et al., 1984).

Those individuals low in need for cognition are labeled *cognitive misers*, while those high in need for cognition are referred to as *cognizers* (Cacioppo et al., 1994). The difference between cognizers and cognitive misers is a difference in intrinsic motivation, not intellectual ability, and tends to be a stable individual trait across domains and life contexts (Cacioppo et al., 1996).

In the most comprehensive review of empirical research related to need for cognition (Cacioppo et al., 1996), internal consistency was reported as typically $>.85$ (Cronbach's alpha). Split-half reliability was at least .79. Test/retest reliability was .88 over seven weeks and .66 over eight months. Discriminant and convergent validity was established in comparison with dozens of other instruments (see Cacioppo et al., 1996, for supporting details).

Modes of Problem-Solving Scale (MPSS). Also referred to as the Job Associate-

Bisociate Review Index (JABRI) by Payne, Lane and Jabri (1990), the MPSS was developed by Jabri (1988) from the theoretical work on decision making and problem solving by Koestler (1949, 1964). According to Payne et al., the MPSS identifies the individual differences in “preferred problem-solving style” (1990, p. 47).

The MPSS is a 19-item self-report instrument containing two independent subscales measuring *associative* (10 items) and *bisociative* (9 items) thinking (Jabri, 1991). Respondents indicate the extent to which they agree with each statement that begins with “I am a person who is . . . ” on a 7-point scale ranging from “unlikely to enjoy” to “likely to enjoy” (Jabri, 1991). Scoring is additive without counterbalancing.

According to Jabri (1988), the essence of Koestler’s theory is the distinction between associative and bisociative thinking. Associative thinking approaches problems in a habitual manner, applying set routines and techniques to the situation at hand (Jabri, 1988, 1991). In a phrase he attributes to Koestler (p. 976), Jabri (1991) summarizes associative thinking as “single-minded (and) mono-disciplined.” Payne et al., (1990) add conventional, rational, methodical, verbal, and established to the descriptions of associative thinking. Jabri (1991) conceives of associative thinking as conventional logical thinking in opposition to intuitive thought. Associative thinking is indicative of formal operational thought within a given domain of knowledge and is unlikely to be associated with adult cognitive development in postformal theories.

Bisociative thought, in contrast, approaches each problem from multiple perspectives, looking for creative and previously unknown approaches (Jabri, 1988). It involves a conscious decision to temporarily forget customary relationships, to suspend established procedures, and to merge unrelated disciplines (Payne et al., 1990). Again

referring to Koestler. Jabri (1991) summarizes bisociative thinking as “double-minded transitory thinking of unstable equilibrium” (p. 976). Other descriptions of bisociative thinking may include frivolity, imagery, and unlearning (Payne et al., 1990). Jabri (1991) conceives of bisociative thinking as an operational definition of intuition in opposition to conventional logical thought. Bisociative thinking is more consistent with the development of adult cognition in postformal theories.

Adequate internal consistency estimates (Cronbach's alpha) ranging from 0.80 to 0.87 for both subscales have been determined with four discrete samples (Jabri, 1988, 1991; Payne, et al., 1990). Test/retest reliability over a two week period was .77 and .83 for the associative and bisociative subscales, respectively (Jabri, 1991). Further substantiation of the validity of the test has been established by the comparison of manager ratings with respondents' self-reports, with validity ratings of .94 for associative and .69 for bisociative subscales (Jabri, 1991). External validity has yet to be established (Payne et al., 1990).

Adult Scale of Intellectual Development (SAID-44). Martin, Silva, Newman and Thayer (1994) developed the SAID-44 as an alternative to interview procedures that dominate postformal assessment. The SAID-44 assesses the “fundamental epistemological orientation which constitute the context within which knowledge claims are evaluated and seen as more or less warranted (p. 167).” Based on the operational distinctions between the seven stages of reflective judgment (King & Kitchener, 1994), the SAID-44 consists of 44 groups of statements containing two to five sentences in each group. Respondents indicate the extent to which they agree that the group of statements is “least like me” to “most like me” on a 7-point scale (Martin et al., 1994).

Factor analysis indicates three continuous epistemological styles - *absolutism* (12 items), *relativism* (15 items), and the 17-item *evaluativism* subscale (Martin et al., 1994). Scoring is additive without counterbalancing. Absolutism assumes "an unqualified epistemic access to the world" (p. 627). Reality is assumed to be composed of facts that can be directly known. Relativism, in contrast, assumes "that the knower is epistemically disconnected from the world" (p. 627). Reality is constructed by choice. Evaluativism rejects the extremes embraced by both absolutism and relativism. "the knower is assumed to be an agent who has access to the world, but not a fully determined or explicit access" (p. 627). Reality is constructed by the knower in a good faith exercise of judgment and commitment.

Initial testing to measure the reliability of the SAID-44 determined Cronbach's alpha to be .79, for absolutism, .82 for relativism, and .87 for evaluativism (Martin et al., 1994). Concurrent validity for the relativism subscale was supported by significant correlation with the *relativism* subscale of the Scale of Intellectual Development (Erwin, 1983). The *dualism* subscale (Erwin, 1983) and the Dogmatism Scale (Rokeach, 1956) were significantly correlated with absolutism. Test/retest reliability over a three-week period ranged from .63 to .75, and split-half correlations ranged from .53 to .57 (Martin et al., 1994).

In general, absolutism was found to have a significant negative correlation, and relativism a significant positive correlation, with evaluativism (Martin et al., 1994). In comparison with the need for cognition (Cacioppo & Perry, 1982), absolutism had a significant negative correlation, and evaluativism a significant positive correlation, with an increase in need for effortful thought. Gender differences were also identified, with

men scoring higher on both the absolutism and the evaluativism subscales (Martin et al., 1994). In postformal theories of adult cognitive development, absolutism is most likely associated with lower levels of development. Relativism and/or evaluativism are more likely to be associated with more advanced stages of development.

Biographic questions. Age, gender, educational level (no high school degree, high school graduate, some college, college degree, graduate degree), and location of recruitment were requested of each respondent (Appendix B). Each respondent was also asked to identify major life experiences (marriage, divorce, death of spouse, birth of child, death of child, employment outside of home, and forced termination of employment).

Because some contributors to postformal literature claim that there is a natural human tendency to prefer assimilation to accommodation, and that accommodation in adulthood is most likely as a last resort (Irwin, 1991), major life experiences were collected as a rough measure of individual stress. Scoring was additive, ranging from 0 to 7 on total life experience (each affirmative response valued as 1) and for 0 to 4 on negative life experience (affirmative responses to divorce, death of spouse, death of child, and forced termination valued as 1).

Procedures

Potential participants were contacted by the researcher, his family members, or his friends. They were invited to participate in a graduate thesis project studying how adults change the way they think as they age. A solicitation packet containing an informed consent document (Appendix A), the short-form of the NCS, the MPSS, the SAID-44, the biographic questionnaire, and an addressed, stamped envelope were provided to those

willing to consider participation.

Informed consent was demonstrated by completion of the questionnaire and its return to the researcher by mail. Participants were included in the study only if they elected to return the questionnaires to the researcher by mail.

Completed questionnaires were stored in a locked storage space and accessible only to the researcher and his faculty sponsor. Alpha was set at the customary .05 for statistical analyses discussed further below.

Chapter III

RESULTS

While distribution of blank questionnaires was not strictly controlled, the researcher distributed 321 solicitation packets. One hundred and ten questionnaires were returned to the researcher by mail, indicating a response rate of 34.3%. Specific age was provided by 101 respondents. Four respondents provided only a general indication of age. Three of these respondents indicated that they were "senior citizens" and the fourth identified age as "50+." These age identifiers were recorded as "60" and "50," respectively. One respondent's data for the SAID-44 were omitted from the results due to insufficient face validity of the responses, that is, all 45 groupings of statements received the same response ("least like me"). Other missing data results in variations in sample size. Because this study is exploratory in nature, all subject and dependent variables are compared in detail.

Demographics of Respondents

The majority of respondents ($n = 60$) were graduate or undergraduate students at the University of Houston-Clear Lake. The remainder of respondents ($n = 50$) were recruited off-campus. Female respondents ($n = 79$) outnumbered males ($n = 29$); however, there were no significant differences in instrument scores due to gender. Ages ranged from a low of 20 years to a high of 74 years with a slight positive skew (0.303). Distribution of responses is described in more detail in Table 1 and 2.

Table 1

Frequency Table of Respondents by Source of Recruitment

	<i>On-Campus</i>	<i>Off-Campus</i>	<i>Total</i>
Questionnaires returned	60	50	110
Age ranges			
18 to 29 years	26	3	29
30 to 39 years	15	5	20
40 to 49 years	8	8	16
50 to 59 years	8	10	18
over 60 years	1	21	22
Missing	2	3	5
Gender			
Male	12	17	29
Female	48	31	79
Missing	-	2	2
Education level			
Some high school	-	-	-
High school graduate	-	4	4
Some college	7	26	33
College graduate	39	12	48
Graduate school	14	8	22
Missing	-	-	-

Missing scores indicate that respondents failed to answer at least one question pertaining to the specific subscale (Table 2). The evaluativism subscale was the most frequently incomplete ($n = 17$), but this is not a function of the complexity of the subscale. Instead, incomplete responses to the evaluativism questions appear to be due to the format of the questionnaire.

Table 2

Frequency Table of Completed Instruments by Source of Recruitment

	On-Campus	Off-Campus	Total
Need for Cognition Scale	58	49	107
Missing	2	1	3
Mode of Problem-Solving Scale			
Associative Thinking	60	49	109
Missing	-	1	1
Bisociative Thinking	59	48	107
Missing	1	2	3
Scale of Adult Intellectual Development			
Absolutism	57	46	103
Missing	3	4	7
Relativism	56	47	103
Missing	4	3	7
Evaluativism	52	41	93
Missing	8	9	17

Gender Effects

Gender did not prove to be a significant discriminator in results on the NCS.

MPSS, and the SAID-44 as can be seen in Table 3, below:

Table 3

Gender Difference and Instrument Scores

<i>Instrument</i>	<i>df</i>	<i>t_{obt}</i>	<i>p</i>
NCS	6.645	.469	.640 ^{ns}
MPSS:			
Associate	105	-.323	.747 ^{ns}
Bisociative	103	.374	.710 ^{ns}
SAID-44:			
Absolutism	99	-.377	.707 ^{ns}
Relativism	99	-1.391	.167 ^{ns}
Evaluativism	90	.487	.627 ^{ns}

Accordingly, gender is not considered further in this study.

Age Effects

Pearson correlations were not significant for age and the following variables: need for cognition ($r = -.09, p = .368$), associative thinking ($r = .026, p = .794$), bisociative thinking ($r = .027, p = .787$), absolutism ($r = .052, p = .613$), and relativism ($r = -.088, p = .387$); however, age and evaluativism were significantly correlated ($r = .288, p = .007$). Age was also positively correlated with total life experience ($r_s = .553, p < .001$) and negative life experience ($r_s = .425, p < .001$), but negatively correlated with level of education ($r_s = -.244, p = .012$).

Reassigning participants into five age intervals (under 30 years, 30 to 39 years, 40 to 49 years, 50 to 59 years, and over 60 years) resulted in significant between group differences

in need for cognition, evaluativism, and bisociative thinking. Age intervals did not prove significantly different for participant scores on absolutism, relativism, and associative thinking (Table 4).

Table 4

Analysis of Variance – Age Intervals and Instrument Scores

Source	SS	df	MS	F	p
NCS:					
Between	6.586.3	4	1.646.6	3.482	.011
Within	45.872.1	97	472.9		
MPSS:					
Associate					
Between	596.4	4	149.1	1.379	.247 ^{ns}
Within	10.708.2	99	108.2		
Bisociative					
Between	1.836.5	4	459.1	4.462	.002
Within	9.980.7	97	102.9		
SAID-44:					
Absolutism					
Between	1,019.6	4	254.9	1.735	.149 ^{ns}
Within	13.666.5	93	147.0		
Relativism					
Between	215.8	4	53.9	.398	.810 ^{ns}
Within	12.602.6	93	135.5		
Evaluativism					
Between	1.175.7	4	293.9	2.896	.027
Within	8.424.3	83	101.5		

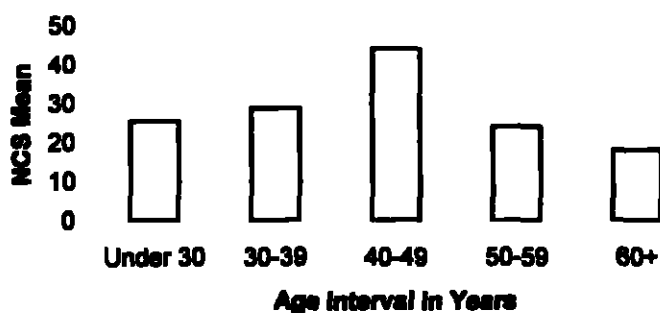
Tukey's post hoc test identified a significant difference in need for cognition in the comparison of the 40 to 49 year and 60+ year intervals ($p = .005$). The difference

between the under 30 year and 40 to 49 year intervals approached significance ($p = .053$) as did the difference between the 40 to 49 year and 50 to 59 year intervals ($p = .062$).

Figure 1 presents a comparison of the interval means for need for cognition scores.

Figure 1

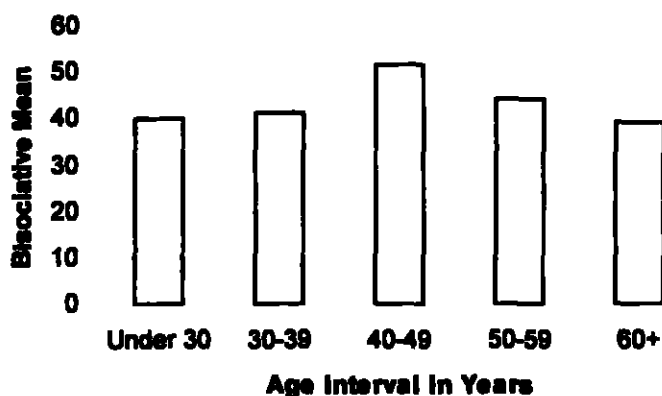
Age Intervals and Mean Scores – Need for Cognition



Age intervals were also significantly different for bisociative thinking (Figure 2). and for evaluativism (Figure 3). below.

Figure 2

Age Intervals and Mean Scores – Bisociative Thinking

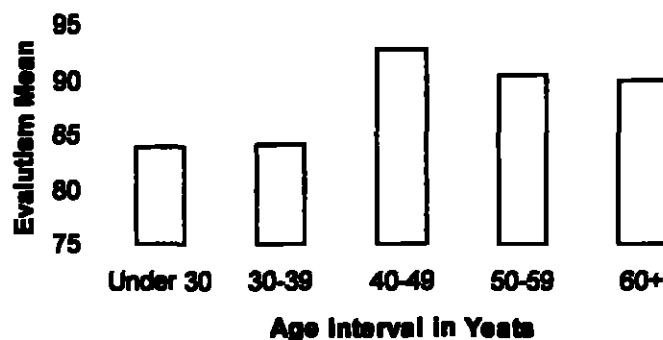


Tukey's post hoc tests identified a significant difference between the 40 to 49 year

interval and the under 30 year ($p = .004$), 30 to 39 year ($p = .020$), and over 60 year ($p = .003$) intervals. Only the 50 to 59 year interval was not significantly different from the 40 to 49 year group.

Figure 3.

Age Intervals and Mean Scores – Evaluativism



Tukey's post hoc test failed to identify the source of the age difference for evaluativism; however, the difference between the 40 to 49 year interval approached significance in comparison with the under 30 year ($p = .060$) and 30 to 39 year ($p = .104$) groups.

Education Effects

Education level was not significantly correlated with need for cognition ($r_s = .163$, $p = .094$), associative thinking ($r_s = -.102$, $p = .290$), bisociative thinking ($r_s = .128$, $p = .188$), relativism ($r_s = -.036$, $p = .719$), or evaluativism ($r_s = -.009$, $p = .929$). Education level had a significant negative correlation with absolutism ($r_s = -.289$, $p = .003$) and age ($r_s = -.244$, $p = .012$).

Life Experience Effects

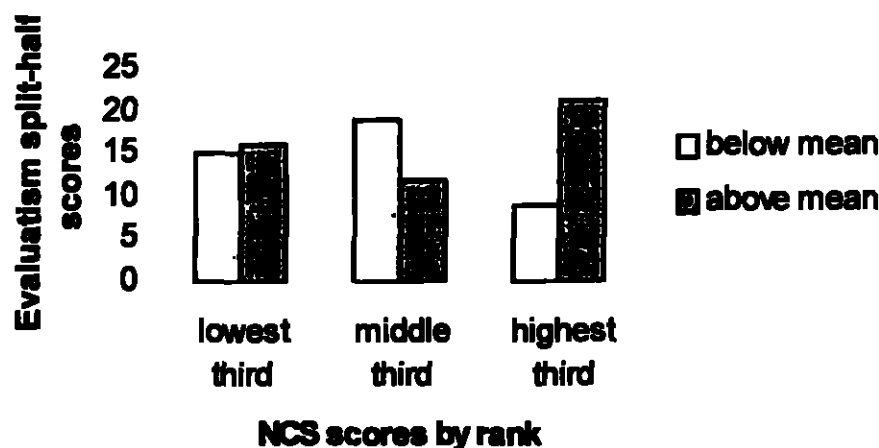
Total and negative life experience proved to be without significant correlation to education level, NFC scores, SAID-44 scores or MPSS scores, and are not addressed further in this study.

Need for Cognition

NCS scores were not significantly correlated with associative thinking ($r = -.121$, $p = .218$), absolutism ($r = -.147$, $p = .144$), relativism ($r = -.130$, $p = .193$), evaluativism ($r = .138$, $p = .190$), age ($r = -.090$, $p = .368$), or education ($r = .163$, $p = .094$); however, there was a significant positive correlation with bisociative thinking ($r = .617$, $p < .001$).

NCS scores were stratified by thirds in order to isolate the highest ranked cognizers. Comparison of these rankings with dichotomized ranking (split-halves by mean) of absolutism, relativism, and evaluativism scores indicates that there is a marginally significant χ^2 preference for evaluativism ($\chi^2(2) = 6.047$, $p = .049$) among the highest scoring cognizers (Figure 4). There was no significant χ^2 preference for relativism ($\chi^2(2) = 2.774$, $p = .250$) and absolutism ($\chi^2(2) = .996$, $p = .608$). There were no statistically significant interaction effects in NCS scores between education level, age intervals in decades, negative life experience, or total life experience

Figure 4.

Frequency of Participant Scores – Evaluativism Split-half and NCS Thirds*Modes of Problem-Solving Scale*

The associative thinking subscale was not significantly correlated with age ($r = .026, p = .794$), education ($r_s = -.102, p = .290$), need for cognition ($r = -.121, p = .218$), or relativism ($r = .019, p = .849$). Associative thinking had a significant positive correlation with absolutism ($r = .479, p < .001$) and evaluativism ($r = .243, p = .020$), and a significant negative correlation with bisociative thinking ($r = -.273, p = .005$).

Bisociative thinking was not significantly correlated with age ($r = .027, p = .787$), education ($r_s = .128, p = .188$), absolutism ($r = -.147, p = .146$), or relativism ($r = .094, p = .352$). Bisociative thinking had a significant positive correlation with need for cognition ($r = .617, p < .001$) and evaluativism ($r = .309, p = .003$), but a significant negative correlation with associative thinking ($r = -.273, p = .005$).

There were no statistically significant interaction effects in MPSS subscale scores between education level, age interval in decades, and NCS scores grouped in equal thirds.

Comparison of the mean plots for associative thinking and bisociative thinking (Figure 5) by age interval shows that the means of associative thinking are highest in the below 30 year and in the 60+ year group. The bisociative mean plot is the inverse, having the highest mean in the 40 to 49 age group.

Figure 5.

Mean Plot for Associative/Bisociative Thinking and Age Interval



Scale of Adult Intellectual Development – 44

Absolutism was not significantly correlated with age ($r = .088, p = .387$), need for cognition ($r = -.147, p = .144$), bisociative thinking ($r = -.147, p = .146$), relativism ($r = .137, p = .178$), or evaluativism ($r = .103, p = .331$). Absolutism had a significant negative correlation with education ($r_s = -.289, p = .003$) and a significant positive correlation with associative thinking ($r = .479, p < .001$).

Relativism was not significantly correlated with age ($r = .088, p = .387$), education ($r_s = -.036, p = .719$), need for cognition ($r = -.130, p = .193$), associative

thinking ($r = .019, p = .849$), relativism ($r = .137, p = .178$), or bisociative thinking ($r = .094, p = .352$). Relativism had a significant positive correlation with evaluativism ($r = .405, p < .001$).

Evaluativism was not significantly correlated with education ($r_s = .009, p = .929$), need for cognition ($r = .138, p = .190$), or absolutism ($r = .103, p = .331$). There was a significant positive correlation between evaluativism and age ($r = .288, p = .007$), associative thinking ($r = .243, p = .020$), bisociative thinking ($r = .309, p = .003$), and relativism ($r = .405, p < .001$).

There were no statistically significant interaction effects in SAID-44 subscale scores between education level, age interval in decades, and NCS scores grouped in equal thirds.

The significant findings in this study are detailed below (Tables 5 and 6).

Table 5.

Summary of Statistically Significant Relationships by Subject Variable

Subject Variable	N	Statistic	Value	<i>p</i>
Age, raw score:				
and Education	105	r_s	-.244	.012
and Evaluativism	88	r	.288	.007
Age intervals:				
and Bisociative Thinking	102	F	4.462	.002
and Evaluativism	88	F	2.896	.027
and Need for Cognition	102	F	3.482	.011
Education				
and Absolutism	103	r_s	-.289	.003
and Age, raw score	105	r_s	-.244	.012

Table 6.

Summary of Statistically Significant Relationships by Dependent Variable

Dependent Variable	N	Statistic	Value	p
Absolutism:				
and Associative Thinking	102	<i>r</i>	.479	< .001
and Education	103	<i>r_s</i>	-.289	.003
Associative Thinking:				
and Absolutism	102	<i>r</i>	.479	< .001
and Bisociative Thinking	107	<i>r</i>	-.273	.005
and Evaluativism	92	<i>r</i>	.243	.020
Bisociative Thinking:				
and Age intervals	102	<i>F</i>	4.462	.002
and Associative Thinking	107	<i>r</i>	.273	.005
and Evaluativism	90	<i>r</i>	.309	.003
and Need for Cognition	104	<i>r</i>	.617	< .001
Evaluativism:				
and Age, raw score	88	<i>r</i>	.288	.007
and Age intervals	88	<i>F</i>	2.896	.027
and Associative Thinking	92	<i>r</i>	.243	.020
and Bisociative Thinking	90	<i>r</i>	.309	.003
and Need for Cognition, 3rds	92	χ^2	6.047	.049
and Relativism	92	<i>r</i>	.405	< .001
Need for Cognition, raw score:				
and Age intervals	102	<i>F</i>	3.482	.011
and Bisociative Thinking	104	<i>r</i>	.617	.001
Need for Cognition, 3rds:				
And Evaluativism	92	χ^2	6.047	.049
Relativism:				
And Evaluativism	92	<i>r</i>	.405	< .001

Chapter IV

DISCUSSION

Major findings

Need for cognition was determined to be a significant discriminating variable for two characteristics of postformal thought: bisociative thinking and evaluativistic epistemological style. High cognizers are more likely to exhibit both characteristics. These findings provide, for the first time, an efficient means of identifying those individuals most likely to exhibit characteristics of postformal thought by utilizing a short (18-item) self-report instrument.

This study takes seriously the multidimensionality and interindividual diversity of adult developmental patterns in a manner rare among hierarchical postformal theorists. The finding that need for cognition is a significant discriminator for bisociation and evaluativism may detract from hierarchical postformal theories as predictable stage sequences for all adults, but it strengthens hierarchical stage theories with reference to those who are high cognizers. If need for cognition is a stable individual difference as claimed by Cacioppo et al. (1996), then this study may indicate that high cognizers are the individuals most likely to follow a postformal developmental pattern.

These results may offer insight into research studies that have been unable to identify age-related advance in postformal thought, and may provide assistance in answering the question, "If age is not the key variable, might some others be?" (Sinnott, 1998, p. 160). That key variable may well be need for cognition.

Age effects

Alternatively, the moderate correlation of evaluativism with age (.288) and need for cognition with decade intervals may indicate that, at least with regard to evaluativism, the relationship between cognizer and evaluativism is age-driven. The absence of a significant interaction between NCS thirds and decade intervals on evaluativism indicates that this criticism is unlikely to be valid. Both bisociative thinking and need for cognition are significantly related to decade intervals; however, there was no significant interaction between NFC thirds and decade intervals on bisociation.

What appears to be more likely is that cognizers react to environmental conditions, especially in the fifth decade of life, in a way that facilitates bisociation and evaluativism. The age-related factors contributing to bisociative thinking may decline after the fifth decade, but apparently this decline is less prominent for evaluativism. If this conjecture is substantiated by further research, it would explain the declining bisociative mean following the fifth decade as well as the decade specific relationship between bisociation and decade intervals. Since bisociative thinking is an innovative approach to problem space definition (Jabri, 1988), there may simply be fewer unfamiliar problems with age. Evaluativism, as an epistemological orientation, is less likely to decline due to increase in experience and improvement in problem solution strategies.

Other data

Because this study is exploratory, all relationships between subject and dependent variables have been considered. Statistically significant relationships that do not bear directly on postformal development have been identified. Cohort differences in respondents were replicated in the negative correlation between age and education level

(Hertzog & Schaie, 1988a, 1988b), and reflective judgment studies were replicated in the negative correlation between age and absolutism (King & Kitchener, 1994).

While it is not central to this study to consider the role of associative thinking in adult development, there is a significant positive correlation between associative thinking and absolutism and evaluativism. The relationship between associationism and absolutism may be due to the emphasis in each construct on external authority and standards. Associative thinking is essentially conventional and elects to establish problem space and to define problem solutions in compliance with prevailing standards (Jabri, 1988, 1911). Absolutism tends to objectify externals, to uncritically accept perceptual input, and to rely on external authority (Martin et al., 1994).

The relationship between associationism and evaluativism is more problematic. This study did not identify a third variable common to both constructs. The finding that both associative thinking and bisociative thinking have significant positive correlation to evaluativism, while sharing a significant negative correlation with each other, implies that the connection between evaluativism and need for cognition is weak. It seems likely that an epistemological shift to evaluativism is a more complex occurrence than adoption of bisociation, and may indicate the need for greater sophistication and refinement of the SAID-44.

Sinnott (1998) suggests another possibility when describing the epistemological shifts essential to formation of meaningful adult interpersonal relationships. Even cognitive misers may have to develop epistemologically, and it appears likely that young adults who elect to follow a developmental pattern that emphasizes social support in lieu of cognitive advance may demonstrate rapid epistemological advance. At the least, the

positive correlation of associationism with both evaluativism and absolutism may indicate that problem solving styles and epistemological styles develop independently. and that growth mechanisms promoting each may be multicausal.

Limitations of study

Sampling bias. The convenience sample of adults is clearly not representative of the adult population taken as a whole; therefore, results cannot be applied to the adult population. However, the connection of high cognizers with bisociative thinking and evaluativism may not be seriously weakened by the sampling technique if need for cognition is a stable individual trait.

Instrumentation. Both the MPSS and the SAID-44 are relatively new instruments and have been rarely utilized in published studies. Face validity of the subscale constructs exists, but there is not sufficient concurrent, criterion, and external validity to conclude that these measures qualify as discriminators of postformal thought. Further, the SAID-44 purports to identify epistemological style in a manner consistent with reflective judgment studies; however, reflective judgment studies have identified seven epistemological stages (King & Kitchener, 1994) as opposed to only three on the SAID-44. SAID-44 results are further confounded by the relationship between evaluativism and relativism, suggesting the need for additional refinement of this instrument.

Summary

Postformal theories of adult cognitive development have had only a modest impact on life span developmental psychology, and virtually no impact on differential psychology. For example, postformal thought is not listed in Sternberg's recent *Handbook of Intelligence* (2000). This lack of recognition and influence may be

attributed to a modest and often contradictory empirical base.

This study, by adopting a life span perspective concerning the variety of adult developmental patterns, may have presented a future direction for postformal theorists. Rather than attempting to synthesize all adult development into a single theoretical pattern, postformal theorists may find more persuasive empirical support for a variety of developmental models that are differentiated on the basis of individual selection of an adult coping strategy.

Considerable research remains to identify an economical schema for conceptualizing different coping strategies. Instrumentation needs to be developed and refined that facilitates replicative studies, and these studies need to be extended to include that portion of the adult population that is not college-educated. Until postformal theorists address these issues, it is likely that formal theories will remain a small footnote in life span developmental psychology.

Chapter V

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APPENDIX A

INFORMED CONSENT DOCUMENT

REQUEST TO PARTICIPATE IN RESEARCH

You are being asked to consider participation in a thesis research project. This project is an attempt to measure the changes, if any, in the way adults think during their life-span. Your participation is entirely voluntary, and your anonymity is guaranteed. Participation involves completion of the four-part questionnaire enclosed. It should take you less than one hour to complete the questionnaire.

Your scores will be aggregated with other participants for comparison purposes, and all published reports of the study will reveal only the aggregated scores. Your questionnaire will be secured with access restricted to the Project Director and his faculty sponsor. You may withdraw from the study at any time without penalty.

There are no physical risks associated with participation in this project, however, there is a slight chance that you may experience some discomfort in reviewing your personal opinions. Benefits of participation may include increased self-awareness, as well as the satisfaction associated with contributing to an increased understanding of adult cognitive development.

If you have any additional questions, please contact the Project Director, Peter A. Kindle, at the numbers listed below, or his faculty sponsor, Dr. Kyna Shelley at 281-283-3437. QUESTIONS REGARDING YOUR RIGHTS AS A RESEARCH SUBJECT MAY BE ADDRESSED TO THE UNIVERSITY OF HOUSTON-CLEAR LAKE COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (281-283-3015).

This is the only contact you will receive concerning this research project. In the event that you elect to participate, the completed questionnaire should be returned within four weeks to the Project Director in the stamped enveloped provided for your use. By returning the completed questionnaires you are giving consent for your scores to be included in the study.

A summary of the research results will be available by e-mail on or about August 1, 2001. Please contact the Project Director by e-mail on or before that date for your copy.

Thank you for your consideration.

**Peter A. Kindle, Project Director
4722 Silverlake Dr., Sugar Land, TX 77479
281-565-1134 (home) 832-541-9469 (cell)
pakindle@msn.com**

APPENDIX B

BIOGRAPHICAL QUESTIONNAIRE

Biographical questions:

Age _____ Male _____ Female _____

Education attained (please check one):

No high school _____

High school graduate _____

Some college _____

College graduate _____

Graduate degree _____

Major life experiences (please check all that apply):

Marriage _____

Divorce _____

Death of spouse _____

Birth of children _____

Death of child _____

Employment outside of home _____

Forced termination of employment _____

Where were you recruited to participate in this study?

Church _____ Name _____

Workplace _____ Name _____

Civic club _____ Name _____

Other _____ Please describe: _____