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Need for Cognition Scale:  
A Study of its Psychometric Properties  
and its Ability to Predict Academic Achievement

A Thesis  
Presented to  
the Faculty of the Department of Psychology  
Western Kentucky University  
Bowling Green, Kentucky

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts

by  
Arthur R. Cleavinger

June 1990

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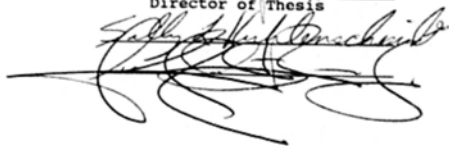
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The Need for Cognition Scale:  
A Study of its Psychometric Properties  
and its Ability to Predict  
Academic Achievement

Recommended \_\_\_\_\_

William P. Baker  
Director of Thesis

Guthrie J. Tomack  


Approved July 24, 1990  
(Date)

Elmer Gray  
Dean of the Graduate College



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THE NEED FOR COGNITION SCALE: A STUDY OF ITS  
PSYCHOMETRIC PROPERTIES AND ITS ABILITY  
TO PREDICT ACADEMIC ACHIEVEMENT

Arthur R. Cleavinger                      June 1990                      72 pages

Directed by: William Pfohl, Sally Kuhlenschmidt &

John Bruni

Department of Psychology, Western Kentucky University

The psychometric properties of the Need for Cognition Scale (NCS; Cacioppo & Petty, 1982) were investigated in two studies with independent samples of undergraduates at Western Kentucky University. In the first study (N = 379), the internal consistency and factor structure of the NCS were examined, and the NCS was compared to the Achievement subscale of the Personality Research Form (Jackson, 1974) and the State-Trait Curiosity subscale of the State-Trait Personality Inventory (Spielberger, 1979). Also, the possibility of differences in "need for cognition" attributable to socio-economic status (i.e. the educational attainment of the subjects' parents) were examined. The second study (N = 72) compared the NCS to the Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn & Dunn, 1981) and, in addition, investigated the possibility that the NCS could explain variance in American College Test

(ACT) scores other than that explained by the PPVT-R alone. The findings indicated that the NCS is a reliable instrument in terms of internal consistency. In factor analyses, one primary and one lesser factor emerged. The first factor was interpreted as representing the enjoyment of thinking, which is consistent with the first factor described in previous factor analytic investigations (i.e. Cacioppo & Petty, 1982; Cacioppo, Petty, & Kao, 1984). The weaker factor appeared to represent the "amount" of cognitive activity sought by the individual high in NCog. This factor corresponded to one described by Tanaka, Panter, and Winbourne (1988). The NCS correlated positively and moderately with the Achievement and Curiosity subscales. The analyses of SES differences in NCS scores indicate that there is a main effect for SES; the participants whose parents had fewer years of formal education had higher scores on the NCS. In the second study, the NCS correlated moderately and positively with the PPVT-R; however, the NCS did not account for variance in ACT scores which was significant and unique to that accounted for by PPVT-R scores.

## Chapter One

### Introduction

In the history of psychology, a lot of energy has been applied in an effort to understand human cognitive processes. Cacioppo and Petty (1982) state that cognition research has "tended to focus on two issues: the nature of knowledge and the character of underlying processes that enable the acquisition and use of this knowledge" (p. 116). Of the factors which affect the "acquisition and use" of knowledge, intelligence has been the source of the most abundant research. Many of Psychology's "giants" (e.g. Binet & Simon, Spearman, Wechsler, Thorndike, Das, etc.) have struggled (and continue to do so) to define the nature and scope of intelligence and to quantify it. Given the impact intelligence has on the acquisition and use of knowledge, its prominent place in the cognition literature is assured. Another factor, however, seems to be the logical "next step" from intelligence. This factor relates to the motivation to acquire and subsequently use knowledge. Wechsler (1958) appeared to recognize this factor in his definition of intelligence. He stated that intelligence is a "global capacity of the individual," and that it is not a mere sum of abilities. He

believed that incentive and drive impacted intelligent behavior (Sattler, 1982).

The Need for Cognition Scale (NCS; Cacioppo & Petty, 1982) purports to measure the motivation to think. Because this motivation is closely tied to the desire to acquire and utilize knowledge, the NCS has the potential to contribute greatly to the cognition data base. Therefore, the scale merits further investigation. The present study will examine the psychometric properties of the NCS, including its reliability, factor structure, and convergent and predictive validity.

The Need for Cognition (NCog), currently defined as "the tendency to engage in and enjoy thinking" (Cacioppo & Petty, 1982, p.116), is believed to represent stable differences in individuals' desire to apply cognitive energy to any situation. The measurement of NCog is an attempt to identify those individuals for whom it is "fun to think and quest for reality" (Murphy, 1947, p. 407).

NCog has been in the social psychology research literature for many years (See Asch, 1952; Maslow, 1943; Murphy, 1947; Sarnoff & Katz, 1954; Cohen, Stotland & Wolfe, 1955; Cohen, 1957). In Cacioppo's and Petty's view, NCog is not really a need, but a purely motivational construct. They retained the word "need" in the title in tribute to the pioneering work of Arthur Cohen and his colleagues, who, on

the other hand, felt that NCog fit the definition of a true need (Cacioppo & Petty, 1982).

Cacioppo and Petty (1982) stated that current NCog research emphasized the "statistical tendency of and the intrinsic enjoyment individuals derive from engaging in effortful problem solving" (p. 1033). They postulated that NCog develops slowly through successful experience with cognitive activity. However, those who are low in NCog are not considered incapable of effortful thought (Cacioppo et al. 1982, Cacioppo, Petty, Kao, & Rodriguez, 1986).

Another aspect of NCog as explained by Cacioppo (personal communication, 3-30-89) is that it encompasses specific cognitive behaviors, such as evaluation, synthesis, analysis. Cacioppo stated that NCog is "the general predisposition to perform cognitive endeavors." He indicated that physical activity provides an appropriate analogy when trying to understand the construct. One who generally enjoys physical activities will probably engage in and enjoy several effortful physical tasks (e.g. running, racquetball, basketball, etc.). NCog, by the same token, appears to predispose one to "engage in and enjoy" effortful cognitive endeavors (e.g. analysis, evaluation, etc.). The individual may not engage in all of these behaviors, but the predisposition is there. Cacioppo indicated that NCog should not be equated with any specific cognitive behaviors (e.g. analysis, evaluation, synthesis). He

stated that the cognitive behaviors are manifestations of NCOg.

Cohen, Stotland and Wolfe (1955) stated that individuals differ in their desire to "organize their experience meaningfully, and this corresponds to differences in the need for cognition" (p. 291). They defined NCOg as "a need to structure relevant situations in meaningful, integrated ways. It is a need to understand and make reasonable the experiential world" (p. 291).

Cohen described the "need" aspect of NCOg. Cohen, Stotland and Wolfe (1955) indicated that NCOg had the characteristics of a true need in that there appeared to be tension and resultant goal-directed behavior, ultimately leading to tension reduction. These characteristics, according to Cohen and his colleagues, are what separates NCOg from the Gestalt notions of the need to structure one's environment. They speculated that tension occurred with frustration of NCOg, and by seeking to "understand and make reasonable" the source of the tension arousal, the tension could be reduced. An hypothesis for their research, one which follows directly from the above line of thought, was that an ambiguous situation (i.e. one which lacks sufficient cues to satisfy NCOg) would result in negative feelings toward the frustrating situation (Cohen, et al., 1955).

Cohen attempted to measure NCOg with two scales developed by himself. The first was the "Situations Checklist" which



consisted of several hypothetical situations with three responses for each. One response in each group was decided a priori to represent the desire for more information or understanding. The second scale, the "Hierarchy of Needs Scale," consisted of sets of statements developed to represent the following needs: achievement, affiliation, recognition, autonomy and cognition. The statements were presented in every possible combination of three, and the respondent was to rank order each triad in terms of importance. Cohen obtained a correlation of .50 between the two scales (Cohen et al., 1955).

In experimentation with the two scales, Cohen et al. (1955) found that university undergraduates presented with an ambiguous story reported negative feelings toward the story, and this effect was exacerbated for those high in NCog. Cohen (1957) found that more attitude change occurred in college undergraduates when a persuasive argument was preceded by a "need arousal" statement (i.e. some detailing of the problem). This effect was attenuated for undergraduates high in NCog. It appeared that they were motivated to thoroughly process the persuasive communication without the "need arousal" statement. Cohen suggested that this was due to the already established desire to think.

Research on the NCog construct disappeared from the literature until 1982 when Cacioppo and Petty developed the Need for Cognition Scale (NCS) and conducted four experiments

to begin to establish evidence of its reliability and validity. All subsequent research (e.g. Ahlring, 1987; Cacioppo, Petty & Kao, 1984; Cacioppo, Petty, Kao & Rodriguez, 1986; Heppner, Reeder & Larson, 1983; Osberg, 1987) was conducted using the NCS; Cohen's checklists have not been used again.

Following the development of the NCS, many researchers began the work of comparing NCog to various other variables. A brief description of some of these investigations follows.

Cacioppo and Petty (1982) obtained a small but significant correlation ( $r = .19$ ,  $N = 419$ ,  $p < .001$ ) between the NCS and the Embedded Figures Test (EFT; French, Ekstrom & Price, 1963), a measure of cognitive style. The EFT calls upon the ability to separate figure from ground. Leary, Sheppard, McNeil, Jenkins and Barnes (1986) obtained a correlation of  $.47$  ( $N = 46$ ,  $p < .001$ ) between the NCS and scores on the Objectivism Scale, which purports to assess the "tendency to base one's judgements and beliefs on empirical information and rational considerations" (p. 32).

Other research studies indicated that those high in NCog reported being better problem solvers (Heppner, Reeder & Larson, 1983), score higher on measures of self-esteem and masculine sex-role identity (Osberg, 1987), and score lower on a measures of dogmatism, test anxiety and social desirability (Cacioppo & Petty, 1982). Tanaka, Panter and Winborne (1988)

found no relationship between performance on the NCS and years in school. They concluded that NCog appeared to be an enduring trait.

High NCog individuals have been found to underestimate time on-task in a problem solving situation (Baugh & Mason, 1986) and enjoy a complex number circling task more than a simple task (Cacioppo & Petty, 1982). Cacioppo, Petty and Morris (1983) found that high NCog individuals attend to parts of persuasive communications which are central to the message, rather than parts which are "peripheral" (i.e. situational variables such as the expertise of the message source or the number of arguments presented).

Ahlering (1987) found that people high in NCog were more likely than those low in NCog to anticipate watching the 1984 presidential and vice-presidential debates, and marginally more likely to actually do so. High NCog subjects also reported having more beliefs about the candidates. In the same vein, Cacioppo, Petty, Kao, and Rodriguez (1986) found that high NCog subjects reported thinking about the 1984 presidential candidates more and listed more information about each than did low NCog subjects. High NCog individuals showed more attitude/voting behavior consistency than did low NCog individuals. Ferguson (1985; cited in Cacioppo et al., 1986) found that high NCog individuals are more likely to obtain news and information from newspapers, magazines and journals rather than from more passive sources such as TV and radio.

The purpose of the present investigation will be to reexamine the psychometric properties of the NCS Short Form. The psychometric properties of the NCS Short Form have been researched only once (Cacioppo, Petty, & Kao, 1984). In that study, only the factor structure of the NCS Short Form and its reliability were reported. In the present investigation, the factor structure and the reliability (Coefficient Alpha) will be reexamined in an effort to replicate the results of Cacioppo and Petty (1982) in a different locale with a different subject pool. Next, the possibility of differences in NCS scores which may be attributable to socioeconomic status (SES) will be examined. The educational attainment of the participants' parents was selected as the SES variable for this investigation. This variable will be addressed due to speculation by Cacioppo and Petty (1982) that NCog development is due to previous experience with cognition.

Finally, the relationship between the NCS Short Form and the State-Trait Curiosity subscale of the State-Trait Personality Inventory (STPI; Spielberger, 1979) will be assessed. The NCS Short Form will also be compared to the Need for Achievement (NACH) subscale of the Personality Research Form (PRF, Jackson, 1974). These variables will be investigated in order to replicate previous research findings (Roseboro & Osberg, 1986; Olson, Camp, & Fuller, 1984) and contribute evidence for convergent validity.

In a second study with an independent sample, the NCS Short Form will be correlated with the Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn & Dunn, 1981), a measure of receptive vocabulary and estimate of verbal intelligence, in order to assess the relationship between NCog and verbal intelligence. Secondly, the possibility that the NCS Short Form can estimate academic achievement will be investigated. Cacioppo and Petty (1986) indicated that the NCS might be useful in predicting school performance. The NCS Short Form and the PPVT-R will serve as independent variables in a regression equation; the dependent variable will be American College Test (ACT) scores. In the past, measures of intelligence have been one of the primary predictors of achievement. It is hoped to ascertain whether the NCS Short Form can account for variance in ACT scores over and above that explained by the PPVT-R.

#### Hypotheses

- 1) The NCS Short Form will demonstrate adequate internal consistency, based on an Alpha coefficient.
- 2) The present study will yield one primary factor representing the "tendency to engage in and enjoy thinking."
- 3) Parents with higher levels of formal educational training may encourage their children to be "thinkers"; their children should then have higher levels of NCog. Therefore, there will be a significant difference in NCS

scores attributable to differences in Educational Attainment level, with children of highly educated parents having the highest NCS scores.

- 4) NCog will correlate positively and significantly with NACH and State-Trait Curiosity; however, the correlations will be moderate and NCog will retain its unique status.
- 5) The NCS Short Form and the PPVT-R will correlate significantly and positively, but the correlation will be moderate enough to allow NCog's interpretation as a unique construct.
- 6) The NCS will account for variance in ACT scores over and above that explained by the PPVT-R.

## Chapter Two

### Literature Review

This review will first address the development of the NCS and studies which have investigated the reliability and factor structure of the NCS (long and short forms). Studies which have examined the relationships between NCOg, curiosity and NACH will follow. Finally, a review of the studies targeting the relationships between NCOg, intelligence and academic achievement will be presented.

#### Development of the Need for Cognition Scale

Heesacker (1985), in his review of the NCS, stated the Cacioppo and Petty were motivated to develop the NCS for three reasons. First of all, the instruments used by Cohen had no psychometric data and were no longer available. Secondly, Cacioppo and Petty were interested in the individual difference variables that might impact the processing of persuasive communications, and NCOg was an important component in their research base. Finally, cognition had gained importance in several areas of psychological research, and Cacioppo and Petty felt that there should some means of assessing the motivation to think.

Initially, Cacioppo and Petty began a search for the appropriate item format. It was decided that a series of

statements would be developed to which one would indicate on a Likert-type +4 to -4 scale format how much they agreed with the statement. The items generated included those that described situations in which one could collect, analyze and/or synthesize information. Purposefully excluded from the scale were items dealing with "inner broodings, reverie, mystical or religious experiences, mind wandering, and artistic imaginings" (Cacioppo et al., 1982, p. 806). Some of the items were negatively worded to attenuate response bias. In preliminary testing, those items that were found to be ambiguous were either reworded or eliminated from the scale. Forty-five items remained after this stage (See Appendix B).

Next, the remaining 45 items were administered to individuals (N=96) thought to differ in strength of NCog. The subjects for the high NCog group were chosen from the faculty of a large midwestern university. The low NCog subjects were chosen from assembly line workers in surrounding communities. For this experiment, any item which failed to differentiate between the two groups was eliminated. Also, any item failing to correlate significantly (i.e.  $p < .01$ ) with the total score was eliminated. Thirty-four items, constituting the final form of the original NCS, met all of the criteria and were retained for further analyses. Twenty-one items were negatively worded (see Appendix B).

Cacioppo, Petty and Kao (1984) rank ordered the 34 items in terms of their absolute loadings on the first factor



derived from previous factor analyses. They then calculated Cronbach's Alpha each time an item was added. When the 19th item was added, there was a decrease in the Alpha coefficient and little internal consistency was gained by adding additional items. Therefore, an 18 item "short form" of the NCS was created. This version is being used in the present study (see Appendix A & B).

The NCS was developed by Cacioppo and Petty (1982) to address the need for a means of measuring NCog. The original form began as a set of opinion statements describing situations in which one could apply cognitive effort. Following a search for ambiguous items, the item pool was reduced to 45 items. These items were then piloted. The 34 items included in the final form were those which correlated best with the total score and discriminated best between groups thought to be high and low in NCog (Cacioppo & Petty, 1982). Cacioppo, Petty, and Kao (1984) were able to develop an 18 item short form of the original 34 item version.

#### NCS Reliability Data

Only three studies have examined the reliability of the NCS, only one of these is particular to the NCS Short Form. In developing the original NCS, Cacioppo and Petty (1982) hoped to build reliability into the scale by applying a "criterion of internal consistency." This meant that any item which failed to correlate significantly (i.e.  $p < .01$ ) with the total score would be eliminated. The 34 items which were

retained for the NCS long form correlated significantly with the NCS total score and seemed to exhibit a "high degree of interrelatedness" (Cacioppo & Petty, 1982, p. 119). They reported a split-half reliability coefficient, corrected for test length abbreviation with the Spearman-Brown formula, of .87 (p. <.0001).

In the development of the NCS Short Form, Cacioppo, Petty and Kao (1984) reported Theta coefficients of .91 and .90 for the 34 item and 18 item versions respectively. The two versions correlated .95 (p. <.001) with each other.

The results from studies examining the reliability of the NCS, both the original and the short form, indicate that it demonstrates good internal consistency. All reported coefficients were in the upper .80 to low .90 range.

#### The Factor Structure of the NCS

First, Cacioppo and Petty (1982) claim that NCog is an individual difference variable which should be stable across gender; therefore, the construct validity of the NCS would be in question if there were differences attributable to gender. In three separate investigations, Cacioppo and Petty (1982) found no main effects for gender or gender x NCog interactions.

The factor structure of the NCS has been examined four times. Three of the studies were conducted by Cacioppo, Petty and their colleagues during the development of either the 18 or 34 item scale.

The first factor analysis on the original 34 item form was conducted with 96 individuals, either university faculty or assembly line workers (Cacioppo & Petty, 1982). Ten factors emerged with latent roots greater than one. The Scree Test eliminated all but one of the factors. The Eigenvalue of this factor was 10.22 and it accounted for 30.1% of the variance. The Eigenvalues for the next two factors were 2.31 and 1.82, and each accounted for 6.8% and 5.4% of the variance respectively. Cacioppo and Petty indicated that the first factor, which was clearly dominant, seemed to represent the "tendency to engage in and enjoy thinking." Some of the items that loaded highly on this factor were, "I prefer complex to simple problems" and "Thinking is not my idea of fun" (negatively worded). Cacioppo and Petty did not interpret the two weaker factors, and did not indicate which items loaded on these two factors. Cacioppo and Petty concluded that the NCS is an effective means of assessing NCog.

A second factor analysis, also conducted with the 34 item version, was performed by Cacioppo and Petty (1982) with a sample of 419 undergraduates at the University of Missouri. They hoped to replicate the results of the first factor analysis with a more homogeneous sample in a different locale. The subjects (N = 419) were introductory psychology students at the University of Missouri. As in the first study, ten factors had latent roots greater than one. Following the Scree Test, one factor accounting for 20% of the variance remained.

The second and third factors accounted for 5.7% and 4.6% of the variance respectively. Thus, the first factor was clearly dominant. Cacioppo and Petty (1982) indicated that the factor loadings of the items in the second experiment were quite consistent with those in the first experiment, and stated that "the weightings from both studies suggest that the retained factor represents people's tendency to engage in and enjoy thinking" (p. 123).

Tanaka, Panter and Winborne (1988) conducted another factor analysis on both the original 45 item and the 34 item scales. They wanted to discover any constituent subcomponents of the "macro-level assessment" of NCog, because they felt that the construct could be better understood in terms of these subcomponents. In other words, there are various aspects of thinking, and, if the NCS's factor structure reflects them, perhaps NCog as a whole could be better understood if these aspects were known.

Two hundred and eighty-eight undergraduates (139 males and 149 females) at a private university took part in the study, as well as a cross-validation sample of 116 (56 males and 60 females) from the same university. Tanaka and his colleagues (1988) chose to interpret only the 34 item version so that their results could be compared to those of Cacioppo and Petty. Three factors emerged, accounting for 25% of the

total variance. By isolating items that loaded on one factor, they were able to construct a 25 item scale consisting of three factor clusters or subscales (see Appendix B).

The factors were labeled "Cognitive Persistence," which corresponds to the degree to which an individual enjoys engaging in cognitive activity; "Cognitive Complexity," which deals with the degree to which an individual enjoys complex information processing demands; and "Cognitive Confidence," which represents the degree of confidence one has in one's cognitive abilities. The Cronbach Alpha coefficients for the three subscales were .72, .57 and .59 respectively.

This factor structure was replicated in the cross-validation sample. The factor clusters on the 25 item scale had Cronbach Alpha coefficients of .68, .66, and .63, respectively. The reliability coefficient for the full 25 item scale was .77 in the first sample and .80 in the cross-validation sample.

Tanaka and his colleagues used the 34 item version of the NCS in their analyses, but changed the response format from the nine point Likert-type format selected for the test by Cacioppo and Petty (1982), and for which the items were developed, to a dichotomous (i.e. true-false) format. This change was based on the assumption that dichotomous scales are less susceptible to response style biases (e.g. acquiescence). Because it is not known at this point the degree to which this

change altered the nature of the NCS, the results of their analyses should be interpreted with great caution.

The fourth factor analysis was performed on both the 18 and 34 item versions of the NCS (Cacioppo, Petty & Kao, 1984). With 527 University of Iowa students, Principle Components analyses indicated one primary factor in the 18 item version, and this factor accounted for 37% of the variance. Principle Components analyses with the 34 item version indicated one primary factor accounting for 27% of the variance. Again, this factor represented individuals' desire to "engage in and enjoy thinking." Cacioppo, Petty and Kao concluded that the 18 item version appeared to be more efficient.

Three previous factor analytic investigations (Cacioppo & Petty, 1982; Cacioppo, Petty, & Kao, 1984) suggest a single factor interpretation of the 34 and 18 item versions of the NCS. This factor represents the desire to think. Tanaka et al. (1988) found a three factor interpretation to be most appropriate. Due to item sensitivity lost in changing the NCS from a Likert-type to a dichotomous response format, it was suggested that these results be interpreted cautiously.

#### SES Differences in NCS Performance

Cacioppo, Petty, Kao, and Rodriguez (1986) indicate that NCS develops slowly through success with cognitive activity. Although not defined by Cacioppo et al., "success" would suggest that the individual had been reinforced in various

ways for acquiring and using knowledge. It would seem that the parents would be responsible for a good deal of such reinforcement. Their attitudes toward "cognition" could certainly determine whether they reinforce their children's cognitive efforts, and the amount of formal schooling pursued by them might be a good indication of their attitudes toward "cognition," specifically knowledge acquisition and utilization. No previous investigations have examined this possibility.

#### Need for Cognition, Curiosity, and Need for Achievement

In two previous investigations, NCog has been found to be moderately correlated with curiosity (Olson, Camp & Fuller, 1984) and achievement motivation measures (Roseboro & Osberg, 1986). Curiosity, according to Olson and his colleagues, is defined as "a need or desire to know more about one's self or one's environment" (p. 75). They stated that to the extent that curiosity involves cognitive exploration, curiosity should be positively related to NCog. In the conversation with Cacioppo (personal communication, 3-30-89), he differentiated the two constructs by stating that curiosity is an outcome of NCog (i.e. one who is high in NCog is predisposed to be curious), again demonstrating the higher order nature of NCog. Olson, Camp and Fuller (1984) found significant correlations between all but one of eight measures of curiosity. The mean correlation was .57 (see Table 1).

The need or motivation to achieve (NAch; McClelland, Clark, Roby & Atkinson, 1949) has been defined as a learned motive to attain or master something (e.g. idea, standard, internal or external goal). This definition implies that NAch is instrumental in that it motivates behaviors that ultimately lead to the achievement of something. To the extent that NCog is instrumental in nature (i.e. represents a desire to achieve more understanding, clarity or information), NAch and NCog will be positively related. Roseboro and Osberg (1986) found the NCS to be correlated .52 with the Prostatic Motivation Test (Hermans, 1970) and .31 with the Academic Involvement Scale (Batlis, 1978). Both are measures purporting to assess achievement motivation.

One of the goals of the present investigation is to analyze the relationships among these constructs. Some degree of overlap in the definitions of NCog, curiosity, and NAch is evident. Whether or not NCog represents a unique and higher order construct that predisposes one to be curious and/or want to achieve remains to be investigated.



Table 1

Pearson Correlations Between the NCS  
and Measures of Curiosity  
(Olson, Camp & Fuller, 1984)

Instrument	K
Ontario Test of Intrinsic Motivation	
Specific Curiosity	.50
Ambiguity	.45
Complexity	.50
Novelty	.45
Outdoor	.17
Mechanical	.33
Computational	.44
Scientific	.44
Persuasive	.29
Artistic	.19
Literary	.40
Musical	.25
Social Service	.47
Clerical	.39
Thinking	.59
Consultation	.37
Observation	.44
Diversive Curiosity	.01
Melbourne Trait Curiosity	.55
Melbourne State Curiosity	.45
Academic Curiosity	.68
STPI Trait Curiosity	.67
STPI State Curiosity	.55
Median	.57

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Need for Cognition and Intelligence

Logically, those who are more intelligent will experience more success with cognitive activities. Nevertheless, Cacioppo, Petty, Kao and Rodriguez (1986) differentiated NCog and intelligence conceptually by stating that intelligence is

an ability factor which, in effect, limits the extent of NCog. Cohen and his colleagues (1955) stated that "meaningful integration" should be defined in terms of the individual's ability to do so. Finally, Cacioppo and Petty (1982) pointed out that the NCS that it is not an intelligence test, though they do expect a positive but weak relationship between NCog and intelligence.

Five studies addressed the relationship between NCog and intelligence. Cacioppo and Petty (1982) found a significant relationship between NCog and reported American College Test (ACT) scores, which they considered to represent intelligence ( $r = .39$ ,  $N = 104$ ,  $p < .01$ ).

Cacioppo, in an unpublished 1983 study (cited in Cacioppo et al., 1986) found a weak relationship between intelligence, as measured by the Shipley-Hartford Vocabulary Test, and NCog with coefficients of .15 and .21. Cacioppo and his colleagues (1986) reported a substantial correlation of .32 ( $N = 185$ ,  $p < .001$ ) between NCS and Shipley-Hartford scores.

Olson, Camp and Fuller (1984) obtained ACT scores from the records of those for whom they had NCS scores and found a correlation of .31 ( $N = 140$ ,  $p < .05$ ). Also interested in how intelligence impacted NCog, Cohen and his colleagues (1957) found a nonsignificant correlation of .23 between college grades and NCog.

Need for Cognition and the Prediction of Academic Achievement

Cohen, Stotland, and Wolfe (1957) found grades and NCS to be uncorrelated. Roseboro and Osberg (1986) were interested in whether the NCS could predict achievement. They obtained course grades for 75 undergraduates enrolled in an introductory psychology course. A step-wise multiple regression analysis was conducted. In the equation, the students' course grades served as the dependent variable; the NCS and the measures of achievement motivation were independent variables. Only the NCS entered the equation (see Table 2).

Table 2

Multiple Regression Predicting Course Grades  
(Roseboro & Osberg, 1986).

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Step	Variable	F	B	p
1	NCS	8.47	.37	.0052

Note. The Prostatic Motivation and Academic Involvement scales failed to enter the equation.

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Review of the literature Summary

The research conducted on the NCS up to present suggests that it is a reliable instrument with a unidimensional structure. The factor which consistently emerged in the

analyses of Cacioppo, Petty and their colleagues represented the desire to think. The NCS has been found to be moderately and positively related to measures of curiosity, achievement motivation, and intelligence.

## Chapter Three

### Methods

Two separate studies were conducted with two independent samples. The descriptions of the nature of the samples, the procedures used to recruit them, the instruments administered, and the administration procedures will be described in two parts.

#### Study One

##### Purpose

The first sample was used to examine the psychometric properties (i.e. reliability and factor structure) of the NCS, the relationships between the NCS, measures of curiosity, and Need for Achievement. Also, the possibility of differences in NCS performance attributable to SES differences was investigated in this study.

##### Subjects

The sample for Study One consisted of 379 undergraduates (128 males, 251 females) enrolled in various psychology classes at Western Kentucky University. The students were recruited by the experimenter through short presentations in the classroom describing the nature of the research project and its purpose. Following the presentation, a sign-up sheet

was circulated for those wishing to volunteer for the project. The participants received extra credit in their psychology classes in return for their participation.

#### Description of Instruments

"Need for Cognition" (NCog) was assessed using the Need for Cognition Scale (NCS; Cacioppo & Petty, 1982). The NCS consists of 18 self-statements to which the individual is to indicate the degree to which the item reflects them. The response format is a six point Likert-type scale (A-F). Selecting "A" indicates that the item is "very much like me" (high NCog) and "F" indicates that the item is "very much unlike me" (low NCog). Nine of the items are reverse-keyed (i.e. the selection of "F" indicates high NCog) in an attempt to reduce response bias (i.e. acquiescence).

Past research with the NCS (Cacioppo & Petty, 1984) indicates that the 18 item version has good internal consistency; they report an Alpha coefficient of .90. The scale requires approximately 15 minutes to complete.

"Need for achievement" (NACH) was assessed using the Achievement subtest of the Personality Research Form, Form AA (PRF; Jackson, 1967). The Achievement subtest consists of 20 self-statements to which the individual indicates the degree to which the item reflects them. The response format for this subtest was changed from a dichotomous (i.e. true-false) to a six point Likert-type scale ("A" indicating high NACH). It is

recognized that this change constitutes a break in standardized procedures; therefore, the use of the normative data for purposes of interpretation of the PRF would not be valid. For purposes of this analysis, the degree of NACH will be represented by the total additive score. Standardized scores will not be reported, so the norms will not be consulted. Also, the change to a Likert-type format serves to increase the sensitivity of the scale; therefore, this change appears justifiable. Ten of the items are reverse-keyed to attenuate response bias. Information obtained from the manual (Jackson, 1974) indicates that the subtest has good internal consistency ( $\text{Alpha} = .89$ ). The subtest requires approximately 15 minutes to complete.

"State-trait curiosity" was assessed using the Curiosity subtest of the State-Trait Personality Inventory (STPI; Spielberger, 1979). The STPI S-T Curiosity subtests consist of 20 self-statements (10 State and 10 Trait) to which the individual indicates the degree to which the item reflects them on a four point Likert-type scale. The selection of "A" indicates that the self-statement is "not at all like them" (low curiosity) and "F" indicates that the self-statement is "very much like them". For the State Curiosity items, the individual is instructed to respond according to the way they feel at that moment, whereas on the Trait Curiosity items, they are to respond according to way they generally feel. Two

items on each of the scales are reverse-keyed to attenuate response bias.

Information obtained from the STPI manual (Spielberger, Jacobs, Crane, Russell, Westberry, Barker, Johnson, Knight & Marks, 1979) indicates that the State Curiosity subtest has internal consistency (Alpha = .84 & .78 for college males and females respectively). The Trait Curiosity subtest appears to demonstrate internal consistency as well (Alpha = .87 & .81 for college males and females respectively). The subtests require approximately 15 minutes to complete.

Information regarding the age, sex, race and SES of the participant was obtained through a demographic questionnaire developed by the experimenter. For the present study, SES is represented by the educational attainment of the participants' parents. It was felt that this variable would be most related to the research questions at hand, that is, the development of attitude towards cognitive effort. Thus, this SES variable seems to have the greatest possibility of influencing level of NCog. In addition, it was felt that this variable could be more accurately provided by the participant, as opposed to the income of the parent for example. The study participants indicated their parents' educational attainment on the demographic questionnaire.

The demographic questionnaire was combined with the NCS, the Achievement subtest of the PRF and the S-T Curiosity



scales and put in a booklet format for ease in administration. The booklet contained instructions for each scale and an identification number (1 to 379). The participants' names did not appear on the test booklet. The instructions and test booklet are provided in Appendix A.

#### Procedure

The subjects indicated their desire to volunteer for the study by signing a sheet circulated at the time of the recruitment presentation. During the presentation, the students were briefed regarding the nature and purpose of the study, the amount of time involved in participating, their rights to confidentiality and feedback, their right to withdraw from the study at any time, and the amount of extra credit they would receive from their instructor in return for their participation. The volunteers were then thanked in advance for their participation.

All test administrations occurred in a large auditorium with the exception of three administrations which occurred in the classroom following the recruitment presentation. There were approximately 10 auditorium administration sessions lasting from 2 to 6 hours. The participants were allowed to come at their convenience to any of the sessions. The sessions occurred at various times of the day on various days of the week in hopes that no one would be forced to withdraw due to class or work.

Before the classroom administrations, the students were told that those who did not wish to complete the test booklet were free to go. In an attempt to reduce the embarrassment of leaving, the students were told that even if they did complete the test booklet, they were free to refuse the use of their information in the study. Other than these statements, the classroom administration did not differ from the auditorium administrations.

Before beginning the tests, the participants were told once again that they could receive feedback regarding the outcome of the study as a whole. They were told that, because of the use of identification numbers for confidentiality, it would not be feasible to report individual performances. At that time, an address was displayed to which they could send a self-addressed, stamped envelope. The results would then be sent to them. Less than 15 of all of the participants requested feedback.

The following instructions were read to all participants:

Please answer the following questions as honestly as possible. No one will see your booklet but me and your name will not appear anywhere on the booklet. Be careful not to skip any of the questions.

The experimenter then went through each of the sections of the booklet describing what to do and what sections required careful attention. The participants were thanked once again for their help.

## Study Two

### Purpose

The second sample was used to examine the relationship between NCog and intelligence and the ability of the NCS to account for significant variance in achievement test scores over and above that explained by intelligence test scores.

### Subjects

The participants in Study Two consisted of 71 undergraduates enrolled in psychology classes during the summer term at Western Kentucky University. The participants were recruited in their psychology classes by the experimenter using the same methods as in Study One. Those volunteering and completing the study received extra credit in their psychology course.

### Description of Instruments

The Need for Cognition Scale (NCS; Cacioppo & Petty, 1982), the Achievement subtest of the Personality Research Form (PRF; Jackson, 1967) and the State-Trait Curiosity Scales from the State-Trait Personality Inventory (STPI; Spielberger, 1979) were again used with the second sample.

To assess achievement, an American College Test (ACT) score was obtained from the participant's student file. The ACT consists of four timed tests of educational development in the areas of English, Math, Social Studies and Natural Sciences. The ACT is normally taken by college-bound juniors and seniors in high school, and is required of all those

wishing to enroll at Western Kentucky University. Information from the ACT is used to predict academic performance in college and aid in career planning.

The Peabody Picture Vocabulary Test-Revised, Form L (PPVT-R; Dunn & Dunn, 1981) was used to estimate intellectual ability. It is a norm-referenced test for individuals 2.5 to 40 years of age. It consists of an easel with four pictures per page; the examiner reads a stimulus word and the individual points to the picture which best represents the stimulus word. The test takes approximately 15 to 20 minutes to administer.

Dunn and Dunn (1981) indicated that the PPVT-R is not a comprehensive measure of intelligence, but that it assesses one aspect of intelligence, receptive vocabulary. One function of the test is to assess verbal ability, and due to high correlations found between verbal ability (particularly vocabulary) and general intelligence, the PPVT-R has been used to supplant intelligence tests. This practice led to many warnings (e.g. Dunn & Dunn, 1981; Salvia & Ysseldyke, 1988; Sattler, 1982, 1988) that intelligence tests and PPVT-R scores are not interchangeable. Sattler (1982) indicated that PPVT-R scores have consistently been lower than Stanford-Binet scores for ethnic children, sometimes as much as 30 to 40 points.

While PPVT-R scores are not substitutes for intelligence scores from accepted tests, there seems to be some merit to the ability of the PPVT-R to estimate intelligence to some

extent. Median correlations between the PPVT-R and various intelligence tests run in the .60's, with correlations ranging from .20 to .90.

Burris (1983) found the PPVT-R and the Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1981) to correlate substantially. The PPVT-R correlated highest with the Verbal Scale ( $r = .67$ ), followed by the Full Scale ( $r = .65$ ), and finally the Performance Scale ( $r = .52$ ). She found that the PPVT-R could predict WAIS-R Verbal Scale scores with a Standard Error of Estimate (SE) of 7.59. Therefore, the PPVT-R appears to be of use in predicting intelligence scores, particularly verbal intelligence scores.

The PPVT-R was chosen for this study because of the paucity of instruments available to assess adult intelligence in a group format. In light of the evidence cited above, the experimenter feels justified in using the PPVT-R to estimate, albeit cautiously, the level of intelligence of the study's participants.

The PPVT-R is normally administered individually. For the purposes of this study, the instrument was administered in a special group format. This format corresponded to that used by Dunn and Dunn (1981) with the 828 adults in the standardization sample. A response form was designed for items 70 through 175. The experimenter presented the pictures via a slide presentation while reading the stimulus words. The individuals then marked their response forms. The size of the

groups ranged from 2 to 15. Information from the PPVT-R manual indicates that the median split-half correlation coefficient for Form L in the adult sample was .82.

#### Procedures

The procedures in the second study in terms of the administration of the questionnaire booklet did not differ from the those in the first study. The PPVT-R administration is described above because of its irregular group format.

#### Data Analysis

The Statistical Package for the Social Sciences (SPSS) was used for all of the data analyses. To estimate the reliability of the NCS Short Form, more specifically its internal consistency, Coefficient Alpha was computed for the NCS in the first sample. The criterion for determining the adequacy of the obtained coefficient will be .80. Nunnally (1978) stated that for basic research, when the focus is correlations with other variables, an Alpha coefficient of .80 or greater is adequate.

The factor structure of the NCS Short Form was determined using Principle Components analyses. Those items with Eigenvalues greater than one were retained. The Scree Test was also used to aid in interpreting the analyses.

The relationships between NCog, NACH, and curiosity were determined using Pearson Product Moment Correlation coefficients. Differences in NCS scores due to SES differences were investigated using one-way Analysis of Variance (ANOVA).

For the second sample, the internal consistency of the NCS was again determined in order to provide confidence in the rest of the analyses conducted. A Pearson Product Moment Correlation coefficient was used to assess the relationships between the NCS, the ACT, and the PPVT-R.

In order to determine the ability of the NCS Short Form to account for variance in ACT scores, a regression analysis was conducted. ACT scores served as the dependent variable and PPVT-R and NCS scores were regressed upon them. PPVT-R scores were entered first due to the nature of the research question, that being whether NCS scores could account for significant variance in ACT scores over and above that accounted for by PPVT-R scores.

## Chapter Four

### Results and Discussion

This section will present the sample characteristics of the sample for the first study followed by the results of the analyses conducted with this sample. The sample characteristics and results for the second study will follow. The discussion will address each of the hypotheses, stating whether or not each was supported, along with some possible explanations for the finding.

#### Study One-Sample Characteristics

Table 3 provides a description of sample for the first study. The mean NCS Short Form score for the first sample was 77.6 (see Table 4). The standard deviation was 15.04 and the scores ranged from 20 to 111. These figures were based on 365 of the 379 cases. Fourteen cases were deleted due to missing data. Because no norms currently exist for the NCS, it is not possible to determine if this sample was markedly different from those in previous NCS studies.

The mean score for the Achievement subscale of the Personality Research Form was 82.2, the standard deviation was 13, and scores ranged from 25 to 116. The mean reported in the PRF Manual (Jackson, 1974) for the original item pool was 87.54 with a standard deviation of 19.51. This sample's scores



are somewhat lower and less dispersed than those in the sample from the original PRF. Eleven cases were deleted in the current analysis due to incomplete questionnaires (see Table 4).

Table 3

Study One Sample Characteristics

	n	%*
Total	379	
Male	128	33%
Female	251	66%
Black	27	7%
White	342	90%
Hispanic	4	1%
Other	6	2%
Age Range	18-51	
Educational Attainment		
	Father	Mother
0-6 yrs.	52	22
6-12 yrs.	143	167
12+ yrs.	184	190

\* These values represent the percentage of the total sample.

---

The sample's mean State Curiosity score was 30, the standard deviation was 5.07 and the scores ranged from 11 to 40. For the Trait Curiosity scale, the mean score was 29, the standard deviation was 5.98 and the scores ranged from 10 to 40. The comparison of these scores to those cited in the STPI Manual (Spielberger, 1979) indicates that this sample is somewhat higher than the standardization sample on the State Curiosity scale but not significantly different on the Trait Curiosity scale (see Table 4).

Table 4  
Study One Sample Means Compared to Those  
of Previous Investigations

Scale	Study			
	Present		Previous	
	M <sup>a</sup>	SD	M	SD
Need for Cognition	77.64	15.04	No current norms	
Need for Achievement	82.21	13.09	87.54	19.51
STPI State Curiosity	30.05	5.07	26.85	5.72 (Males)
			26.17	5.45 (Females)
STPI Trait Curiosity	29.08	5.98	29.67	5.05
			29.30	4.53

Note. The previous means and standard deviations were obtained from the manuals (Jackson, 1974; Spielberger, 1979).

<sup>a</sup> The means presented in this table are raw score means, as opposed to standardized score means.

---

Study One-Results

In computing the reliabilities of the three scales, the average response (on a scale of 1 to 6 or 1 to 4) was used to represent total performance. This allowed some flexibility as the mean response would not be impacted a great deal if one item was deleted, as in several of the cases. It was then possible to reduce the number of missing cases.

The Coefficient Alpha for the NCS, displayed in Table 5, was .90. The item-total correlations ranged from .29 (item 18) to .67 (item 2), with a median correlation of .57 (see Table 6).

Table 5

Alpha Coefficients and Correlation Matrix  
for the NCS, NAch, and State-Trait Curiosity

Instrument	Alpha Coefficient
NCS	.90
NAch	.85
State Curiosity	.79
Trait Curiosity	.87

---

Table 5 (continued)

	NCS	NAch	Curiosity	
			State	Trait
NCS	--			
NAch	.67	--		
State Curiosity	.56	.55	--	
Trait Curiosity	.55	.50	.91	--

---

Table 6

Item-Total Correlations for the NCS

Item	r	Item	r
1	.55	10	.57
2	.68	11	.61
3	.62	12	.58
4	.60	13	.57
5	.63	14	.61
6	.45	15	.61
7	.58	16	.48
8	.47	17	.46
9	.55	18	.29
	Median	.57	

---

In the Principal Components analysis, two factors emerged accounting for 46.5% of the variance (see Table 7). The first

factor accounted for 38.3% of the variance. The second factor accounted for 8.2% of the variance. The Scree Test confirmed that the two factor interpretation was most plausible.

The above factor analysis was exploratory in nature. To address the possibility of a three factor interpretation, a confirmatory Principal Components analysis was conducted, in which three factors were rotated (see Table 7). The third factor had an Eigenvalue of nearly one and accounted for 5.5% of the variance.

Table 7

Factor Analytic Information for the HCS

## First Analysis

Factor	Eigenvalue	%	Cumulative %
1	6.89	38.3	38.3
2	1.48	8.2	46.5

## Second Analysis (3 Factors Rotated)

Factor	Eigenvalue	%	Cumulative %
1	6.89	38.3	38.3
2	1.48	8.2	46.5
3	.997	5.5	52.0

Note. Principal Components procedures were conducted for this analysis.

---

Table 8 displays the items and the factors on which they load the highest in the two analyses. As can be seen, Item 18, which did not hold together with the rest of the items in the interitem correlational analysis and which had the lowest item-total correlation (see Table 6), loaded only to a fair degree on the second factor in the first analysis. In the second analysis, the loading for Item 18 is the highest of all of the loadings in either analysis.

Table 8

Item Loadings in Order of Strength on Each Factor  
for the Two Principal Components Analyses

## First Analysis

Factor			
1		2	
Item	Loading	Item	Loading
12	.76	6	.73
3	.74	13	.68
5	.72	1	.63
4	.71	2	.63
7	.71	14	.63
8	.55	11	.60
9	.52	15	.59
16	.47	10	.57
17	.44	18	.46

---

Table 8 (continued)  
 Second Analysis (3 Factors Rotated)

		Factor					
		1		2		3	
Item	Loading	Item	Loading	Item	Loading	Item	Loading
12	.75	1	.74	18	.83		
3	.74	10	.69	14	.55		
7	.71	11	.66				
5	.71	2	.65				
4	.69	13	.61				
8	.55	6	.60				
9	.51	15	.54				
16	.45						
17	.44						

In the one-way Analysis of Variance (ANOVA), the main effects for SES (i.e. the educational attainment of the participant's parents) was significant (see Table 9). For the analysis, educational attainment level was divided into three groups: 1) 0-6 years; 2) 6-12 years and 3) 12 years and above. These spans were chosen because they correspond to primary, secondary and post secondary levels. The cell means indicate that NCS scores were highest for individuals whose parents had between zero and six years of formal educational training.



Table 9

Results of One-Way ANOVA

NCS by Parent's Educational Attainment Level					
	0-6 Years	7-12 Years	12+ Years		
Cell Means	4.25	3.90	3.91		
	(n = 52)	(n = 143)	(n = 184)		
Source	SS	Df	MS	F	p
Ed. Level	5.364	2	2.682	5.507	.004

Legend. 0-6 years = Primary Education Level

6-12 years = Secondary Education Level

12+ years = Postsecondary Education Level

Post hoc analyses show that the Primary Level was significantly different from the Secondary and Postsecondary Levels. The Secondary and Postsecondary Levels were not significantly different from each other (see Table 10).

The correlation between the NCS Short Form and the Achievement subscale of the PRF was significant and positive ( $r = .67$ ,  $p < .0001$ ). The NCS correlated positively and significantly with the State Curiosity subscale ( $r = .56$ ,  $p < .0001$ ) and the Trait Curiosity subscale ( $r = .55$ ,  $p < .0001$ ).

Table 10  
Post Hoc Analyses of Parents' Educational  
Attainment Level Differences

	Years of Education			Results	
	0-6	7-12	12+	t	p
Contrast 1	-1	0	1	-3.101	.002
Contrast 2	-1	1	0	3.119	.002
Contrast 3	0	-1	1	0.161	.872

Legend. 0-6 years = Primary Education Level

6-12 years = Secondary Education Level

12+ years = Postsecondary Education Level

---

The implications of the above results in terms of the hypotheses will be addressed in the Discussion section at the end of this chapter. The results of the second study will now be presented, beginning with a description of the sample's demographics.

#### Study Two-Sample Characteristics

The demographic characteristics for the second sample are provided in Table 11. The composition of the sample in the second study was consistent with that of the sample in the first study. Likewise, the total scores of the Study Two participants on the NCS, the NACH subtest, and the State-Trait

Curiosity subtests are consistent with those of the Study One participants (See Table 11).

Table 11

Study Two Sample Characteristics

	N	%
Total	79	
Males	26	36%
Females	46	66%
Black	4	5%
White	67	93%
Hispanic	0	0%
Other	1	1%

Age Range 17-33

Educational Attainment

	Father	Mother
0-6	8	4
6-12	27	33
12+	37	35

\* These values represent the percentage of the total sample.

---

Table 12

Study Two Sample Means

Scale	M*	SD
Need for Cognition	78.45	12.40
Need for Achievement	86.67	11.86
STPI State Curiosity	31.34	4.91
STPI Trait Curiosity	30.54	5.90

\* These means presented in this table are raw score means.

---

Study Two-Results

In the analyses conducted in Study Two, the NCS Short Form correlated significantly with the PPVT-R ( $r = .34$ ,  $N = 71$ ,  $p < .004$ ; see Table 13). In the regression analyses, NCS did not account for any significant amount of variance over and above that explained by PPVT-R scores (see Table 14). Ten participants were not included in the analyses because they did not have an ACT score on file.

Table 13

Correlation Matrix for Critical Variables in Study Two

	NCS	PPVT-R	ACT
NCS	1.00	.34	.37
PPVT-R	.34	1.00	.68
ACT	.37	.68	1.00

---

Table 14

Results of Multiple Regression Analysis

	Independent Variable	
	PPVT-R	NCS
R	.67	.68
R <sup>2</sup>	.45	.46
F	44	23
p	.00	.00

Discussion

This discussion will focus on each of the hypotheses presented in Chapter One. Each hypothesis will be restated and conclusions will be drawn as to whether or not the data obtained in the two studies support the hypothesis. In the event that a hypothesis is not supported by the data, some possible reasons for finding will be discussed.

The first hypothesis stated that the NCS would demonstrate adequate internal consistency; this hypothesis was confirmed based on the criteria set by Nunnally (1978). The second hypothesis stated that this study would yield one primary factor, which was not supported by the present investigation. Although the observed Eigenvalues were consistent with those reported by Cacioppo and Petty (1982), a two factor solution appears most viable based on the

Eigenvalues and the Scree Test. Nine items loaded to the two factors.

The first factor accounted for a substantial portion of the variance; this finding is consistent with those reported by Cacioppo, Petty and their colleagues (1982, 1984). The second factor, though markedly smaller than the first factor, also accounts for a sizable portion of the variance. Although their obtained Eigenvalues were similar to those obtained in this investigation, Cacioppo et al. (1982) did not extract the second factor in their findings.

Factor one illustrates NCog, in its definitiona<sup>l</sup> sense, as a "desire" to think. Some examples of these kinds of items would be, "Thinking is not my idea of fun" and " I only chink as hard as I have to." This factor is consistent with the first factor described by Cacioppo and Petty (1982) and Cacioppo, Petty, and Kao (1984), as well as the "Cognitive Persistence" factor described by Tanaka, Panter and Winborne (1988).

Factor two emerges through items such as "I find satisfaction in deliberating hard and for long hours" and "I would prefer complex to simple problems." Factor two seems to describe a "degree of complexity" in cognitive activity which is preferred by the high NCog individual. Individuals endorsing items such as these prefer situations in which a lot of thought is required or those in which the complexity of thought required is great. The interpretation is not so clean

however, as item 10, "The idea of relying on thought to make my way to the top appeals to me," loads highly on this factor in the second analysis. While implying "degree" to an extent, this item seems to represent the instrumental nature of thought, that is using thought for personal gain. This factor corresponded closely to the "Cognitive Complexity" factor described by Tanaka and his colleagues (1988).

In the confirmatory factor analysis, three factors were rotated in an effort to replicate the Eigenvalues reported by Cacioppo and Petty (1982). Item 18, which did not load particularly high on either of the other two factors, was the singular contributor to the third factor. Factor three appears to represent the "abstract" nature of thought engaged in by the high NCog individual. High NCog individuals may enjoy thinking about things which will never have a chance to impact them or vice versa. This typifies clearly the process of thinking purely for the sake of thinking. This factor did not correspond to any of the factors described in previous studies.

Another trend found in the data was that the negatively worded items fell to factor one, while the positively worded items loaded on to factor two. The extent to which this limits the interpretability of the factors and, thus, the entire construct is not known. At this time, further investigation is needed to evaluate this concern about the NCS.

The third hypothesis stated that individuals whose parents had greater levels of formal educational training would have higher levels of NCog. This was based upon the assumption that the parents' positive attitudes toward thinking would be conveyed to the children. This hypothesis was not supported in the present investigation. The obtained results suggest an entirely different situation. Those whose parents had lower levels of educational experience had significantly higher levels of NCog. Perhaps those with fewer years of education want more for their children and make a special effort to motivate their children to think, or perhaps highly educated parents tend to push their children too hard and eventually burned them out. This is a highly interesting finding which merits further investigation. Cell numbers were not controlled, and, thus, these results should be interpreted cautiously.

The fourth hypothesis stated that the NCS would correlate positively and significantly with the NACH and State-Trait Curiosity subscales; this was supported by the data. Regarding the NACH subscale, the degree of the correlation was such that, while the two shared a good deal of the variance (45%), NCog appeared to remain unique from NACH. Perhaps the element of extrinsic reinforcement which is most often associated with NACH (i.e. the attainment of external objectives such as grades, diploma, recognition, etc.) is the point of departure for the two constructs. By definition, NCog represents



effortful cognitive activity put forth purely for the enjoyment derived from taking part in the same. Roseboro and Osberg (1986) stated that NCog "appears to assess a more stable attribute likely to relate to cognitive mastery in people and may be less influenced by social desirability" (p.4).

NCog appears to be distinct from State and Trait Curiosity. The amount of variance shared by the NCS and the State-Trait Curiosity subscales was 31% and 30% respectively. These values are moderate enough to warrant the interpretation of NCog as a unique construct. Cacioppo's comments (personal communication, 3-30-89) may help explain this. He stated that cognitive exploration is only one facet of cognitive activity to which the high NCog individual is predisposed. According to Cacioppo, NCog is unique from both NACH and curiosity, and it predisposes an individual to want to achieve or to be curious. The results lend some support to his contention.

The fifth hypothesis stated that the NCS and PPVT-R, a measure of verbal intelligence, would correlate significantly and positively, although the correlations would be modest enough to allow the interpretation of NCog as a construct unique from verbal intelligence. This hypothesis was supported by the data. The NCS and the PPVT-R share only 11% of the variance. This finding is consistent with previous investigations, which reported correlations ranging from the twenties to the thirties. The obtained correlation provides

evidence of convergent validity for the NCS, although the NCS appears to be assessing a construct which is unique from verbal intelligence.

Finally, the sixth hypothesis, stating that the NCS would account for variance in ACT scores which would be unique from that accounted for by PPVT-R scores, was not supported in this study. The NCS and the PPVT-R tap qualities which are too similar with regard to ACT scores to be differentiated in the prediction. Further research is certainly needed. More comprehensive measures of intelligence should be used to establish the relationship between NCog and intelligence and the NCS's ability to predict achievement scores.

In this evaluation of the psychometric characteristics of the NCS, two very important hypotheses, which were based on the research and theories of Cacioppo and Petty (1982, 1984), were not supported by the data. The fact that the negatively and positively worded items polarized into factors one and two respectively may implicate the construct validity of the NCS. Similarly, the NCS demonstrated no more utility than PPVT-R scores in the prediction of achievements. These points should be picked up in future research, and will be discussed in detail in the next chapter.

## Chapter Five

### Summary

The purpose of the present study was to re-examine the psychometric properties of the Need for Cognition Scale (NCS; Cacioppo & Petty, 1982). The Need for Cognition (NCog) represents "the tendency to engage in and enjoy thinking" (Cacioppo & Petty, 1982, p.116). With a sample of 379 undergraduates, the reliability, factor structure and convergent validity of the NCS was analyzed. With another sample of 71 undergraduates, the relationship between the NCS and the PPVT-R, an estimate of verbal intelligence, was examined. Also, the ability of the NCS to predict academic achievement after verbal intelligence test scores had been entered into the equation was investigated. A review of the literature found that the primary research was conducted by John Cacioppo and Richard Petty, the authors of the NCS, and their colleagues (Cacioppo & Petty, 1982; Cacioppo, et al., 1984; Cacioppo, et al., 1986). Each hypothesis, with the exception of two, represented a replication of their previous research. One of the exceptions examined the relationship of NCS to socioeconomic status (SES); the other examined the utility of the NCS in predicting academic achievement. It was discovered that Cacioppo and Petty felt that the NCS might be

useful in predicting achievement; they had not, however, considered the role of SES in NCS scores. The research data presented indicated that the NCS had adequate internal consistency and had a single factor structure.

The research methods and analytic procedures which would be employed in the study were described. It was stated that the samples would be drawn from a university population, and would consist of undergraduates enrolled in various psychology courses. The methods used to recruit the participants were described in detail. Two independent samples were used, yielding Study One and Study Two. The first four hypotheses were examined in Study One, and the last two hypotheses were examined in Study Two.

The results of the analyses and a discussion of their implications was presented. There were mixed results in both studies. The hypotheses regarding the reliability of the NCS and the relationship between the NCS and measures of NACH and State-Trait Curiosity were supported. Likewise, support was found for the hypothesis that verbal intelligence and NCOG are significantly and positively correlated. Support was not found for the hypotheses regarding the factor structure of the NCS, the relationship between SES and NCS scores, nor the utility of the NCS in predicting academic achievement. The discussion section presented some possible reasons for the lack of support and raised some issues for future research.

### Directions for Future Research

This section should be prefaced by recognizing that there are many reasons to interpret studies of this nature with caution. There are constraints in working with undergraduates in terms of the generalizability of the results and the restriction of range in terms of ability and motivation to achieve (i.e. those who attend the university tend to be more intelligent and more motivated to achieve). All students were given class credit for their participation in the study which may also have impacted the sample pool.

The NCog construct is intrinsically a very interesting concept. Many would agree that some people like to problem solve more than others, and that this individual difference may have lots of practical implications within many fields of psychology. This study provided an opportunity to thoroughly examine the psychometric characteristics of the Need for Cognition Scale, and, more importantly, the theoretical bases for the items within the scale.

Cacioppo and Petty (1982) define NCog as "the tendency to engage in and enjoy thinking" (p.116). This definition implies that a scale which adequately assesses the construct will differentiate those individuals who actually think more than others and enjoy doing so from those individuals who think only when they absolutely have to. However, a close inspection of the items in the 18 item short form of the NCS reveals that only one item (i.e. Item 18, "I usually end up debating about

issues even when they do not affect me personally") pertains to actually "engaging" in thinking. The other 17 items present situations in which effortful thinking is involved, and the individual's attitude toward these situations is queried. Future research should address the content validity of the scale. Also, given the social values attached to situations requiring thinking (i.e. we all want to appear to be intelligent and "thoughtful" individuals, rather than cognitively "lazy"), the role of social desirability in the NCS scores should be thoroughly examined. Cacioppo and Petty (1982) correlated the NCS with a measure of social desirability and found a nonsignificant relationship. This type of research should be carried further. For example, NCS performance of a group whose members are anonymous could be compared to the performance of a group whose members are known and receive recognition for their scores. The NCS might be more efficient and valid if all of the items reflect the actual act of thinking, rather than the "tendency" to think.

Some theoretical issues also need clarification. Cacioppo's and Petty's definition fails to specify the types of thought which qualify as "effortful." Cacioppo (personal communication, 3-30-89) stated that thought must be "purposeful" in order to fall within the realm of NCog. He specifically stated that "daydreaming does not count." He failed to note, however, the point at which daydreaming stops and "purposeful" thought begins.

The factor structure indicated in this study also presents the need for more research. On the surface, the Eigenvalues and Scree Test looked quite similar to those found by Cacioppo and Petty (1982). In this investigation, however, nine of the items loaded significantly on the second factor. Based on this fact, the second factor was extracted and interpreted. Further study of these factors indicated that the items had in effect polarized, with the negatively worded items loading on the first factor, and the positively worded factors loading on the second factor. This tendency suggests that social desirability may be a confounding factor in the assessment of NCog. Future research should attempt to factor out social desirability and examine the relationship between these two factors. Would a change in the direction of the item (i.e. from positive to negative wording) radically change the factor structure of the NCS? This question has major implications for the validity of the scale. The NCS is an important first step in trying to assess NCog; however, many theoretical and definitional issues should be clarified through future research.

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Appendices

Appendix A

Need for Cognition Research Questionnaire

Personal Data

ID Number \_\_\_\_\_ Date \_\_\_\_\_  
Please complete the following

Age: \_\_\_\_\_  
Sex: Male \_\_\_\_\_ Female \_\_\_\_\_  
Race: Black \_\_\_\_\_  
Hispanic \_\_\_\_\_  
White \_\_\_\_\_  
Other \_\_\_\_\_

Marital Status: Single \_\_\_\_\_  
Married \_\_\_\_\_  
Widowed \_\_\_\_\_  
Separated \_\_\_\_\_  
Divorced \_\_\_\_\_

\*\*\* Important Note \*\*\*

In the following section, I would like to know about your parents or those that took the role of parent (e.g. step mother) in the household in which you were primarily raised.

If you spent the majority of your childhood and adolescence with both parents, please complete both sections. If you were raised primarily in a single parent household, please complete only the appropriate section.

-----Mother

Age: \_\_\_\_\_  
Occupation: \_\_\_\_\_  
Approximate income per year: \_\_\_\_\_  
Highest number of formal years of education (e.g. Bachelor's Degree= 16 years): \_\_\_\_\_

Father

Age: \_\_\_\_\_  
Occupation: \_\_\_\_\_  
Approximate income per year: \_\_\_\_\_  
Highest number of formal years of education (e.g. Bachelor's Degree= 16 years): \_\_\_\_\_

A number of statements will follow that people use to describe themselves. For each statement, circle the letter that fits you best based on the descriptors given for each letter. Do not spend too much time on any statement, just circle the most appropriate letter based on the way you feel now. There are no right or wrong answers and your responses will be strictly confidential.

Thank you very much for your participation in this study.

- A. Very Much Like Me
- B. Much Like Me
- C. Somewhat Like Me
- D. Somewhat Unlike Me
- E. Much Unlike Me
- F. Very Much Unlike Me

Part I

1. I would prefer complex to simple problems.....A B C D E F
2. I like the responsibility of handling a situation that requires a lot of thinking.....A B C D E F
3. Thinking is not my idea of fun.....A B C D E F
4. I would rather do something that requires little thought than something that is ~~easy~~ to challenge my thinking abilities..A B C D E F
5. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.....A B C D E F
6. I find satisfaction in deliberating hard and for long hours.....A B C D E F
7. I only think as hard as I have to.....A B C D E F
8. I prefer to think about small, daily projects to long term ones.....A B C D E F
9. I like tasks that require little thought once I've learned them.....A B C D E F
10. The idea of relying on thought to make my way to the top appeals to me.....A B C D E F
11. I really enjoy a task that involves coming up with new solutions to problems....A B C D E F

12. Learning new ways to think doesn't  
excite me very much.....A B C D E F

13. I prefer my life to be filled with  
puzzles that I must solve.....A B C D E F

14. The notion of thinking abstractly  
appeals to me.....A B C D E F

15. I would prefer a task that is  
intellectual, difficult and important to  
one that is somewhat important but does  
not require much thought.....A B C D E F

16. I feel relief rather than satisfaction  
after completing a task that required  
a lot of mental effort.....A B C D E F

17. It's enough for me that something  
gets the job done, I don't care how or  
why it works.....A B C D E F

18. I usually end up debating about issues  
even when they do not affect me personally..A B C D E F  
Part II

- A. Very Much Like Me
- B. Much Like Me
- C. Somewhat Like Me
- D. Somewhat Unlike Me
- E. Much Unlike Me
- F. Very Much Unlike Me

1. I enjoy doing things which challenge me..A B C D E F

2. Self-improvement means nothing to me  
unless it leads to immediate success.....A B C D E F

3. I get disgusted with myself when  
I have not learned something properly.....A B C D E F

4. I work because I have to, and for  
that reason only.....A B C D E F

5. I will keep working on a problem  
after others have given up.....A B C D E F

6. I try to work just hard enough  
to get by.....A B C D E F

7. I often set goals that are very  
difficult to reach.....A B C D E F

8. I would rather do an easy job than one involving obstacles which must be overcome.....A B C D E F
9. My goal is to do at least a little bit more anyone else has done before.....A B C D E F
10. I really don't enjoy hard work.....A B C D E F
11. I prefer to be paid on the basis of how much work I have done rather than how many hours I have worked.....A B C D E F
12. I have rarely done extra studying in connection with my work.....A B C D E F
13. People have always said that I am a hard worker.....A B C D E F
14. When people are not going to see what I do, I often do less than my very best....A B C D E F
15. I don't mind working when other people are having fun.....A B C D E F
16. It really doesn't matter to me whether I become one of the best in my field.....A B C D E F
17. Sometimes people say I neglect other important aspects of my life because I work so hard.....A B C D E F
18. I am sure people think that I don't have a great deal of drive.....A B C D E F
19. I enjoy work more than play.....A B C D E F
20. It is unrealistic for me to insist on becoming the best in my field of work all of the time.....A B C D E F



## Part III

- A. Not At All
- B. Somewhat So
- C. Moderately So
- D. Very Much So

For the first section of items, select the response that best describes how you feel **right now**.

1. I feel like exploring my environment.....A B C D
2. I feel curious.....A B C D
3. I feel interested.....A B C D
4. I feel inquisitive.....A B C D
5. I am in a questioning mood.....A B C D
6. I feel stimulated.....A B C D
7. I feel mentally active.....A B C D
8. I feel bored.....A B C D
9. I feel eager.....A B C D
10. I feel disinterested.....A B C D

For this section, choose the response which best describes the way you **generally feel**.

11. I feel like exploring my environment.....A B C D
12. I feel curious.....A B C D
13. I feel interested.....A B C D
14. I feel inquisitive.....A B C D
15. I feel eager.....A B C D
16. I am in a questioning mood.....A B C D
17. I feel stimulated.....A B C D
18. I feel disinterested.....A B C D
19. I feel mentally active.....A B C D
20. I feel bored.....A B C D

Appendix B

Original Need for Cognition Scale  
(Cacioppo & Petty, 1982)

- A. Negatively worded, reverse-keyed
  - B. Selected for the 34 item scale
  - C. Selected for the short form
  - D. Loaded on the "Cognitive Persistence" factor (Tanaka, Panter & Winborne, 1988)
  - E. Loaded on the "Cognitive Complexity" factor (Tanaka, et al., 1988)
  - F. Loaded on the "Cognitive Confidence" factor (Tanaka, et al., 1988)
1. I really enjoy a task that involves coming up with new solutions to problems. (B,C)
  2. I believe that if I think hard enough, I will be able to achieve my goals in life.
  3. I am very optimistic about my mental abilities.
  4. I would prefer a task that is intellectual, difficult and important to one that is somewhat important but does not require much thought. (B,C,D)
  5. I tend to set goals that can be accomplished only by expending considerable mental effort. (B,E)
  6. When something I read confuses me, I just put it down and forget it. (A)
  7. I take pride in the products of my reasoning.
  8. I don't usually think about problems that others have found to be difficult. (A)
  9. I am usually tempted to put more thought into a task than the job minimally requires. (B)
  10. Learning new ways to think doesn't excite me very much. (A,B,C,D)
  11. I am hesitant about making important decisions after thinking about them. (A,B,F)

12. I usually end up deliberating about issues even when they do not affect me personally. (B,C)
13. I prefer just to let things happen rather than try to understand why they turned out that way. (A,B,D)
14. I have difficulty thinking in new and unfamiliar situations. (A,B,F)
15. The idea of relying on thought to make my way to the top does not appeal to me. (A,B,C,F)
16. The notion of thinking abstractly does not appeal to me. (A,B,C,E)
17. I am an intellectual. (B)
18. I find it especially satisfying to complete an important task that required a lot of thinking and mental effort.
19. I think only as hard as I have to. (A,B,C,D)
20. I don't reason well under pressure. (A,B,F)
21. I like tasks that require little thought once I've learned them. (A,B,C)
22. I prefer to think about small, daily projects to long term ones. (A,B,C)
23. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. (A,B,C,D)
24. I find little satisfaction in deliberating hard and for long hours. (A,B,C,D)
25. I think primarily because I have to. (A)
26. I more often talk to people about the reasons for and the possible solutions to international problems than about gossip or tidbits of what famous people are doing. (B,E)
27. These days, I see little chance for performing well, even in "intellectual" jobs, unless one knows the right people. (A,B)
28. More often than not, thinking just leads to more errors. (A,B,F)
29. I don't like to have the responsibility of handling a situation that requires a lot of thinking. (A,B,C,F)

30. I appreciate opportunities to discover the strengths and weaknesses of my own reasoning. (B,D)
31. I feel relief rather than satisfaction after completing a task that required a lot of mental effort. (A,B,C,F)
32. Thinking is not my idea of fun. (A,B,C,E)
33. I try to anticipate and avoid situations where there is a likely chance that I will have to think in depth about something. (A,B,C,D)
34. I don't like to be responsible for thinking of what I should be doing with my life. (A)
35. I prefer watching educational to entertainment programs. (B,E)
36. I often succeed in solving difficult problems that I set out to solve.
37. I think best when those around me are very intelligent. (B,E)
38. I am not satisfied unless I am thinking.
39. I prefer my life to be filled with puzzles that I must solve. (B,C,E)
40. I prefer complex to simple problems. (B,C,E)
41. Simply knowing the answer rather than understanding the reasons for the answer to a problem is fine with me. (A,B,D)
42. When I am figuring out a problem, what I see as the solution to a problem is more important than what others believe or say is the solution.
43. It's enough for me that something gets the job done, I don't care how or why it works. (A,B,C,D)
44. Ignorance is bliss. (A,B)
45. I enjoy thinking about an issue even when the results of my thought will have no effect on the outcome of the issue. (B)