THE EMPIRICAL DEVELOPMENT OF THE NORMATIVE MESSAGE PROCESSING SCALE

R. KELLY AUNE AND RODNEY A. REYNOLDS

The empirical development of a Normative Message Processing Scale (NMPS) is presented. An argument is made for the need to develop an instrument that distinguishes between the tendency to engage in message processing that is selective, effortful, and highly deliberate and message processing that is unselective, low effort, and nondeliberate. Because self reported differences in exerted cognitive effort may indicate both quantitative and qualitative differences in message processing, effort-based instruments do not allow specific predictions regarding the processing habits of low effort individuals. Understanding and measuring the processing characteristics of high and low effort individuals may explain observed differences in performances between individuals with a high or low need for cognition and between individuals induced to perform in a mindful or mindless manner. Five studies are presented, reporting on the development, conceptual validation, and behavioral validation of the NMPS. In addition, the conceptual and predictive validity of the NMPS is compared to related trait information-processing instruments. The usefulness of the NMPS in communication research is discussed.

Studies of information processing and learning tend to focus on two issues: the structure of knowledge and the nature of the processing that is imposed on information in the course of knowledge development. Message processing research that addresses the latter concern has often examined two seemingly complementary approaches that individuals may use when faced with the task of message processing and assessment. One approach to message processing is described as highly intentional, deliberate, and ultimately effortful. Information processing is seen as a selective process wherein a manageable number of variables and their relationships are attended to and dealt with in a deliberate, intentional manner (Berry & Broadbent, 1988; Broadbent, Fitzgerald, & Broadbent, 1986; Hayes & Broadbent, 1988). Message processing in this framework would entail the identification of important communicative variables and analysis of the relationships among those variables, ultimately leading to outcomes such as conclusions regarding the truth value or validity of a message and acceptance or rejection of a message.

Conversely, message processors may employ lower effort deliberation dynamics. Lower effort processing is conceptualized in a couple different manners. One perspective conceives of low effort processing as employing simple rule systems and heuristics (e.g., Chaiken, 1980) or taking a "peripheral route" to message deliberation (e.g., Petty & Cacioppo, 1986a, 1986b) wherein the message processor is less critical of the message, attending instead to non-content cues for use in a simplified deliberation process. Aside from the differences in which cues are attended to, this form of low effort processing is quantitatively, rather than qualitatively, different from high effort processing.

In contrast, low effort processing has also been conceived of as a less deliber-
ate, unselective, and nonanalytical process (Brooks, 1978; Hasher & Zacks, 1979; Hayes & Broadbent, 1988) that operates at low levels of awareness and employs a multichannel complex of nonsymbolic cues that produces in receivers a meaningful gestalt (Andersen, 1991). Attention is diffused rather than specific and may include both content and non-content cues. Andersen has referred to this type of message processing as intuitive communication.

Human information processing typically employs multiple modes of processing (Berry & Broadbent, 1987, 1988; Hayes & Broadbent, 1988). In some cases we are more deliberate and effortful, making distinctions, categorizing, and carefully evaluating. In other cases we are less effortful, guided by already-established distinctions, meanings, and categories and invoking simple rule systems. Still other times information is processed with little or no cognitive intervention, and multiple forms of information are dealt with effortlessly, producing outcomes such as judgments and conclusions with little or no awareness as to the process that gave rise to the outcomes.

Fundamental to most writing on human message processing is the notion that people have dominant processing responses, which must be superseded by contingencies that prompt an adaptation to another mode of processing or to multiple processing modes. Any particular response mode is likely to be an amalgamation of processing modes but will have a characteristic pattern that will be experienced and described mostly in terms like effortful, deliberative, and cautious; or the processing will be experienced and described mostly in terms like intuitive, effortless, diffused, and automatic. Obviously, people may well experience changes in their dominant mode of processing, which may even involve sustained periods where no clear tendency can be discerned. Stephen Hawking (1988), the famed theoretical physicist, describes just such a process of change in his own mode of processing as he adapted to his changing physical conditions resulting from Amyotrophic lateral sclerosis (ALS). People confronted with multiple tasks requiring multiple modes of processing may also become adept at moving quickly beyond the dominant response to deploying multiple modes of processing. Nevertheless, the prevailing assumption about human cognitive processing is that people develop primary modes of processing responses consistent with past experience and successes with cognitive processing.

The present study reviews literature regarding these forms of information and message processing and reports the empirical development of an instrument designed to assess one's tendency when decoding messages to engage in high effort, selective, and analytical message processing or in low effort, unselective, gestalt-based, and intuitive message processing. This instrument would allow more specific understanding of and predictions concerning message processing differences than effort-based indices of information processing.

**Characteristics of High Effort Message Processing**

A large body of research shows that some situations give rise to greater mindfulness and a concomitant increase in effortful, analytical information processing (e.g., Langer, 1978; Langer & Piper, 1987). Chaiken (1980) and Petty and Cacioppo (1979) have found that issue involvement can bring about increases in effortful, and more effective, message processing as well. There is a good deal of consensus in the literature that more effortful message processing
is characterized by greater systematic analysis, categorization, and deliberate evaluation of information.

Related lines of research have also demonstrated that some people are predisposed to expend greater effort when processing messages. The tendency for some individuals to process information in a relatively consistent manner is evident in the need-for-cognition literature (Cacioppo & Petty, 1982, 1984; Cacioppo, Petty, & Kao, 1984; Cacioppo, Petty, Kao, & Rodriguez, 1986; Petty & Cacioppo, 1981). People with a higher need for cognition tend to make and use more distinctions and categories when analyzing information. Such people also report expending more mental effort in processing messages than do those low in need for cognition and demonstrate greater recall of a message's arguments (Cacioppo, Petty, & Morris, 1983; Cacioppo et al., 1986).

Characteristics of Low Effort Message Processing

The same research that reveals much about effortful message processing is less conclusive as to the nature of processing characterized by lesser degrees of cognitive effort. For instance, Chaiken (1980) speculates that some low effort processing is heuristic based. This form of low effort processing "de-emphasizes detailed information processing and focuses on the role of simple rules or cognitive heuristics" (p. 752). Implicit in this perspective is the assumption that low effort processors are still relying upon a logical calculus, albeit an extremely simple and perhaps not entirely logical assessment. A simple heuristic might be "the speaker has a degree, therefore she must be credible." In this perspective, low effort processing differs from high effort processing in two ways: The decision-making criteria are often drawn from non-content cues, and the decision-making rules are few and simple. Petty and Cacioppo (1979, 1986a, 1986b) discuss persuasion resulting from message processing via the peripheral route in a similar manner. They argue that persuasion through the peripheral route results from the receiver attending to non-content cues and incorporating those cues in an attenuated deliberation process.

An alternative to the Chaiken (1980) and Petty and Cacioppo (1979) conceptualizations of low effort processing is to characterize low effort processing as a less deliberate, unselective, and nonanalytical process. In this alternative information processing is considered less effortful (Brooks, 1978; Hasher & Zacks, 1979) and an "unselective and passive aggregation of information about the co-occurrence of environmental events and features" (Hayes & Broadbent, 1988, p. 251). Message processing within this alternative perspective is comparable to what Andersen (1991) refers to as intuitive communication. Intuitive communication tends to be processed at low levels of awareness, employing a multichannel complex of nonsymbolic cues that produces in receivers a meaningful gestalt. This conceptualization of low effort processing does not invoke simple decision-making rules or suggest that the receiver attends to non-content, rather than content, cues. Available cues become weighted components of a constellation of cues that produces in the receiver an affective experience of conclusion or judgment. It is likely that both low effort processing conceptualizations described above present accurate pictures of information processing dynamics. It is also likely that the presence of low cognitive effort processing could be indicative of either (and perhaps both) systematic or unsystematic
forms of message processing. Simply put, self reports of expended cognitive effort may not be adequately informative regarding characteristics of message processing.

*Problems Associated with Effort as a Processing Index*

Researchers have often used the Need for Cognition Scale (NCS) as an effort-based index of a normative message processing trait. This instrument was designed to measure how much a person enjoys and is inclined to think effortfully. The NCS has repeatedly proven to be a good predictor of a person's ability to differentiate between strong and weak arguments and to comprehend, retain, and recall the content of a message or argument. One's score on this instrument also allows a fairly accurate prediction of susceptibility to different types and forms of persuasive appeals (Cacioppo et al., 1983). Those who score low on the NCS can be persuaded by a poor argument providing the message has the structure and appearance of an argument. Evidence indicates that individuals who score high on NCS focus on the message itself, elaborating on the content and assessing the logical validity and strength of the argument.

A thorough understanding of the processing norms of individuals scoring low on need for cognition is not as readily at hand. It has been speculated that individuals who score low on the NCS are being "cognitive misers," that is, they are capable of processing information effectively but are not always motivated to do so (Cacioppo et al., 1986). It has been demonstrated that individuals scoring high on the NCS differentiate better between strong and weak arguments than do individuals who score low on the NCS. However, it is also the case that low scoring individuals do, in fact, successfully and significantly discriminate between strong and weak arguments—they just tend to be less extreme in their differentiation relative to high scoring individuals (Cacioppo et al., 1986). Other research has found that individuals scoring low on the NCS, when motivated to process mindfully, could differentiate between strong and weak arguments just as well as high-scoring individuals (Aune, 1988). Nevertheless, the low-scoring individuals in both studies continued to report expending less cognitive effort and seemed less able to recall message content than high NCS subjects. Expended cognitive effort does not sufficiently explain the outcomes of these subjects' performances. Results of such studies suggest that perhaps only some of the low-scoring individuals are processing significantly less of the message; it may also be the case that some of the low-scoring individuals are processing the message in a manner different from the high-scorers, a manner that is related to but not dependent upon expended cognitive effort, and in a manner that is consistent with the obtained lower recall scores.

Some light might be shed on this problem by the work of Hayes and Broadbent (1988). They found that participants who learned a task using an effortful, deliberate, and selective processing strategy performed the task well and were able to verbally describe the information processing behind their learning. Participants who used a low effort, nondeliberate, unselective processing strategy, however, were also able to learn the task well but could not give an accurate verbal account of their processing strategy. In a subsequent test, Hayes and Broadbent gave their participants a secondary task to perform while performing the previously learned task a second time. Performance suffered for
those who learned selectively and deliberately; performance was actually facilitated for the nondeliberate, unselective learners. Hayes and Broadbent concluded that the secondary task further strained the attention-focusing capacities of the selective learners. Their counterparts' use of lower effort, unselective learning, on the other hand, required little attention to complete the same task. Consequently, the addition of a secondary task had little or no negative effect on task performance.

In sum, evidence indicates that the degree of cognitive effort applied to an information processing task may be indicative of qualitatively different processing strategies as well as quantitative differences in expended effort. Consequently, an instrument that measures a disposition for mental effort, as does the NCS, may be less than adequate for testing more extensive, theory-generated hypotheses, particularly when attempting to explain the behavior of low scoring individuals. The processes that lead to differences in performance between high- and low-scoring individuals have yet to be determined conclusively. A self report of expended effort has undoubtedly been useful to date but ultimately provides only a partial explanation for the message processing differences that have been demonstrated. It should be remembered that when Cacioppo and Petty (1982) developed the NCS, they argued that need for cognition, or "the tendency to think about and elaborate on events in searching for reality" (p. 122), was seen as conceptually distinct from an "individual's tendency to think about events in a piecemeal or holistic fashion" (p. 122). To the extent that thinking about events in a holistic or gestalt fashion is characterized by less expended cognitive effort, the NCS may be a tool for studying a limited number of the low effort processors.

Self Reports of Message Processing Characteristics

It has been demonstrated that people can report their use of intentional and structured thinking (or lack thereof). In fact, measuring one's need for cognition (Cacioppo & Petty, 1982) rests on the assumption that individuals are aware of how deliberative they are and how much effort they expend when thinking. In addition, the Human Information Processing Survey (Taggart & Torrance, 1984; Taggart & Valenzi, 1990) successfully differentiates individuals based on self reports related to hemispheric processing differences. Hayes and Broadbent (1988) have found the use of selective information processing to be positively correlated with the ability to accurately report decision-making strategies.

On the other hand, if some individuals tend to process messages in a low effort, unselective manner, how well can we hope to reliably assess this manner of processing? If we use an effort-based instrument, we simply measure a decline in level of expended cognitive effort. But lack of effort need not indicate the presence of unselective, more intuitive processing. Further, Hayes and Broadbent (1988) find such processing leads to an attenuated ability to recall decision-making strategies. In fact, Andersen (1991) provides experimental evidence that the relatively mindless manner in which intuitive communication is processed leads not only to attenuated recall, but also to inaccurate reconstructions of decision processes. More specifically, Reber and Lewis (1977) argue that in
attempting to assess unselective processing through self reports:

an annoying kind of uncertainty principle pertains. If we ask our subjects to try to report their cognitive modus operandi during [information] acquisition, the very introspective act transmutes the cognitive process and we lose the implicit element, the very thing we wish to study. If we do not ask them, we must rely upon indirect evaluation procedures which... are often unsatisfactory. (p. 334)

However, people do seem to be aware of, and often report, occasions when their cognitive processes were not deliberate, logical, and linear. If they cannot report specifically what they did in the decision making process, they do seem capable of reporting what they did not do. Consequently, to construct a self-report instrument that will detect one's tendency to rely on unselective processing, items need to reflect not the person's actual processing of a message, which is functionally unavailable to the person, but the person's conscious experience of the understanding process and its outcomes.

One manner in which message processing research can progress is to develop an instrument such as a normative message processing scale (NMPS) that assesses one's typical message decoding tendencies. Rather than distinguishing on a single dimension of processing such as effort, this instrument would also assess additional significant indicators of message processing mode derived from current information processing and learning theories described above. Such indicators include general processing characteristics such as the level of awareness a person has of his/her processing behavior, the deliberateness with which the information is processed, the preference for message structure the person displays, the awareness of the use of a systematic approach to decoding such as the use of a logical calculus, and the general experience and reportability of the processing method.

To the extent that a NMPS reliably assesses these processing tendencies, researchers should be able to make more specific predictions about message processing behaviors. Certainly a NMPS, with its focus on a person's awareness and deliberateness of processing, should be able to predict message processing behaviors resulting from differences in exerted cognitive effort. In this manner a NMPS would be useful in some of the same research domains as the NCS (e.g., cognitive response to messages, susceptibility to persuasion via message design). However, a NMPS should be able to go beyond such predictions. For instance, a NMPS should be able to make predictions about processing outcomes resulting from more gestalt or analytical approaches to messages, and the manner in which multiple cues are processed. This indicates that a NMPS should have applicability in nonverbal message-processing research as well. Given the inherent multi-codal nature of nonverbal messages, and the simultaneity with which many nonverbal messages are processed, a NMPS should allow specific predictions about nonverbal message processing behavior not immediately suggested by cognitive–effort research.

PHASE ONE: ITEM GENERATION AND INITIAL FACTOR ANALYSIS

Overview

A review of related literature was conducted to enable the generation of opinion statements designed to indicate one's normative mode of message
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processing. Items were generated by several persons active with or interested in the research project. There were three stages of item generation wherein the research assistants shared and critiqued items, discussed conceptions they had about cognitive processing, and identified aspects of cognitive processing that might not yet be represented in the pool of items. Items reflected the tendency to rely on hunches and intuition (to tap the experience of a meaningful gestalt), to employ deliberate analysis and evaluation (as is characteristic of a high need for cognition individual), preference for a particular message form and structure (to assess the preference for messages that are amenable to analytical decoding or producing meaningful gestalts), indications of memory structure and retrieval processes (since it was assumed that message decoding and assessment would be related to subsequent ability to recall message content), and tendency to easily process multiple message codes simultaneously (characteristic of Andersen's, 1991, concept of intuitive communication). The final set of items was reduced to 40 statements that researchers and assistants felt were precise and unique. These 40 items comprised the initial version of the instrument. Items were phrased in both positive and negative manners.

Method for Initial Factor Analysis

Four hundred and thirty-eight undergraduate speech and communication students (209 males, 213 females, 16 not identified) from a large university in the western United States volunteered to participate in the study. The average age of the sample was 22.5 years, ranging from 17 to 70 years. The ethnic background of the sample included 37.7% Japanese, 15.7% Caucasian, 11.5% Chinese, 9.1% Filipino, 8.9% Hawaiian, and the remaining 16% identified themselves as Other.

Participants completed a questionnaire containing the 40 preferred message processing items. Responses were scored using a −4 to +4 Likert-type scale.

Results of Initial Factor Analysis

Data were subjected to a principal axis factor analysis with varimax rotation. Twelve factors emerged with eigenvalues greater than 1.0; however, following the scree test and item analysis, only three factors were retained. The first factor had an eigenvalue of 5.26 and accounted for 13.1% of the variance. The second factor had an eigenvalue of 3.24 and accounted for 8.1% of the variance. The third factor had an eigenvalue of 2.49 and accounted for 6.2% of the variance.

The first factor included items that clearly indicated the tendency to carefully and deliberately analyze messages. Items addressed a preference for addressing each point of a message one at a time and making an assessment or judgment about the point before proceeding. This factor clearly seemed to be tapping a subject's preference for a careful, deliberate, and analytical approach to processing messages. Such an approach would be the antithesis of an unselective, nondeliberate approach to message processing.

The third factor had acceptable loadings in light of the exploratory nature of the instrument. The quality of the factor that made it worthy of further analysis was its strong face validity and conceptual clarity. The items that clearly loaded on this factor all addressed the tendency for the subject to rely on hunches, intuition, and first impressions when judging the quality and validity of mes-
sages. Conceptually, these items would be directly related to message processing habits typical of unselective, more intuitive processing. Since such processing is conducted with little cognitive intervention, the experiential outcome of the deliberation process would be more accessible than would be the deliberation process itself. The experiential outcome of such a process ought to be reported as a conclusion without awareness or recall of deliberation (i.e., an intuition).

The second factor was initially problematic. While the factor loadings were stronger than the third factor, it seemed to lack any meaningful interpretability. Items that appeared theoretically contradictory were clearly loading on this factor. Respondents indicated the tendency to remember messages word for word or in great detail, which would suggest a preference for deliberate, selective processing; however, they also claimed that understanding "comes easy to me" and that "I can juggle a lot of different messages at the same time"—both items expected to be associated with a preference for unselective message processing. A closer examination of the items loading on this factor suggested it was assessing the self-perceived communicative capability and complexity of some of the respondents. The items all seemed to tap positive self-assessments of one's own communicative capabilities. While this in itself appears interesting and may be worthy of future exploration, the factor was conceptually unrelated to a person's normative message processing and was excluded from continuing analysis.

Phase One Discussion

Of the three factors that emerged from the factor analysis, two appeared strongly related to a person's normative message-processing mode. Both factors were conceptually related to message processing characteristic of either a nondeliberate, unselective system or a selective processing system employing greater analysis and effort. The Intuition factor consisted of items indicating a person's tendency to process messages using gestalt-like evaluations (i.e., hunches, intuitions, feelings). The Analysis factor focused on deliberate and careful analytical processing. Both factors incorporate indirect measures of expended cognitive effort in that the former involves a low effort approach to message assessment while the latter clearly addresses high effort deliberation.

Some of the items that were expected to differentiate between a preference for selective or unselective processing failed to load well on either factor. These included indicators of preference for certain memory structures and the ability to process multiple codes using multiple channels simultaneously. While such items are assumed to be conceptually related to the processing modes that the NMPS is designed to assess, it may be that individuals cannot comment reliably on these aspects of their message processing. Perhaps multiple code and channel use and the building and accessing of resulting memory structures routinely function at low levels of awareness, rendering such knowledge less accessible to the individual.

Prior to the second phase of the scale's development, poorly loaded items were dropped and new items reflecting an emphasis on the salient characteristics of the two factors were written.
PHASE TWO: CONFIRMATORY FACTOR ANALYSIS AND TESTS OF CONSTRUCT VALIDITY

Overview

The revised version of the NMPS focused on items reflecting either a preference for deliberate, analytical processing of messages or a tendency to rely on intuitive, gestalt-like impressions of messages. The second version of the NMPS consisted of 17 items reflecting characteristics indicative of the selective, analytical processing dimension and 13 items indicating unselective, intuitive processing experiences. Items were worded positively and negatively.

A second data set was collected using the revised instrument. The second study had three goals: to ascertain through confirmatory factor analysis the presence of two factors that differentiated between processing mode tendencies, to ensure conceptual validity of the instrument through convergent-discriminant validity tests, and to test and compare with the NMPS the conceptual validity of other information/message processing instruments.

Method for Confirmatory Factor Analysis

Participants. The revised instrument was administered to a second sample of 237 undergraduate speech and communication students (89 males, 145 females, 3 not identified). The average age of the sample was 24.2 years, ranging from 18 to 53 years. The ethnic background of the sample included 35.6% Japanese, 20.8% Caucasian, 12.7% Chinese, 9.7% Filipino, 5.1% Hawaiian, and the remaining 16% identified themselves as Other.

Results for Confirmatory Factor Analysis

The unidimensionality of each of the two factors was determined through confirmatory factor analysis. This consisted of tests establishing content homogeneity, internal consistency, parallelism, and reliability.

The content of each factor had been generated to differentiate between the characteristics of preferred processing that emerged most strongly from the initial factor analysis. Upon examination, the items with the poorest content homogeneity also had the lowest factor loadings (i.e., factor loadings below .40). Eliminating these items resulted in the loss of one of the items from the Analytical factor and four of the items from the Intuition factor. The remaining items demonstrated satisfactory homogeneity, satisfying the first test for unidimensionality (Hunter & Gerbing, 1982).

Internal consistency of the two factors was determined through two tests. First, a matrix of correlations among items was generated for each factor. Using the Spearman product rule (Hunter & Gerbing, 1982), matrices of predicted correlations were generated from the individual factor loadings for each item. No observed correlations differed significantly from predicted correlations for the Intuition factor. Of the 128 correlations of items on the Analytical factor 3 differed significantly from predictions. These deviations were relatively small and may be attributable to sampling error. However, three of the items demonstrated highly redundant language, which also may have resulted in higher correlations. A single item contributed to two of these correlations and demon-
strated the most redundancy; consequently it was eliminated from the Analytical factor.

A second test for internal consistency, the flatness test, was used to assure that no item correlations differed significantly from the mean inter-item correlations (r Analytical = .31; r Intuition = .30). Both factors met this criterion. Each had only a single correlation that differed significantly from the average correlations, and both were relatively small in size.

Parallelism for the two factors was tested by again comparing a matrix of observed correlations with predicted correlations. In this case the observed correlations of the analysis and intuition items with the overall Need for Cognition (NCS) score were compared with predicted correlations (computed by the product rule) of the same items and the overall NCS score. Again, each factor had only a single correlation that deviated significantly from predicted correlations. One of these deviations was marginal and both could be expected due to sampling error. Thus, both factors satisfactorily met the test of parallelism.

Finally, alpha reliability for the two factors was acceptable. The final version of the Analytical factor had a reliability of .87, and the final Intuition factor had a reliability of .79. Table 1 reports item statistics for the revised NMPS.

A final instrument consisting of 15 analysis items and 9 intuition items was judged as having satisfied the criteria of unidimensionality for both factors. This version of the NMPS was then subjected to construct validity tests through convergent-discriminant analysis.

Methods for Construct Validity Tests

**Instruments.** The NCS (Cacioppo & Petty, 1982) and the Human Information Processing Survey (HIP; Taggart & Torrance, 1984) were used to test convergent validity. The latter instrument was designed to differentiate people according to cognitive style differences arising from cerebral hemispheric dominance. While the HIP has been challenged on the basis of its conceptual validity, it reliably measures preferences for information processing that are characteristic of right and left hemispheric processing. Since left hemispheric processing is typically serial and digital in nature, it was expected to correlate positively with the Analytical factor. A person processing messages in analytical fashion would tend to break a message into component parts and assess the ideas point-by-point, unlike the more gestalt-processing intuitive person whose NMPS scores should be negatively associated with left hemispheric processing. Right hemispheric processing is typically more affectively oriented and analogic in nature; thus, the score on this scale was expected to correlate with the Intuition factor. A higher Intuition score indicates a greater reliance on one's overall assessment of a message, which may manifest itself in an affective response. The tendency for higher Analytical scores to be associated with a more reductionist, serial processing mode leads to a prediction of a negative relationship between right hemispheric processing and the analysis dimension of the NMPS.

In their test of the validity of the NCS, Cacioppo and Petty (1982) predicted and found a negative correlation between need for cognition and dogmatism (Trolldahl & Powell, 1965). Their rationale was that the dogmatic person would not be inclined to enjoy evaluative and elaborative thinking. In the present study, it seemed likely that a dogmatic person would have greater respect for a
# TABLE 1

**Final Scale Means, Standard Deviations, Correlations**

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>S.D.</th>
<th>Item to Scale Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I know when a message makes sense because it just seems to feel right.</td>
<td>6.45</td>
<td>1.78</td>
<td>.36</td>
</tr>
<tr>
<td>2. After making a decision about someone’s argument, I usually know the thought processes that led to my decision.</td>
<td>6.43</td>
<td>1.86</td>
<td>.45</td>
</tr>
<tr>
<td>3. Objectivity and analysis are not my primary tools for assessing persuasive messages.*</td>
<td>6.19</td>
<td>2.09</td>
<td>.41</td>
</tr>
<tr>
<td>4. The best way for me to assess a person’s argument is through careful analysis.</td>
<td>6.51</td>
<td>1.97</td>
<td>.53</td>
</tr>
<tr>
<td>5. I analyze each point of a message one at a time and very carefully.</td>
<td>5.59</td>
<td>2.00</td>
<td>.61</td>
</tr>
<tr>
<td>6. My intuition plays only a weak role in my analysis of a person’s message.*</td>
<td>6.17</td>
<td>1.97</td>
<td>.45</td>
</tr>
<tr>
<td>7. When developing a message, I don’t think much about the order of the specific points of the message.*</td>
<td>6.05</td>
<td>2.13</td>
<td>.50</td>
</tr>
<tr>
<td>8. I don’t need to completely understand a message to know if it makes sense.*</td>
<td>4.27</td>
<td>2.28</td>
<td>.43</td>
</tr>
<tr>
<td>9. When I read or listen to a message I pay close attention to each point that is made and decide whether it is a good point or not.</td>
<td>6.00</td>
<td>1.98</td>
<td>.61</td>
</tr>
<tr>
<td>10. Hunches and intuitions are not my primary tools for assessing persuasive messages.*</td>
<td>5.03</td>
<td>2.07</td>
<td>.51</td>
</tr>
<tr>
<td>11. When I’m listening to an explanation about something, I stop everything else so that I can pay close attention to what is being said.</td>
<td>5.95</td>
<td>1.99</td>
<td>.42</td>
</tr>
<tr>
<td>12. My best decisions about a message come from careful analysis and reflection about the content of the message.</td>
<td>6.67</td>
<td>1.83</td>
<td>.71</td>
</tr>
<tr>
<td>13. It takes me a while to understand an argument because I carefully think about each point presented.</td>
<td>5.48</td>
<td>2.04</td>
<td>.53</td>
</tr>
<tr>
<td>14. When assessing the validity of an argument, I rank each point in order of importance and then consider whether it makes sense.</td>
<td>5.18</td>
<td>2.06</td>
<td>.49</td>
</tr>
<tr>
<td>15. I don’t like to rely on my hunches about the validity of people’s arguments.*</td>
<td>5.21</td>
<td>2.07</td>
<td>.57</td>
</tr>
<tr>
<td>16. When assessing the validity of a person’s argument I rely a lot on my feelings and intuitions.</td>
<td>5.80</td>
<td>2.09</td>
<td>.67</td>
</tr>
<tr>
<td>17. When assessing a persuasive argument I try to remain objective and analyze the content of the message.</td>
<td>6.89</td>
<td>1.54</td>
<td>.44</td>
</tr>
<tr>
<td>18. I don’t usually have hunches or intuitions about messages.*</td>
<td>6.42</td>
<td>1.88</td>
<td>.54</td>
</tr>
<tr>
<td>19. When I listen to a speaker I concentrate on the content of the message and don’t let myself get distracted by anything else.</td>
<td>5.37</td>
<td>1.98</td>
<td>.51</td>
</tr>
<tr>
<td>20. I don’t usually go with my first impressions when making an important decision; I prefer to take my time.*</td>
<td>3.86</td>
<td>2.87</td>
<td>.36</td>
</tr>
<tr>
<td>21. Having a good hunch is often as useful as developing a good understanding.</td>
<td>5.80</td>
<td>2.05</td>
<td>.48</td>
</tr>
<tr>
<td>22. I’m not very careful or deliberate when I’m listening to a message.*</td>
<td>6.19</td>
<td>1.92</td>
<td>.49</td>
</tr>
<tr>
<td>23. I don’t always know what leads me to believe or reject an argument; it just happens.</td>
<td>4.34</td>
<td>2.36</td>
<td>.39</td>
</tr>
<tr>
<td>24. I assess a person’s argument by evaluating each point, one at a time.</td>
<td>5.64</td>
<td>1.89</td>
<td>.69</td>
</tr>
</tbody>
</table>

*Indicates reverse-coded item.
proper (e.g., apparently thoughtful and analytical) approach to message processing and would reject a tendency to rely on hunches that could not be accounted for verbally. Accordingly, we expected to find a negative correlation between dogmatism and the Intuition factor of the NMPS, and a positive correlation between the Analytical factor and dogmatism. To the extent that the dogmatic person might not be highly aware of his/her thinking processes, these correlations were not expected to be strong.

To test for the possibility of social desirability effects, subjects also completed Crowne and Marlowe's (1964) Social Desirability Scale. No correlation between social desirability and either factor of the NMPS was expected.

Since measures of cognitive processing are often threatened by the effects of linguistic competencies or attitudes (e.g., Beatty & Payne, 1985; Powers, Jordan, & Street, 1979), some comparison to language attitudes seemed worthy. Self-perceptions of speech dynamism, attractiveness, competence, and status were assessed with Gunderson and Perrill's (1989) adaptation of Zahn and Hopper's (1985) Speech Evaluation Instrument. Some degree of perceived speech competence may be positively correlated with message processing tendencies as measured by the Analytical factor. This would be the case to the extent that the more analytical person is more adept at recognizing and critiquing the nuances of an argument's syntactic structure and semantic content. Thorough message analysis ought to be related to competence at verbal assessment. However, general message processing tendencies and other self-perceptions of speech or language characteristics should not be significantly related to the NMPS.

Finally, there is no theoretical basis to posit a correlation between one's message processing tendencies and one's level of general communication apprehension or one's perceptions about the reward level of communication. The tendency to decode messages in analytical or gestalt fashion should not produce nor be indicative of greater communication anxiety or enjoyment. Likewise, one's message processing tendencies may allow some communicative events to be perceived as more rewarding and others as less rewarding. However, no direct relationship between normative message processing and reward level of communication ought to be found. To verify this, Burgoo's (1976) Unwillingness to Communicate Scale, which measures reward and fearfulness (originally labelled Approach-Avoidance), was administered to the sample. Reliabilities for all scales involved are reported in Table 2.

Results of Construct Validity Tests

Construct validity was well supported. Most correlations were in line with predictions. However, an unexpected social desirability effect emerged. Social desirability correlated significantly with the Analytical factor ($r = .44, p < .01$), Intuition factor ($r = -.23, p < .001$), need for cognition ($r = .22, p < .001$), and left hemispheric processing ($r = .36, p < .001$). Cacioppo and Petty (1982) had reported small but significant correlations between need for cognition and social desirability in an earlier study but suggested it may be an artifact of the transparent purpose of the instrument coupled with participants' concern over evaluation or reduced anonymity. In the present study the social desirability correlations were found with the message and information processing scales and with the NCS and were consistent in directionality: Greater analytical, effortful
TABLE 2

<table>
<thead>
<tr>
<th>Scale</th>
<th>Alpha Reliability</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>.86</td>
<td>6.00</td>
<td>1.15</td>
</tr>
<tr>
<td>Intuition</td>
<td>.78</td>
<td>5.44</td>
<td>1.25</td>
</tr>
<tr>
<td>NeogS</td>
<td>.88</td>
<td>5.70</td>
<td>1.20</td>
</tr>
<tr>
<td>Right hem.</td>
<td>.69</td>
<td>4.53</td>
<td>.55</td>
</tr>
<tr>
<td>Left hem.</td>
<td>.75</td>
<td>4.28</td>
<td>.61</td>
</tr>
<tr>
<td>U.C. (afraid)</td>
<td>.87</td>
<td>3.42</td>
<td>1.06</td>
</tr>
<tr>
<td>U.C. (reward)</td>
<td>.82</td>
<td>2.54</td>
<td>.83</td>
</tr>
<tr>
<td>Dogmatism</td>
<td>.77</td>
<td>3.47</td>
<td>.75</td>
</tr>
<tr>
<td>Ling. compet.</td>
<td>.85</td>
<td>6.72</td>
<td>1.35</td>
</tr>
<tr>
<td>Ling. status</td>
<td>.86</td>
<td>6.76</td>
<td>1.12</td>
</tr>
<tr>
<td>Ling. dynamism</td>
<td>.83</td>
<td>6.26</td>
<td>1.55</td>
</tr>
<tr>
<td>Ling. attract.</td>
<td>.88</td>
<td>7.40</td>
<td>.98</td>
</tr>
<tr>
<td>Social desire</td>
<td>.79</td>
<td>4.05</td>
<td>.56</td>
</tr>
</tbody>
</table>

processing was positively correlated with social desirability; intuitive, hunch-based processing was negatively correlated.

It seemed possible that these results might be at least partly explained by differences between sample demographics of Cacioppo and Petty's (1982) study and the present study. While Cacioppo and Petty had a largely Caucasian sample, the present data were collected from a sample consisting of respondents with multiple ethnic and cultural backgrounds. Some of these social desirability effects may be related to ethnic and cultural differences. To test this question, correlations were run between social desirability, the NCS, the Analytical factor, and the Intuition factor and broken out across the four dominant ethnic types.

Consistent with Cacioppo and Petty's (1982) study, Caucasians in the present study showed no significant correlations among the variables in question. Participants of Japanese and Chinese ethnicity, however, both showed significant correlations between social desirability and the Analytical factor. Moderate correlations were also evident between social desirability and need for cognition for the Filipino portion of the sample as well. Generally, it appears that the correlations between need for cognition, analysis, and social desirability seem to be limited to the Asian and Pacific Islander subjects in the study. Correlations are reported in Table 3.

To control for this social desirability effect, all correlations were run a second time with social desirability partialed out. Results provided strong support for the construct validity of the Analytical and Intuition factors. As predicted, the Analytical factor correlated positively with need for cognition \( (r = .30) \), the left hemisphere portion of the HIP \( (r = .50) \), dogmatism \( (r = .32) \), and perceived linguistic competence \( (r = .16) \). The Analytical factor failed to correlate significantly with the right hemisphere dimension of the HIP \( (r = .01) \). As expected, no significant correlations were found between Analytical and unwillingness to communicate subscales (fearfulness, \( r = -.03 \); reward \( r = .07 \)) or the other perceived linguistic style subscales (attractive, \( r = .08 \); dynamic, \( r = .14 \); status, \( r = .07 \)).

The Intuition factor also received strong convergent support. As predicted, the Intuition factor correlated positively (and significantly) with the right hemispheric portion of the HIP \( (r = .43) \) and negatively (and significantly) with
TABLE 3

<table>
<thead>
<tr>
<th>Scale</th>
<th>Caucasian</th>
<th>Japanese</th>
<th>Chinese</th>
<th>Filipino</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social desire. with NCS</td>
<td>.11</td>
<td>.19</td>
<td>.39</td>
<td>.26</td>
</tr>
<tr>
<td></td>
<td>(48)</td>
<td>(82)</td>
<td>(29)</td>
<td>(23)</td>
</tr>
<tr>
<td>Social desire. with Analysis</td>
<td>.16</td>
<td>.34**</td>
<td>.69**</td>
<td>.34</td>
</tr>
<tr>
<td></td>
<td>(48)</td>
<td>(82)</td>
<td>(29)</td>
<td>(23)</td>
</tr>
<tr>
<td>Social desire. with Intuition</td>
<td>-.13</td>
<td>-.02</td>
<td>-.14</td>
<td>-.20</td>
</tr>
<tr>
<td></td>
<td>(48)</td>
<td>(82)</td>
<td>(29)</td>
<td>(23)</td>
</tr>
</tbody>
</table>

*Note. Number in parentheses is n.

*p < .01. **p < .001.

need for cognition (r = -.17), the left hemispheric portion of the HIP (r = -.24), and dogmatism (r = -.15). No significant correlations were found between the Intuition factor and perceived linguistic style or unwillingness to communicate. Correlations are reported in Table 4.

Comparison of NMPS to Other Message and Information Processing Instruments

While demonstrating that the NMPS correlated in a predictable manner with other instruments illustrates the conceptual validity of the scale, it does not fully demonstrate the usefulness of the NMPS as a message-processing scale relative to conceptually related scales. In order to test this, construct validity of the NMPS was compared to that of the other information processing scales used in this study, the HIP scale and the NCS.

As reported, need for cognition was correlated predictably with the NMPS. In the same manner, need for cognition should be associated with the HIP. To the extent that the NCS assesses the tendency to be an effortful and elaborate processor of information, we ought to find the NCS positively associated with the left hemisphere dimension of the HIP. If the analogic, affective processing assessed by the right hemisphere portion of the HIP is indirectly associated with the tendency to exert less cognitive effort then we ought to see a negative correlation between right hemisphere processing and the NCS.

One's need for cognition ought to be somewhat related to dogmatism, as demonstrated earlier by Cacioppo and Petty (1982). In addition, self-perceived linguistic competence should be positively related to need for cognition. Elaborating effectively on an argument requires strong verbal skills. In addition, Cacioppo et al. (1986) found a positive correlation between the NCS and verbal intelligence in their research. However, need for cognition should not be associated with perceptions of linguistic dynamism, attractiveness, or status. One who claims to be an effortful thinker need not be expected to perceive her or his language to be more dynamic and attractive. Likewise, perceptions of linguistic status should not be indicative of need for cognition. Lastly, one's need for cognition ought not be associated with one's willingness to communicate. Neither high nor low need for cognition should predict the degree to which one is apprehensive or fearful of communication. It might be argued that somebody with higher need for cognition might get more out of a communicative experience, thus making communication more rewarding to such an individual; however, this effect would likely be small at best. Since much of our normal
TABLE 4
CORRELATIONS FOR CONVERGENT-DISCRIMINANT VALIDITY TESTS

<table>
<thead>
<tr>
<th></th>
<th>Analytical</th>
<th>Intuition</th>
<th>NCS</th>
<th>Left Hem.</th>
<th>Right Hem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical</td>
<td>- .35***</td>
<td>.30***</td>
<td>.50***</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>Intuition</td>
<td></td>
<td>-.17*</td>
<td>-.24***</td>
<td>.43***</td>
<td></td>
</tr>
<tr>
<td>NCS</td>
<td></td>
<td></td>
<td></td>
<td>.12</td>
<td>-.02</td>
</tr>
<tr>
<td>Left hem.</td>
<td></td>
<td></td>
<td></td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>Right hem.</td>
<td>.01</td>
<td>.43***</td>
<td>-.02</td>
<td>-.01</td>
<td></td>
</tr>
<tr>
<td>U.C. (fearfulness)</td>
<td>-.03</td>
<td>-.04</td>
<td>-.21**</td>
<td>.04</td>
<td>-.15*</td>
</tr>
<tr>
<td>U.C. (reward)</td>
<td>-.07</td>
<td>-.09</td>
<td>-.05</td>
<td>.07</td>
<td>-.09</td>
</tr>
<tr>
<td>Dogmatism</td>
<td>.32***</td>
<td>-.15*</td>
<td>-.08</td>
<td>.43***</td>
<td>.07</td>
</tr>
<tr>
<td>Linguistic competence</td>
<td>.16*</td>
<td>.01</td>
<td>.21**</td>
<td>.14*</td>
<td>.18**</td>
</tr>
<tr>
<td>Linguistic status</td>
<td>.07</td>
<td>-.07</td>
<td>.21**</td>
<td>.14*</td>
<td>.14*</td>
</tr>
<tr>
<td>Linguistic dynamism</td>
<td>.14</td>
<td>.04</td>
<td>.15*</td>
<td>.05</td>
<td>.16*</td>
</tr>
<tr>
<td>Linguistic attractiveness</td>
<td>.08</td>
<td>.02</td>
<td>-.03</td>
<td>.19**</td>
<td>.20**</td>
</tr>
</tbody>
</table>

Note. All correlations after partialing out effects of social desirability. N = 237.
*Indicates p < .05. **Indicates p < .01. ***p < .001.

communication is routine in nature, there is no reason to assume that the low effort, low NCS person would be any more apprehensive about communication than would a high NCS individual.

The HIP may be related to dogmatism as well. Those with right hemispheric processing tendencies may find dogmatic thinking or behavior undesirable or obnoxious. Dogmatic thinking would be anathema to the creative proclivity of the right hemispheric processor, resulting in negative correlations between dogmatism and right hemispheric processing. Conversely, more dogmatic types may find the linear, analytical thinking of the left hemisphere preferential and superior, producing positive correlations between the two instruments. Self-perceived linguistic competence would be positively related to left hemispheric processing, due to the stronger language skills associated with this hemisphere. Self-perceived linguistic status, dynamism, and attractiveness ought not be related to left hemispheric processing, however. The creative nature of right hemispheric processing may produce a positive correlation between self perceptions of linguistic attractiveness; however, the weaker verbal skills of the right hemisphere would tend to mitigate any relationship between self perceptions of linguistic status, competence, and dynamism and right hemispheric processing. Finally, preference for right or left hemispheric processing should not be significantly related to either dimension of the Unwillingness to Communicate Scale (Burgoon, 1976). General perceptions of communication as rewarding or fear-arousing should not be strongly influenced by one’s hemispheric processing habits.

Results of Validity Tests for HIP and NCS

The NCS did not correlate significantly with dogmatism in the present study. In addition, the NCS failed to correlate significantly with either left or right hemispheric processing tendencies as measured by the HIP. However, correlations reported in Table 4 show that the NCS, unlike the NMPS, is significantly and positively correlated with three of the four dimensions of the perceived linguistic style instrument (linguistic dynamism, r = .15; linguistic status, r = .21; linguistic competence, r = .21). It was expected that need for cognition would
be related to perceived linguistic competence; however, the other two significant correlations raise questions about the validity of the NCS. In addition, the NCS was significantly and negatively correlated with the fearfulness dimension of Burgoon's (1976) Unwillingness to Communicate Scale \((r = -0.21)\). Specifically, the higher one scored on the NCS, the less fearful one was regarding communicative interaction. The effects of the unexpected NCS correlations are generally small and need not be taken as an indictment of the NCS. However, these data do indicate that the NCS is possibly confounded with communicative and linguistic variables in a manner that weakens its status as a measure of effort and message elaboration likelihood.

As predicted, the left hemispheric portion of the HIP scale was positively correlated with dogmatism \((r = 0.43)\), although the right hemispheric portion failed to correlate negatively with dogmatism \((r = 0.07, \text{N.S.})\). Also, the expected significant positive correlation \((r = 0.20)\) between right hemispheric processing and self-perceptions of linguistic attractiveness was found, along with the positive relationship between left hemispheric processing and self-perceptions of linguistic competence \((r = 0.14)\). However, right hemispheric processing was also positively correlated with self-perceived linguistic dynamism \((r = 0.16)\), competence \((r = 0.18)\), and status \((r = 0.14)\), while left hemispheric processing was correlated with self-perceived linguistic status \((r = 0.14)\) and attractiveness \((r = 0.20)\). Finally, right hemispheric processing was negatively correlated with the fearfulness dimension of the Unwillingness to Communicate Scale \((r = -0.15)\). As with the NCS, these unexpected correlations were small. Nevertheless, the HIP does seem to reflect linguistic and communicative confounds similar to the NCS.

Phase Two Discussion

Overall, the results of this second study strongly support the structural and construct validity of the NMPS. Confirmatory factor analysis supported a slightly reduced version of the expected two-factor solution. Convergent-discriminant validity tests provided evidence that the two subscales of the NMPS are tapping the expected differences in message processing characteristics. Lastly, the NMPS appears free of some of the possible linguistic and communicative confounds evidenced by comparison processing scales. Both the HIP and the NCS were related to other instruments in manners not predicted by their conceptual bases.

PHASE THREE: PREDICTIVE VALIDITY

Overview

The final studies were designed to test the predictive validity of the NMPS. Three studies tested hypotheses concerning (a) the relative abilities of the NMPS and the NCS to predict differences in reports of expended cognitive effort and recall message content and (b) the relative abilities of the NMPS, NCS, and HIP to predict nonverbal processing skills.

Study One: Predicting Effort and Recall

Individuals who indicate tendencies for analytical processing of messages ought to manifest this preference through reports of greater expenditures of
cognitive effort during message processing. More analytical processing is accomplished through greater intentionality, thus leading to perceptions of expended cognitive effort. Such reports are typical of those who are high in need for cognition and have been demonstrated by Cacioppo et al. (1983). In addition, due to the greater attention analytical individuals would pay to the details of a message, they should also demonstrate a greater recall of detailed message content relative to those who score low on analysis. This tendency has also been demonstrated by people who score high in need for cognition (Cacioppo et al., 1983).

Those who prefer a more intuitive approach to message processing would be less likely to recall specific details of the message since they would be processing at a more gestalt level. Studies have demonstrated that information processed in an unselective manner is less accessible to conventional retrieval methods (Berry & Broadbent, 1984; Hayes & Broadbent, 1988). Participants preferring more gestalt processing should also be characterized by minimal intentionality, thus leading to the perception of less expended effort than those participants who express a low preference for intuitive processing. Consequently, it was predicted that there would be positive correlations between preferences for analytical processing, need for cognition, and reports of expended cognitive effort and message recall; conversely, we expected to find negative correlations between intuitive processing preferences and effort and recall.

**Method for Effort and Recall Tests**

**Participants.** One hundred ninety-six undergraduate speech communication students from a large university in the western United States (76 males, 120 females) took part in this study. Participants’ ages ranged from 18 to 53 years with an average age of 24.2. The ethnic background of the sample included 35.6% Japanese, 20.8% Caucasian, 12.7% Chinese, 9.7% Filipino, 5.1% Hawaiian, and the remaining 16% identified themselves as Other.

**Procedures.** All participants had completed the NMPS earlier in the semester (Analytical alpha = .84; Intuition alpha = .83). At the same time, participants completed the NCS (alpha = .83). At a point later in the semester (ranging from one to three weeks), participants were asked to read several paragraphs advocating tuition raises for the medical and engineering students at the university. Upon completion, participants responded to five Likert-type items assessing their perceptions of the amount of cognitive effort they exerted while reading the message (Aune, 1988). Alpha reliability for the effort scale was .80. In addition, after reading the message, participants were asked to “please list as many of the message arguments as you can remember.”

Two undergraduate students, who were unaware of the goals of the study, read each participant's list and assessed the amount of recall exhibited. One point was assessed for each argument premise accurately recalled, and an additional point was assessed for each item of evidence (e.g., statistical support) recalled. Consequently, the recall measure assessed only information recalled by the subject that was directly relevant to the argument. Cronbach’s alpha assessed intercoder reliability for the two coders at .93.
Results of Effort and Recall Tests

Pearson correlations assessed relationships between participants' scores on the NMPS and reports of expended effort and ability to recall the arguments. Small but significant correlations supported the predictive validity of the scale. Participants' scores on the analytical factor were positively correlated with reported expended effort ($r[185] = .18, r^2 = .03, p < .05$) and amount of message content recalled ($r[185] = .25, r^2 = .06, p < .001$). Scores on the Intuition factor were negatively correlated with amount of the message content recalled, $r(185) = -.27, r^2 = .07, p < .001$. Expended effort, however, was not significantly correlated with Intuition scores, $r(185) = -.02$. As expected, need for cognition was also positively related to recall ($r[185] = .15, p < .05, r^2 = .02$) and expended effort ($r[198] = .17, p < .05, r^2 = .03$).

Multiple regression was used to examine the recall and expended effort variance that could be attributed to the NMPS beyond that due to need for cognition. With need for cognition parialed out in the first step, the intuition dimension of the NMPS still accounted for a significant portion of the recall variance, partial $r = -.15, F_{\text{change}} = 6.53, p < .05, R^2_{\text{change}} = .04$. With both need for cognition and intuition removed, the analysis dimension still accounted for significant recall variance, partial $r = .15, F_{\text{change}} = 3.99, p < .05, R^2_{\text{change}} = .02$. With intuition and analysis removed, need for cognition did not account for significant additional variance, partial $r = .11, F_{\text{change}} = 1.87, p > .05$. The amount of effort variance that could be attributed to the analysis dimension beyond the effects of need for cognition fell short of significance, partial $r = .14, F_{\text{change}} = 3.35, p = .07, R^2_{\text{change}} = .02$. With both intuition and analysis removed, need for cognition also failed to account for significant additional effort variance, partial $r = .10, F_{\text{change}} = 1.79, p > .05$.

Studies Two and Three: Predicting Nonverbal Decoding Skills

The final set of studies testing the predictive validity of the NMPS examined expected differences in nonverbal processing abilities predicted by scores on the NMPS, HIP, and NCS. Nonverbal processing is inherently multi-codal and can employ multiple channels (Burgoon, Buller, & Woodall, 1989). Researchers have found that research confederates demonstrate difficulty in encoding nonverbal messages on single channels only. Likewise, nonverbal decoders often perform more accurately when making attributions based on multiple, rather than individual, channels and codes (Burgoon & Hale, 1988). Evidence is mounting that messages encoded nonverbally typically employ multiple channels and codes simultaneously and that efficiently decoding such messages requires the communicator to monitor these channels and codes simultaneously (Basil, 1992).

Even nonverbal messages employing only a single code and channel still tend to be considerably complex. The face alone is estimated to be capable of producing at least 20,000 different expressions (Birdwhistell, 1970). Ekman and Friesen (1976) have identified no fewer than 46 different action units in the face with as many as 8 action units simultaneously involved in the expression of a single distinctive facial movement. The simultaneous processing of the cues available in a single nonverbal channel such as the kinesic channel can be a daunting task. It is clear that the communicator who can simultaneously process
multiple nonverbal cues, particularly across multiple codes and channels, will have a decoding advantage over a communicator who tends to focus on single cues processed in a more analytical fashion.

Given the inherent demands of nonverbal decoding, it was hypothesized that a positive correlation would be found between scores on the Intuition factor and nonverbal decoding skill. The preference for a more gestalt processing mode should give the highly intuitive processor an edge over the processor who does not rely on such processing skills, because the intuitive person's processing will not be attenuated by a focus on single cues or codes. Conversely, because the more analytical processors will focus on individual cues, there should be a negative correlation between scores on the Analytical factor and nonverbal decoding skills.

The same arguments can be made for nonverbal decoding skills and scores on the two dimensions of the HIP scale. Those who score high in right hemispheric processing ought to be more adept at processing information conveyed nonverbally; the more left hemispheric processors, with their focus on serial, analytical information processing, should find themselves less accurate when processing nonverbal information.

Finally, it was argued above that the effort-based NCS may be indirectly assessing processing differences. It was suggested that some low need for cognition individuals may in fact be employing a low effort processing mode such as the unselective, more gestalt processing that the NMPS attempts to assess. Conversely, high need-for-cognition individuals may be processing in a more analytical fashion. If this is the case, then we could expect that the NCS ought to be negatively correlated with accuracy of nonverbal decoding as well.

Methods for Nonverbal Decoding Skills Test

Participants. Sixty-five undergraduate speech communication students participated in the study testing hypotheses concerning the predictive utility of the NMPS compared to the HIP. One hundred twenty-four different undergraduate speech communication students participated in a second study examining the same hypotheses regarding the NMPS relative to the NCS. Students received extra credit for their participation. Ethnic background and age of the students were similar to the studies reported above.

Procedures. Both data collections employed the same procedure across two consecutive semesters. At the beginning of both semesters, respondents were asked to complete the NMPS. Participants involved in the NMPS-NCS test completed the NCS within 10 days of completing the NMPS in the first study (alpha reliability NCS = .84, NMPS analysis = .79, NMPS intuition = .79). Participants taking part in the NMPS-HIP study completed the HIP within 10 days of completing the NMPS (alpha reliability HIP right hemisphere = .74, HIP left hemisphere = .83, NMPS analysis = .82, NMPS intuition = .77). Finally, within three weeks of completing either the NCS or HIP, participants were asked to complete the Facial Meaning Sensitivity Test (FMST) (Leathers, 1992). This test consisted of 30 pictures of a woman's face expressing 1 of 10 different affective states (disgust, happiness, interest, sadness, bewilderment, contempt, surprise, anger, determination, fear). Participants were asked to select 3 pictures they felt best depicted each of the 10 affective states.
The recognition of facial expressions of emotion was chosen as the critical nonverbal decoding test due to the inherent complexities of the task. Expression of emotion often takes place across three different regions of the face (Ekman & Friesen, 1976) with multiple facial behaviors typically contributing to single judgments of emotional expressions (Burgoon et al., 1989). The FMST was chosen as a test of nonverbal decoding skills due to the more detailed and difficult discriminatory nature of the test relative to other nonverbal sensitivity tests (Leathers, 1992).

Given the nature of the task and the academic context in which the task was undertaken, there was a possibility that participants may have tried too hard to perform well. That is, some participants may have performed more effortfully and analytically than would be normative for them. To control for this possibility, steps were taken to minimize analytical demand characteristics. Participants were informed that they would have to work fairly quickly as they would be allowed only a limited time to finish the test. In addition, priority was placed on finishing the task. Participants were told that the purpose of the test was to assess accuracy of performance across the entire test under time constraints and doing so would require them to attempt to complete all 30 attributions. It was assumed that these instructions would maximize the likelihood that the intuitive processors would rely on their normative processing skills.

In a pretest, 10 undergraduate students took an average of 10.2 minutes to finish the FMST. In the present studies, participants were allowed 8 minutes to complete the test.

Results of Nonverbal Decoding Skills Test

Results supported the hypotheses concerning the NMPS. In the study testing the predictive validity of the NMPS and the HIPS, a significant positive correlation was found between scores on the Intuition factor and the number of accurate responses made on the FMST, \( r(65) = .28, r^2 = .08, p < .05 \). The predicted negative correlation between scores on the Analytical factor and decoding accuracy was also found, \( r(65) = -.38, r^2 = .14, p = .001 \). The left hemisphere portion of the HIPS also produced the expected negative correlation with decoding accuracy, \( r(65) = -.32, r^2 = .10, p = .005 \). The hypothesized relationship between the right hemisphere portion of the HIPS and decoding accuracy was not found. Scores were negatively, rather than positively, related but fell short of significance, \( r(65) = -.14, p > .05 \).

Multiple regression was used to test whether the NMPS accounted for a significant portion of the variance after the variance accounted for by the HIPS had been removed. With both the left and right HIPS dimensions entered first, the analytical dimension still accounted for significant variance, partial \( r = -.27, F_{\text{change}} = 4.93, p < .05, R^2_{\text{change}} = .07 \). However, the Intuition factor fell just short of significance after removing effects due to the analysis dimension, partial \( r = .23, F_{\text{change}} = 3.54, p = .06 \).

With Analytical and Intuition scores removed, the left hemisphere factor of the HIPS did not account for significant additional accuracy variance, partial \( r = -.13, F_{\text{change}} = 1.04, p > .05 \).

In the study comparing and contrasting the NMPS and the NCS, the same
positive correlation was found between scores on the Intuition factor and the number of accurate responses made on the FMST, $r(124) = .28$, $r^2 = .08$, $p < .01$. The predicted negative correlation between scores on the Analytical factor and decoding accuracy was found again, $r(124) = -.26$, $r^2 = .07$, $p < .01$. The correlation between need for cognition and decoding accuracy was negative as predicted but failed to reach significance, $r(75) = -.09$, $p > .05$.

Phase Three Discussion

The findings of the final two studies support the predictive validity of the NMPS. Scores on the NMPS were correlated with participants' reported expenditures of cognitive effort, their ability to recall message content, and their ability to decode nonverbal information. Further, results indicate that the NMPS can account for additional significant variance beyond that attributed to need for cognition and hemispheric processing differences.

It should be pointed out that the classroom setting in which the data were collected may have produced demand effects that influenced participants' message processing behavior. For instance, while steps were taken to reduce analytical demand effects in the final studies, these same precautions may have attenuated the expected negative association between participants' scores on the analytical factor and their nonverbal decoding skills. Broadbent et al. (1986) have suggested that unselective processing ought to be faster than selective processing. In the present study, if those with analytical tendencies attempted a more unselective, intuitive strategy in order to meet the imposed time constraints, they may have actually improved their accuracy relative to their normative processing behavior. Likewise, when asked to read a short message in a classroom setting, even participants with more intuitive, unselective message processing habits may have attempted to be more analytical, thus reducing the relationship between intuitive factor scores and expended cognitive effort.

In addition, although the recall assessments demonstrate greater recall associated with higher Analytical scores and lesser recall associated with Intuition scores, it remains to be seen just how much more selective the analytical processor is in processing style. The recall measure asked for pertinent information only; it did not discriminate between relevant and irrelevant information recalled by the participant. Consequently, although these data attest to the greater recall of the analytical processors concerning pertinent information, they cannot demonstrate the hypothesized greater selective processing style of the analytical processor.

Caveats aside, scores on the NMPS successfully predicted message processing skills and characteristics. The predictions concerning processing of nonverbal communication and NMPS scores were supported, although the findings were limited to a test employing only a single nonverbal code and channel. Further research will be needed to investigate the degree to which these effects can be found with messages employing multiple codes and channels. It is expected that differences between processing types ought to vary with the number of nonverbal codes and channels employed in message design and the consistency with which the message is encoded across all channels.
GENERAL DISCUSSION AND APPLICATIONS

The present set of studies developed and tested the conceptual and predictive validity of the Normative Message Processing Scale. The NMPS assesses normative or trait message processing habits of individuals on two dimensions: an analytical processing mode characterized by effortful, deliberate, and selective attention to a message or a processing mode characterized by a low effort, unselective reliance on emergent hunches, intuitions, and affective responses to messages. Whereas the former involves mindful application of message processing skills, the latter makes use of a more mindless, less cognitively mediated processing of messages.

The NMPS offers an advantage over other message and information processing scales by conceptualizing and assessing message processing along two dimensions, rather than a single dimension. Accordingly, the NMPS allows differentiation between low effort processing that results from general lack of motivation and from a tendency to process more intuitively. Similarly, one's high score in analytical processing does not necessarily indicate a low score in intuitive processing. In fact, a person may claim both analytical and intuitive processing tendencies. Such scores might be expected from teachers, journalists, and other professional communicators who are more likely to demonstrate versatility in the encoding of messages to reach various audiences.

It might be argued that scores on the Intuition factor still do not differentiate between those relying on unselective processing and those making random guesses (which begs the question whether one can make a random guess). In other words, a person who tends to come to conclusions about messages in a rather random fashion may wish to attribute meaningfulness to such behavior by reporting it as intuitive. However, the behavioral evidence presented above would suggest that this is not a problem. Participants' scores on the Intuition factor reliably predicted performance on the verbal and nonverbal message processing tasks. Regardless, if the NMPS was not distinguishing between intuitive processors and random guessers, then the results found in these studies would be somewhat attenuated at worst.

Perhaps this concern might be resolved through participants' use of a talking protocol subsequent to a message processing task. As discussed earlier, such tests are generally assumed to be of little use for self reporting of processing behavior that takes place at low levels of awareness. However, the Intuition factor is assumed to be assessing the experiential output of intuitive processing; it may be that this experience is different enough from random guessing that it would be accessible through a talking protocol. For instance, high intuition processors may report relying on a hunch or feeling while low intuition-analysis types may report a more "heads or tails, I just guessed" approach to judgments about messages. Future research should address this possibility.

It should also be emphasized that high scores on the Analytical factor need not imply that a sound, valid logical calculus has been employed. The Analytical factor assesses only how deliberately a person applies a selective processing mode, not the quality of the processing mode. It is possible that a person scoring high on the Analytical factor may be applying a systematic message processing mode that would not pass the most elementary logical test.

Nevertheless, the ability of the NMPS to assess normative message processing...
modes suggests a number of immediate applications in the message processing and social influence areas. For instance, in a learning situation, the NMPS could identify learners’ primary message processing mode, thus allowing information to be presented in a manner that will maximize comprehension and retention, and help the learner to become aware of his/her processing deficiencies. This becomes increasingly important as interactive educational computer software becomes more sophisticated, permitting (even requiring) learners to play a more active role in the learning process. Interactive learning systems that allow a learner to select various forms of message encoding presupposes a learner that is aware of his/her processing norms.

Similarly, an understanding of learners’ message processing habits may contribute to more sophisticated test design. A perusal of most classroom tests would suggest that our tests are designed with a bias toward more analytical encoders and decoders. In fact, the more a test stresses specific recall of information, the more handicapped the intuitive processors would find themselves.

The advantage that highly intuitive processors enjoy in nonverbal message decoding would suggest that such decoders may be better able to detect deception as well. Numerous implications arise regarding processing mode and deception detection. Analytical processors may focus more on the deceiver’s words, looking for logical flaws or omissions in the deceiver’s message. Analytical processors may perform poorly if forced to focus on the nonverbal cues of the deceiver because of their penchant to pay attention to single cues. Likewise, the intuitive processor’s accuracy may actually decline as the number of available channels and codes decreases.

Likewise, one’s tendency to successfully process nonverbal cues should be related to one’s ability to process relational messages. It will be interesting to examine the extent to which analytical or intuitive tendencies tend to be assets or liabilities in relational management situations.

In social influence, the NMPS could help resolve concerns in differentiating between persuasive effects that result from “direct” and “peripheral” routes (Allen & Reynolds, 1993). A speaker’s accent, for instance, may affect persuasive outcomes through both routes. It may be processed in a deliberate manner as part of a logical calculus for one person, while for another the accent is processed nondeliberately as part of a complex of nonverbal cues. In the former case, the receiver would be able to recount his/her decision making process, while in the latter, the actual processing of the message would be inaccessible to the receiver. In a related manner, messages could be designed that would appeal to the normative processing characteristics of specific receivers. A highly intuitive, but low analytical processor may be influenced to accept a deductively invalid and inductively weak argument if it has the apparent logical structure of an argument. The same might not be expected from a highly intuitive processor who routinely engages in analytical message processing. Similarly, the same intuitive processor may be more susceptible to manipulations of language intensity such that the gestalt processing of an argument characterized by intense language may lead to a positive response, regardless of argument strength.

It is likely the case that some percentage of the population report themselves
to be both analytical and intuitive processors. Research needs to be conducted to examine how such processors use their message processing capabilities. The application of a specific processing mode may be a deliberate function for such a processor, indicating an understanding of one's situational processing needs and capabilities. Research needs to determine the criteria used in applying a specific processing mode in a given situation.

Finally, as research tests differences based on message processing tendencies, it stands to reason that tendencies in the decoding of messages may reflect tendencies in the encoding of messages as well. Research will need to examine the possibility that encoding habits may influence the construction of a message to the same extent that audience analyses and relational concerns do. For instance, the analytical processor might prefer factual evidence in the design of a persuasive message while the intuitive processor might lean toward affective language, metaphors, and analogies.

The ability to assess the normative message processing characteristics of communicators is fundamental to developing a fuller understanding of encoding and decoding of messages in relational communication and social influence. The NMPS is a tool that can contribute to this body of research.

ENDNOTES

1A weighted constellation of cues that is processed at low levels of awareness and produces affective conclusions in a receiver is conceptually similar to the processing of preferenda (Zajonc, 1980). Zajonc claims that preferences that arise without concomitant cognitive appraisal may rely on the processing of more "gross, vague, and global" (p. 159) stimuli that interact with the internal states of the receiver. Zajonc claims conclusions that arise from this form of processing often leave the processor unable to recall the specifics of the processing itself, resulting in recall attempts that are imprecise and ambiguous.

2It should be noted that, with the exception of Aune (1988), the argument–quality manipulations in NCS related literature consisted of arguments that pilot study participants had responded to with positive or negative "cognitive responses" (i.e., respondents wrote positive or negative reactions to the arguments). Such manipulations may not necessarily involve manipulations of inductive argument strength or deductive argument validity and may serve as potential confounds for other measures of affect in such studies.

3The complete initial pool of items along with means, standard deviations, and factor loadings are available from the authors on request.

4While the HIP scale has served as a fairly useful predictor of some processing characteristics related to hemispheric differences, it should be pointed out that thus far no relationship between the HIP scale and neuropsychological measures of hemispheric function has been found. Further, users of this instrument have often been faced with developing post hoc explanations for results that did not conform with hypotheses based on assumptions about hemispheric differences (Fischler, 1987).

5Although scores on the NMPS were not expected to be correlated significantly with self-perceptions of linguistic style, Aune and Reynolds (1991) demonstrated earlier that the interaction between the dimensions of the NMPS could successfully predict self-perceptions of linguistic style.

6The systematic manner in which the information processing scores of some ethnic groups correlated with social desirability suggests that intercultural or cross-cultural research in information and message processing concerns should control for social desirability. An explanation for the relationship among these variables would be interesting to pursue but is beyond the scope of this paper.

REFERENCES


