

# Temperament and Brain Systems as Predictors of Assertive Communication Traits

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*Previous research has shown a relationship between measures of the big three (extroversion, neuroticism, and psychoticism) and similar validated measures (behavior activation scale, BAS and behavioral inhibition system, BIS) of activation and inhibition systems. The purpose of this study was to compare the extraversion (E) and neuroticism (N) measures with the BAS and BIS measures to determine how well they can predict an individual's assertive communication traits. Results of this investigation indicated that the E and N measures were substantially better overall predictors of assertive communication traits.*

## Introduction

The claim that communication traits are biologically based has recently become an influence in communication research (Beatty, McCroskey, & Valencic, 2001; Horvath, 1995; McCroskey, Heisel, & Richmond, 2001). The study of the connection between communication and biology is referred to as "communibiology." The extraversion, neuroticism, and psychoticism temperament scales (ENP; Eysenck & Eysenck, 1985) have been linked to genetics and used to support the advancement of the communibiology paradigm (Bates, 1989; Beatty & McCroskey, 1998) Beatty, McCroskey, & Heisel, 1998; Horvath, 1995; Valencic, Beatty, Rudd, Dobos, & Heisel, 1998; Zuckerman, 1994). Gray's (1991) behavioral activation system and behavioral inhibition system (BAS/BIS) have been studied for biological links to punishment and rewards; it has also been connected to ENP (Carver & White, 1994; Gray, 1991; Zuckerman, 1995).

While these approaches have been initiated by different researchers and both have been used in communication research, the measures developed in these research

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programs have not been statistically compared for their predictive power when linked to communication traits. Hence, researchers have no scientific evidence to support using one set of measures over the other, or concluding that they are interchangeable tools. The purpose of this study was to compare the extraversion and neuroticism scales with BAS and BIS scales, to determine whether one set of measures is an overall better predictor of assertive communication traits than the other, or if the measures are equally predictive.

### *Temperament*

Eysenck (1986) described temperament by focusing on the big three personality dimensions, extraversion (E), neuroticism (N), and psychoticism (P). Eysenck and Eysenck (1985) explain psychoticism as a lack of impulse control, consisting of hostility and aggression, whereas, extraversion consists of cooperativeness, sociability, and responsiveness in high stimulus situations. Extraverts have been found to be active, assertive, sensation seeking, carefree, dominant, or venturesome. Opposite from extraverts, introverts typically respond better in low stimulus situations and do not prefer social interactions. High neurotics are commonly described as non-stable, anxious, depressed, shy, and having fearful avoidance (Eysenck & Eysenck, 1985).

McCroskey et al. (2001) studied the big three personality dimensions with communication variables. Their findings showed extraversion to be positively correlated with assertiveness, responsiveness, argumentativeness, self-acceptance, affect orientation, self-perceived immediacy, self-perceived communication competence, compulsive communication, and tolerance for disagreement, while being negatively correlated with shyness, communication apprehension, and touch apprehension. Neuroticism was positively correlated with shyness, communication apprehension, and touch apprehension, while being negatively correlated with self-acceptance, assertiveness, self-perceived immediacy, and competence. Psychoticism positively correlated with argumentativeness, verbal aggression, and tolerance for disagreement while negatively correlating with responsiveness (McCroskey et al., 2001).

### *Behavioral Inhibition System (BIS)/Behavioral Activation System (BAS)*

Gray (1991) describes the BIS by its relationship to potential punishment or the removal of rewards and novelty. Therefore the activation of the BIS inhibits gaining of goals (Carver & White, 1994). Biologically the BIS involves neurobiological circuits connecting the hippocampus, the subiculum, and the septum with the limbic system.

Gray (1991) links the BAS to potential reward. Biologically the BAS includes the basal nuclei, the neocortical regions that connect to the basal nuclei, the dopaminergic fibers that originate in the midbrain, and the thalamic nuclei. Gray

(1991) concluded that the BIS and BAS were represented by Eysenck and Eysenck's (1985) ENP personality dimensions. This connection between the BIS/BAS and ENP is supported through the studies done on identical twins that ENP are among the more heritable traits (Eysenck, 1986; Eysenck & Eysenck, 1985; Eysenck 1991), and studies showing consistency between neurobiological functioning and neurobiological circuitry in individuals (Eysenck & Eysenck, 1985; Eysenck 1991; Gray, 1991; Zuckerman, 1995). Gray (1991) found that neurotics possess a low activation level for their BIS and that extraverts tend to have a low activation level for their BAS.

With the development of the BIS/BAS scale, Carver and White (1994) studied relationships between the BIS and anxiety producing situations. Findings concluded that the BIS does reflect anxiety producing situations as proposed and is not predicted by scores on the BAS scale. To validate the BAS scale, Carver and White studied the BAS and extraversion as predictors of happiness. These findings indicated that (1) both the BAS and extraversion equally predicted "happiness," and (2) the subcategories of "reward responsiveness" and "drive" correlated with the BAS.

Sutton and Davidson (1997) claim that the BIS/BAS exhibits a dual effect—one positive and the other negative. They also proposed that the BIS/BAS may predict two separate responses. They tested individuals on the BIS/BAS scale with a resting EEG. The BAS was found to correlate with activation in the left hemisphere while the BIS correlated with activation in the right hemisphere. Dillard and Peck (2001) considered individuals' responses to public service announcements (PSA). When the participant viewed the PSA negatively, the BIS was activated; conversely, the BAS was activated if the PSA response was positive.

### *Rationale*

Investigators have based communibiology research on studying the big three temperaments: extraversion, neuroticism, and psychoticism[1]. Numerous studies have demonstrated the genetic basis of the big three (Bates, 1989; Beatty et al., 1998; Horvath, 1995; Zuckerman, 1994) and have defined the traits as heritable (Eysenck, 1986; Eysenck & Eysenck, 1985; Eysenck 1991). Carver and White (1994) were able to conceptualize a scale to measure the BIS and the BAS. The BAS/BIS scales correlate with extraversion for the BAS and with neuroticism for the BIS (Carver & White, 1994; Gray, 1991; Zuckerman, 1995). Carver and White (1994), in validating the BAS scale, compared the BAS to the extraversion scale (Eysenck & Eysenck, 1985) to see which was a better predictor of the activation system. Employing questionnaires in an experiment observing rewards for successful completion of the experiment, Carver and White compared the participants' level of happiness throughout the interaction. Findings showed drive and reward responsiveness had the highest correlations with reward and positive affect later in the interaction. During initial stages of the experiment, BAS had no correlation. The BIS scale has not been compared to the neuroticism scale to see which one is a better predictor of anxiety. Although claiming the two scales are not completely identical, Valencic et al. (1998) found strong

correlations between the ENP and BIS/BAS. These results suggest that the measures may be equally useful for predicting aggressive communication traits. These results, however, do not preclude the possibility that either set of measures may be more useful than the other.

Using the trait verbal aggressiveness scale (Infante & Wigley, 1986), the assertiveness-responsiveness measure (Richmond & McCroskey, 1990), and the argumentativeness scale (Infante & Rancer, 1982), this study was designed to determine which (if either) set of measures is a better predictor of aggressive communication traits. In order to determine whether either set of measures is a better predictor than the alternative set, the following questions were asked:

*RQ1: How do measures of E/N and BAS/BIS compare as predictors of aggressive communication traits?*

## Method

### *Participants*

Participants for the study were 126 adults (ages 26–61) enrolled in extended learning classes who were engaged in full-time employment in a wide variety of occupations in Mid-Atlantic states. Fifty-two per cent (65) of the sample were males and 48% (59) were females. The participants voluntarily completed a survey packet, which included the extroversion, neuroticism (Eysenck & Eysenck, 1985), as general measures of temperament, the behavioral inhibition system and behavioral inhibition system (BIS/BAS) measures (Carver & White, 1994), the verbal aggressiveness scale (Infante & Wigley, 1986), the assertiveness-responsiveness measure (Richmond & McCroskey, 1990), and the argumentativeness scale (Infante & Rancer, 1982).

### *Instruments*

#### *Extraversion*

Eysenck and Eysenck (1985) developed the extraversion scale. The *E* scale consists of ten questions on a three-point Likert scale (1 = strongly disagree, 2 = neutral/undecided, 3 = strongly agree). Cronbach's alphas have been found ranging from 0.78 to 0.82 for extraversion (Valencic, 2001). This study found extraversion to have an alpha coefficient of 0.75.

#### *Neuroticism*

Eysenck and Eysenck (1985) developed the neuroticism scale. The *N* scale consists of ten questions on a three-point Likert scale (1 = strongly disagree, 2 = neutral/undecided, 3 = strongly agree). Cronbach's alphas have been found ranging from 0.80 to 0.86 for neuroticism (Valencic, 2001). This study found neuroticism to have an alpha coefficient of 0.85.

*Behavioral activation scale/behavioral inhibition scales*

Carver and White (1994) developed the BIS/BAS scales to measure one's behavioral activation system and behavioral inhibition system. The BIS/BAS instrument consists of 20 questions on a four-point Likert scale (1 = strong agreement, 2 = agreement, 3 = disagreement, 4 = strong disagreement). Cronbach's alphas for the BIS and BAS scales were previously observed to be 0.82 and 0.83, respectively (Dillard & Peck, 2001). Alpha coefficients for this study were 0.72 for the BIS scale and 0.83 for the BAS scale.

*Assertiveness-responsiveness measure*

In 1990, Richmond and McCroskey reported the assertiveness-responsiveness scale. The assertiveness-responsiveness scale consists of 20 items (10 for assertiveness and 10 for responsiveness) on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree). This study eliminated the responsiveness scale since it was not related to the research questions. Richmond and McCroskey found an alpha coefficient for assertiveness to be 0.88. This study found an alpha coefficient of 0.89 for assertiveness.

*Verbal aggressiveness scale*

Infante and Wigley (1986) developed the verbal aggressiveness scale measuring a communication trait which "predisposes persons to attack the self-concepts of other people instead of, or in addition to, their positions on topics of communication" (p. 61). The verbal aggressiveness scale consists of 20 questions on a five-point Likert scale (1 = almost never true, 2 = rarely true, 3 = occasionally true, 4 = often true, 5 = almost always true). A previous alpha coefficient for verbal aggressiveness was 0.81 (Infante & Wigley, 1986). For this study, the alpha coefficient for verbal aggressiveness was 0.88.

*Argumentativeness*

Infante and Rancer (1982) developed the argumentativeness scale to measure one's ability to support and contest relevant issues. The argumentativeness scale consists of 20 questions on a five point Likert scale (1 = almost never true, 2 = rarely true, 3 = occasionally true, 4 = often true, 5 = almost always true). The scale is broken into 10 questions focusing on argument avoidance and 10 questions focusing on argument approach. The total argumentativeness score is calculated by subtracting avoidance from approach. Alpha coefficients for the argumentativeness scale were found to be 0.91 for argument approach and 0.86 for argument avoidance (Infante & Rancer, 1986). This study found alpha coefficients for argument approach to be 0.92, for avoidance 0.87, and 0.93 for total argumentativeness.

*Data analysis*

The research questions posed in for this study inquired as to whether the temperament measures or the system measures would be more predictive of the



measures of traits related to assertive communication. Possible outcomes included temperament being better than system, system better than temperament, both being non-predictive, or both being equally predictive. While simple correlations between the measures could have been used to answer our research questions, we were most interested in how well *E/N* would compare with *BAS/BIS* in terms of predicting the assertiveness traits. Hatcher (2001) indicates that when dealing with multiple interval level measures predicting multiple interval level criterion measures, as was the case in this study, the most appropriate statistical analysis is canonical correlation. Hence, the data were submitted to canonical correlation analysis. The four temperament and system scores were entered as the predictor variables with the three scores on the assertive communication traits entered as the criterion variables.

### Results

The canonical correlations analysis yielded one significant root (adjusted  $Cr = 0.45$ ,  $F = 3.29$ ,  $p < 0.001$ ). The loadings for the predictor variables on their first root and the loadings for the criterion variables on their first root are reported in Table 1. Extraversion was the dominant predictor. Its relationship with the canonical variable was 0.93. Neuroticism had the second highest relationship ( $-0.50$ ). Assertiveness was the dominant criterion variable with a relationship of 0.78. Argumentativeness (0.44) and verbal aggressiveness ( $-0.52$ ) had somewhat lower relationships. More extroversion and less neuroticism were associated with high assertiveness, high argumentativeness, and low verbal aggressiveness. Both *BIS* and *BAS* made small contributions to predicting assertive communication traits (see Table 1).

### Discussion

The purpose of this study was to determine whether extraversion/ neuroticism or the *BIS/BAS* is a better predictor of one's assertive communication traits. In order to determine this, the study considered the relationships between the two sets of scales with measures of argumentativeness, assertiveness, and verbal aggressiveness.

The research question asked how the *E/N* and *BAS/BIS* measures compare as predictors of assertive communication traits. The results showed the strong

**Table 1** Correlations Between Predictor and Criterion Measures and Their Variates

Predictors		Criteria	
0.93	Extraversion	0.78	Assertiveness
-0.50	Neuroticism	-0.52	Verbal aggressiveness
0.38	<i>BIS</i>	0.44	Argumentativeness
-0.26	<i>BAS</i>		

superiority of extroversion and neuroticism in predicting all three assertive traits measured.

These results (in conjunction with the previously cited research employing neuroticism) point to the measures of the extraversion and neuroticism variables are far better predictors of assertive communicative traits than the BAS/BIS measures. Previous research (McCroskey et al., 2001) has demonstrated that the third construct of the big three, psychoticism is also highly associated with argumentativeness and verbal aggressiveness. This suggests that the power of the big three to predict variance in assertive communication traits almost certainly is much higher than that of the BIS/BAS systems.

As for the relationship between the ENP and the BIS/BAS, researchers need to provide supplementary support as to the relationship between the two constructs. This study operated on the previously held belief that the two constructs scales measured the same systems. However, even though they are similar in nature, researchers need to be aware of how they are different. A determination needs to be drawn as to whether one scale is a better predictor in all situations or if there are situation constraints that should determine which scale should be used.

#### Note

- [1] Since the BAS/BIS measure does not have a component comparable to the psychoticism dimension of the big three, psychoticism was not measured in this study.

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