



TEMPERAMENT AS A MEASURE OF BEHAVIORAL MOTIVATION PREDICTS LANGUAGE GAINS IN TODDLERS WITH AUTISM SPECTRUM DISORDER



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Introduction

Children with autism spectrum disorders (ASD) display variability in social, cognitive and language abilities. Some of this variability may be explained by individual differences in non-syndrome specific **Modifier Processes** such as motivation.

Two core motivation systems are:

Behavioral Activation System (BAS) - Characterized by initiation of goal-directed activities and the expression of affective states when exposed to the presence or removal of rewards.

Behavioral Inhibition System (BIS) - Characterized by an inhibition of movement towards goals, diminished responsiveness towards rewards, withdrawal from social interactions and fear in response to novel and ambiguous cues.

Relative to BIS, BAS orientation has been associated with lower ratings of social symptom impairment and better social cognitive skills in children and adolescents.

As children higher in BAS may be easier to read and more responsive to goal directed and reward based intervention such as ABA, which of the majority of children in our sample receive we hypothesized that children higher in BAS would show greater gains in language.

Research Questions

1. Do the assessed temperamental dimensions correspond to the conceptualization of the Behavioral Activation System (BAS) and Behavioral Inhibition System (BIS) in young children with ASD?

2. If so, do the motivational systems BAS and BIS as measured using the dimensions of temperament predict change in language over time in young children with ASD?

Methods

Participants		Year 1 N = 157 (78% boys)		Year 2 N = 76	
	VARIABLE	Mean (SD)	Range	Mean (SD)	Range
	Child Age (mos.)	28 (4)	18-33	40 (4)	31-50
ADI	Social Raw Score	17.46 (4.11)	5-25	15.62 (5.74)	2-26
	Communication-Verbal	15.56 (3.25)	8-20	13.68 (4.21)	4-20
	Communication-Nonverbal	11.34 (2.26)	5-14	11.33 (2.35)	7-14
	Stereotyped	4.79 (2.15)	0-9	5.82 (2.38)	1-12
ADOS	Communication	4.57 (1.61)	1-8	4.83 (1.90)	0-10
	Social	10.11 (2.83)	4-14	9.00 (2.86)	3-14
	Stereotyped	3.71 (1.59)	0-6	3.45 (1.71)	0-6
Mullen	Verbal IQ	57.48 (25.02)	14-120	68.10 (27.52)	10-117
	Nonverbal IQ	77.17 (17.64)	23-126	74.04 (21.12)	27-117

Measures

Toddler Behavior Assessment Questionnaire (TBAQ) (Goldsmith, 1996) - A 110 item, eleven-dimension parent report instrument designed to examine temperament-related behavior in 16–36 month old children.

Mullen Scales of Early Learning (Mullen, 1995) - A developmental assessment of language, motor, and perceptual abilities.

Autism Diagnostic Observation Schedule - Generic (ADOS-G; Lord et al., 2000) - A semi-structured assessment of communication, social interaction and play for individuals suspected of having autism.

Analyses

To evaluate the relation of the TBAQ to the two core motivational systems of BAS and BIS, a principle components factor analysis with Varimax rotation was completed with 10 of the 11 TBAQ dimensions (sadness was excluded because the items reflect both BAS and BIS).

Regression analyses were performed to examine whether dimensions of temperament in the BIS and BAS systems accounted for variance in 1-year gains in expressive and receptive language, after controlling for social and communication symptoms.

Results

Research Question 1: Factor Analysis

Results of the factor analysis yielded a 3-factor solution with eigenvalues > 1.0 (Table 1). Two factors correspond to the BIS/BAS conceptualization. TBAQ scales loading onto factor 1 reflect the construct of Attentional/Emotional Control, factor 2 reflects BIS and factor 3 reflects BAS.

Research Question 2: Regression Analyses

BAS: After controlling for year 1 language levels and autism symptoms, the year 1 TBAQ scales associated with BAS accounted for significant changes in expressive language but not receptive language at year 2 (Table 2).

BIS: After controlling for year 1 language levels and autism symptoms, the year 1 TBAQ scales associated with BIS did not account for changes in expressive language; there was a trend level relationship between BIS and receptive language at year 2 (Table 3).

Attention/Emotional Control: After accounting for year 1 language levels and autism symptoms, Attention/Emotional Control did not account for changes in expressive or receptive language at year 2.

Table 1. Factor Loading of TBAQ Dimensions

TBAQ Dimensions	Varimax Rotated Factor Loading		
	Factor 1: AT/EC	Factor 2: BIS	Factor 3: BAS
Attention	.77	-.09	-.09
Inhibitory Control	.74	.13	-.21
Interest	.86	.09	.07
Soothability	.45	-.34	-.09
Pleasure	.60	-.03	.50
Object Fear	.08	.81	.30
Sensory Defen.	-.20	.77	.14
Social Fear	.11	.74	.07
Activity Level	-.26	.22	.77
Anger	.02	.25	.80
Eigenvalue	2.6	2.0	1.7
Percent of Variance	26%	20%	17%

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Table 2. BAS Predicting to Expressive Language Gains

Model	Partial r	β	R ² /R ² Δ	F/F Δ
Step 1:			.55	44.45**
Exp Language Y1	.52	.52**		
ADOS Score Y1	-.35	-.31*		
Step 2:			.06	3.47*
Activity Level	.26	.23*		
Anger	-.30	-.24*		
Pleasure	.21	.14 ^a		

^ap < .10, *p < .05, **p < .01

Table 3. BIS Predicting to Receptive Language Gains

Model	Partial r	β	R ² /R ² Δ	F/F Δ
Step 1:			.58	49.84**
Rec Language Y1	.51	.44**		
ADOS Score Y1	-.50	-.44**		
Step 2:			.04	2.71 ^a
Object Fear	.30	.27**		
Sensory Defen.	-.23	-.18 ^a		
Social Fear	-.21	-.15 ^a		

^ap < .10, *p < .05, **p < .01

Summary & Conclusions

Consistent with our hypothesis, BAS orientation, including high activity level and pleasure were important to gains in expressive language. In contrast to the BAS hypothesis, high frustration tolerance, or low anger expression was also associated with gains in expressive language.

Children who are BAS oriented, showing more activity and positive affective states may find greater reward through interactions with people and objects in their environment and due to clearer signaling may receive more contingent responses. Greater susceptibility to reward and the experience of more contingent reinforcement may optimize expressive language learning.

An unexpected trend level association was observed between high object fear, decreased social fear and decreased sensory defensiveness and gains in receptive language. Being easier to read with respect to emotions (Object Fear) and evidencing lower withdrawal from people and objects appears to be associated with increased opportunities for learning and skill acquisition.

The results support the use of the TBAQ dimensions as BAS/BIS modifier processes of motivation, and that BAS/BIS may be important modifiers of language acquisition in young children with ASD.

Further assessment of these motivational systems may aid in developing interventions for children with ASD. Interventions that use a reward and goal-directed approach, such as ABA, may be more effective for BAS oriented children than BIS oriented children.

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