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Personality and Individual Differences 42 (2007) 987–998

PERSONALITY AND  
INDIVIDUAL DIFFERENCES

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## Psychometric properties of the French versions of the BIS/BAS scales and the SPSRQ

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Received 25 January 2006; received in revised form 21 July 2006; accepted 1 September 2006

Available online 24 October 2006

### Abstract

One of the most recurrent criticisms formulated against Gray's Reinforcement Sensitivity Theory is the lack of a sound structural model of the postulated dimensions, i.e. 'Anxiety' and 'Impulsivity' reflecting the behavioural inhibition and approach systems, respectively. Although valuable efforts have been made and several instruments been published in the past fifteen years, most of the publications conclude that refinements are needed. This is the first paper that presents the psychometric properties of the French version of Carver and White's BIS/BAS scales and Torrubia et al.'s SPSRQ in a sample of students. The reliabilities and the pattern of scores intercorrelations are in line with the literature. For both instruments, exploratory factor analyses reveal a two-order structure with higher-order factors representing BIS-SP and BAS-SR. The structure of the primary factors is discussed with regards to studies in non-French speaking samples. These findings add to the cross-cultural data for the BIS/BAS scales and the SPSRQ, which is an underestimated aspect of scales' development.

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**Keywords:** Reward sensitivity theory; BIS; BAS; Sensitivity to punishment; Sensitivity to reward; Psychometric properties; Factor analysis; Cross-cultural

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## 1. Introduction

For the past forty years, Jeffrey Gray and colleagues developed the most influential motivation-based theory of personality traits: the Reinforcement Sensitivity Theory (RST) (Gray & McNaughton, 2003). It postulates the existence of two major and orthogonal dimensions of personality, namely Anxiety and Impulsivity, regulated by the Behavioural Inhibition System (BIS) and the Behavioural Approach System (BAS), respectively. In the latest version of the RST, BAS is responsive to all positively valenced stimuli (presentation of reward or termination/omission of punishment) and BIS is responsive to conflicting goals (e.g. approaching an appetitive stimulus in the presence of a punishment cue). Recently, a Joint Subsystem Hypothesis has been proposed in which the BIS and BAS are no longer independent (Corr, 2001, 2002).

One of the main problems with Gray's theory is that sound psychometric measures have not yet been developed in spite of valuable efforts (Caseras, Avila, & Torrubia, 2003; Corr, 2001). Furthermore, cross-cultural properties have not been extensively studied (Leone, Perugini, Bagozzi, Pierro, & Mannetti, 2001; Müller & Wytykowska, 2005). Indeed, Gray's development is more comprehensive for BIS than for BAS. Since Gray's theory initially appeared as a modification of Eysenck's, some authors have been inclined to use Extraversion and Neuroticism measures as proxy for Impulsivity and Anxiety, respectively (Caseras et al., 2003). Others have created instruments among which Carver and White's BIS/BAS scales are the most widely used (Carver & White, 1994), but interest is deserved as well for the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ) (Torrubia, Avila, Molto, & Caseras, 2001), the Appetitive Motivation Scale (Jackson & Smillie, 2004), the General Reward And Punishment Expectancies (GRAPES) (Ball & Zuckerman, 1990), and the Gray-Wilson Personality Questionnaire (GWPQ) (Wilson, Gray, & Barrett, 1990). Most if not all available instruments were developed before 2000, that is on the basis of an earlier version of the RST. This point is more relevant for studies aimed at testing the validity of the theory, than for those regarding the psychometric properties of a given instrument. Only the GWPQ takes into consideration the third system postulated in the latest revision of the model: the Fight-Flight System (FFS). Each brain/behavioural system is divided in two subfactors, Activation is measured by Approach and Active Avoidance, Inhibition by Passive Avoidance and Extinction, and Fight/Flight by Defensive Aggression and Flight. Factor analysis provided only limited support to this two-order structure.

### 1.1. BIS/BAS scales

Many authors consider that Carver and White published one of the best attempts to measure Gray's dimensions. Regardless of language and scale's length, the reliabilities range between 0.58 for RR (Müller & Wytykowska, 2005) and 0.83 for DRIVE (Heubeck, Wilkinson, & Cologon, 1998). Regardless of language and sample sizes, the mean scale intercorrelations are about +0.35 except for insignificant values between BIS and DRIVE, and BIS and FUN. With regard to the Kaiser criterion, Carver and White (1994) extracted four factors though a 5-factor structure might have been viable (Heubeck et al., 1998; Müller & Wytykowska, 2005). Unfortunately the test authors did not report all the values of the rotated pattern matrix, preventing any comparison with other published material. They found that all BAS-related scale scores define a second-order factor. The correlation between BIS and RR unweighted scores has been consistently replicated

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