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A French adaptation of a short version of the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ)

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ABSTRACT

According to Gray's Reinforcement Sensitivity Theory (RST; Gray, 1982), personality results from the interaction of three major systems: a Behavioural Activation System (BAS), a Behavioural Inhibition System (BIS) and a Fight/Flight System (FFS). Based on this model, Torrubia, Avila, Molto, and Caseras (2001) developed an instrument, the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ), which assesses the two major systems that explain individual differences in sensitivity and reactions to punishing and rewarding stimuli. In the present study, we have proposed a short version of the SPSRQ, based on O'Connor, Colder, and Hawk's (2004) findings. To this end, 360 participants were screened using the French translation of a short version of the SPSRQ. Confirmatory factor analysis showed that a two-factor model has acceptable fit. Moreover, the results indicated that there was very good internal reliability for both the sensitivity to reward and sensitivity to punishment scales.

1. Introduction

According to Gray's Reinforcement Sensitivity Theory (RST; Gray, 1982), personality results from the interaction of three systems, each associated with an independent neurobiological system. These three motivational systems guide behaviours, thereby explaining individual differences in sensitivity and reactions to punishing and rewarding stimuli. The first of these systems is the Behavioural Inhibition System (BIS), which operates as a comparator that is sensitive to conditioned stimuli for punishment, novel stimuli, signals of frustrative non-reward and innate fear stimuli. Once activated, the BIS promotes the inhibition of behaviours and increases attention and arousal. According to Gray, individual differences in BIS activity are related to individual differences in anxiety traits. The second system described by Gray is the Behavioural Activation System (BAS). This system is sensitive to conditioned stimuli for reward or non-punishment, enhances cortical arousal and promotes approach and active avoidance behaviours. Moreover, Gray proposes that individual differences in BAS activity are related to individual differences in impulsivity. The third system described by Gray, the Fight/Flight System (FFS), mediates behavioural responses, notably escape and defensive aggression, to conditioned and unconditioned aversive stimuli, such as punishment and non-reward stimuli (see also Gray & McNaughton, 2000). This last system has been less explored than the others and remains poorly defined.

There have been several attempts to develop self-report questionnaires that would assess Gray's BIS and BAS. The most widely used of these instruments are the BIS/BAS scales (Carver & White, 1994), the Gray–Wilson Personality Questionnaire (GWPQ; Wilson, Barrett, & Gray, 1989) and the Generalized Reward and Punishment Expectancy Scales (GRAPES; Ball & Zuckerman, 1990). Nevertheless, to the best of our knowledge, no Confirmatory Factor Analysis (CFA) supports the factor structure of any of these three instruments (for the BIS/BAS scales, see Cogswell, Alloy, van Dulmen, & Fresco, 2006; for the GRAPES, see Gomez & Gomez, 2005; for the GWPQ, see Wilson, Gray, & Barrett, 1990). In view of the lack of a satisfactory instrument to measure Gray's two major systems, Torrubia, Avila, Molto, and Grande (1995) created a new scale, the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ). This scale describes many situations in which there is a given probability of activating the BIS or the BAS (but never both). The final Spanish version of the SPSRQ (Torrubia, Avila, Molto, & Caseras, 2001; Torrubia et al., 1995) contains 48 yes/no response items, subdivided into two independent measures of 24 items each: a Sensitivity to Punishment (SP) scale and a Sensitivity to Reward (SR) scale. Items on the SP scale were designed to measure individual differences in the functioning of the BIS, whereas items on the SR scale are postulated to measure the functioning of the BAS. Principal component analyses showed an

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acceptable fit for a two-factor solution and the independence of the two scales has been demonstrated (highest correlation of 0.08; Torrubia et al., 2001). Reliability explorations showed good results, with Cronbach's α ranging from 0.75 to 0.84 and strong test-retest correlations (0.89 for the SP scale and 0.87 for the SR scale after 3 months, 0.74 for the SP scale and 0.69 for the SR scale after 1 year). In addition, several experiments have provided data on the validity of this questionnaire (for more details, see Caseras, Avila, & Torrubia, 2003; Smillie & Jackson, 2005; Torrubia et al., 2001).

Although this questionnaire has been translated into several languages, no study has yet confirmed the two-factor structure proposed by Torrubia et al. (2001). For example, O'Connor, Colder, and Hawk (2004) computed a CFA on 603 students' data with the English version of the SPSRQ and showed that the two-factor model did not fit the data very well. The authors of the study then removed some problematic items with weak factor loadings, creating a short questionnaire containing 35 of the original 48-items. New CFA were applied to the data for this initial sample and for two independent samples. This shorter instrument fit the data better and allowed a perceptible improvement in the factor structure. Similar findings were obtained by Cogswell et al. (2006) in a more recent study undertaken with the English version of the original long questionnaire and with a new short version (without nine items the authors considered to be problematic). The SPSRQ was also translated into Romanian by Sava and Sperneac (2006), who proposed another modified version, excluding eight items with poor factor loading or with gender differences in factor loading, according to the data of Torrubia et al. (2001). Data collected from 345 Romanian undergraduate students did not support the two-factor model; in fact, a three-factor model fit the data better. The proposed model includes an SP scale, an SR scale and a sensitivity to financial reward scale.

Finally, the psychometric properties of a French version of the SPSRQ were investigated in a recent study by Caci, Deschaux, and Bayle (2007). CFA were conducted on data collected from 136 undergraduate students. Once again, the two-factor model did not fit the data for the original 48-item version or for the short version proposed by O'Connor et al. (2004). Moreover, a significant correlation between the two scales was found. After conducting some exploratory analyses, the authors proposed a four-factor model with factors named fear of being rejected, fear of the unknown, competition and arousal. The results of this study suggest that there is a problem with the internal validity of the questionnaire. However, these puzzling results might tentatively be attributed to the translation of the scale. Indeed, in Caci et al.'s (2007) French version, the items were reworded to allow answers on a different sort of scale. Thus, participants read statements worded in the first person singular (e.g., item 17: 'I am shy') and have to evaluate whether these items fit their personality on a 4-point Likert scale, with 1 = *totally true* and 4 = *totally wrong*. However, in the original version, the items are worded as questions (e.g., item 17: 'Are you a shy person?'), and participants have to evaluate their agreement with the items on a *yes/no* answer format scale. This adaptation may well have modified the meaning and interpretation of some sentences. In addition, several of the French translations are not perfectly accurate compared to the English versions. These differences consist of omissions of part of a sentence (e.g., item 2: 'Does the good prospect of obtaining money motivate you strongly *to do some things*?' is translated as 'I am strongly motivated by the good prospect of obtaining money.') or the use of an inappropriate translated word (e.g., item 22: 'As a child, did you do a lot of things to get *people's* approval?' is translated as 'As a child, I did a lot of things to get *adults'* approval.').

Consequently, the aim of the present study was to develop and validate a new French version of the SPSRQ. Considering the findings of previous studies demonstrating inadequate psychometric properties for the 48-item version, a short version based on O'Connor et al.'s (2004) results is proposed.

2. Method

2.1. Participants

The sample was composed of 360 volunteer participants from the community (217 women, 132 men and 11 participants who did not specify their gender) aged from 17 to 30 years old ($M = 22.13$; $SD = 3.19$). In light of the nature of this study, only native French speakers were selected. The anonymity of the participants was guaranteed.

2.2. Instrument

The items of the SPSRQ were translated into French from the English translation of the SPSRQ provided by Torrubia et al. (1995). The French items were then translated back into English by a French–English translator. Problematic translations were discussed and agreement was reached. Prior to the present study, we collected data on the 48 original items of the SPSRQ from 113 undergraduates. However, CFA carried out on this sample showed that a two-factor model based on the original French 48-item SPSRQ did not fit the data, χ^2 (1079) = 1947.539, $p < .001$, RMSEA = 0.084, SRMR = 0.106, CFI = 0.466. Consequently, we decided to create a short version of the questionnaire, similar to that developed by O'Connor et al. (2004), by removing 13 items from the original version. The ratings in this new short version are done on a 4-point Likert scale, ranging from 1 (*totally no*) to 4 (*totally yes*). This answer format is consistent with the Caci et al. (2007) version and is used in order to reduce the bias of Pearson correlation coefficients (Bollen & Barb, 1981; Martin, 1978).

2.3. Statistical analysis

Confirmatory factor analyses were computed with Mplus (Muthén & Muthén, 2006). For these analyses, the Full-Information Maximum Likelihood (FIML) estimator was used for missing data. Goodness of fit was tested with the χ^2 (a non-significant value corresponds to an acceptable fit). However, the power of the χ^2 is known to increase with sample size, and it has been emphasized (Byrne, 1994) that it is unusual to obtain a non-significant χ^2 when performing CFA on self-report questionnaires. Therefore, two other indices that depend on conventional cut-offs (Hu & Bentler, 1999) were also computed: the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR). An RMSEA of between 0 and 0.05 indicates a good fit and between 0.05 and 0.08 an acceptable fit. An SRMR of between 0 and 0.05 indicates a good fit and between 0.05 and 0.10 an acceptable fit (Schermelleh-Engel & Moosbrugger, 2003). Many authors have used the Comparative Fit Index (CFI) in CFA and we also report this index. A CFI >.90 is generally interpreted as an acceptable fit. It should be noted that fit indices are only one of several sources of information to evaluate the quality of a model. In addition, there is no universal and definitive cut-off (e.g., Chen, Curran, Bollen, Kirby, & Paxton, 2008), so we used fit indices as useful indicators, but not for rejecting or accepting a model.

In addition to these overall fit indices, comparative fit indices were also used to compare nested models. To this end, a software application (FITMOD) that provides point interval estimates for RMSEA differences (Browne, 1992) was used. Finally, Pearson's point-biserial correlation (r_{pb}) was used to evaluate the effect of gender on sensitivity to reward and punishment. Women were set at −1 and men at 1. Thus, a positive correlation corresponds