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The Strelau Temperament Inventory—Revised (STI-R): Validity studies

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Abstract
This study examines the construct validity of the revised version of the Strelau Temperament Inventory (STI-R) and the short scale (STI-RS), which were introduced by Strelau, Angleitner, Bantelmann and Ruch (1990). Hypotheses about the relationship between the content scales of the STI-R, viz. Strength of Excitation (SE), Strength of Inhibition (SI), and Mobility (MO) of CNS properties, and (a) other personality/temperament dimensions referring to the level of arousal, (b) selected temperament inventories, and (c) selected personality scales are derived and tested in a total of four samples with altogether 420 Ss. The inventories investigated include, among others, the Eysenck Personality Questionnaire—Revised (EPQ-R), Zuckerman's Sensation Seeking Scale (SSS), the I.7 Impulsiveness Questionnaire (I.7), the Affect–Intensity–Measure (AIM), the EASI, the Structure of Temperament Questionnaire (STQ), and the Revised Dimensions of Temperament Survey (DOTS-R). In general, the hypotheses regarding the place of the STI-R in the temperament and personality domain were confirmed. A factor analysis of the STI-R, EASI, and DOTS-R yielded five factors: Emotional Stability, Rhythmicity, Activity/Tempo, Sociability, and Impulsivity versus Impulse Control.

INTRODUCTION

Since the first half of the 1980s, when Strelau (1983) published in English the Strelau Temperament Inventory (STI) based on Pavlov's conceptualization regarding the central nervous system (CNS) properties, this questionnaire has gained increasing popularity. This may be explained by at least the following three circumstances:

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(a) the Pavlovian concepts of CNS properties were very influential with respect to the construction of temperament theories; (b) the STI was the only questionnaire aimed at measuring the Pavlovian CNS properties; and (c) the application of the STI as a diagnostic tool allowed the Pavlovian temperament features to be related to other temperament or personality traits by measuring them at the same level, i.e. by means of self-reports.

Several authors who have used the STI for the assessment of *strength of excitation*, *strength of inhibition*, *mobility*, and *balance* of nervous processes (cf. Pavlov, 1951–1952) have pointed out some shortcomings of the STI, like the unsatisfactory endorsement rates, the rather low item–scale correlations, and the lack of orthogonality between the scales (see Carlier, 1985; Daum and Schugens, 1986; Stelmack, Kruidenier and Anthony, 1985). A thorough study conducted by Strelau, Angleitner and Ruch (1989) on several samples, including altogether more than 800 subjects, allowed all the disadvantages of the STI to be revealed in detail, especially as regards the item and item–scale characteristics. At the same time, however, the Strelau *et al.* (1989) study has demonstrated that, in spite of the many shortcomings, the STI shows satisfactory external validity in analyses with several temperament and personality inventories that are theoretically related to the STI scales (see also Strelau, 1983).

The promising construct validity of the STI as well as the popularity of the Pavlovian conceptualization of CNS properties stimulated us to develop a new, revised version of the Strelau Temperament Inventory (STI-R). The theoretical background of the STI-R and the scale development of this inventory are presented in detail elsewhere (Strelau, Angleitner, Bantelmann and Ruch, 1990). Taking as the point of departure a 252-item pool, two German versions of the STI-R have been developed—a long (component) form (STI-R; 166 items) and a short form (STI-RS; 84 items).[1] The STI-R is composed on three content scales—*Strength of Excitation* (STI-R-SE), *Strength of Inhibition* (STI-R-SI), and *Mobility* (STI-R-MO) of the CNS. In addition, a Social Desirability control scale is included. The construction of the content scales is based on definitional components assumed to comprise the essence of the following Pavlovian CNS properties.

1. *Strength of Excitation (SE).* According to Pavlov (1951–1952), SE refers to the functional capacity of the CNS. It reflects the ability to endure intense or long-lasting stimulation without passing into transmarginal inhibition. The definitional components of the STI-R-SE scale as well as those of the SI and MO scales are described elsewhere (Strelau *et al.*, 1990).
2. *Strength of Inhibition (SI).* Strength of inhibition reveals itself in the ability to sustain a state of conditioned inhibition such as extinction, differentiation, or delay (Pavlov, 1951–1952). In constructing the SI scale, we referred to behaviours and reactions in which all types of conditioned inhibition are assumed to be manifested.
3. *Mobility of Nervous Processes (MO).* According to Pavlov (1951–1952), the essence of mobility of nervous processes consists in the ability of the CNS to respond adequately to continuous changes in the surroundings.

[1] Both versions exist in a yes/no and a 4-point scale answering format, the latter being especially recommended (Strelau *et al.*, 1990).

The long form of the inventory under discussion (STI-R, 166 items) allows us to measure not only the three CNS properties, but also the separate definitional components. This feature of the long form of the STI-R may be useful when studying in detail the nature of the Pavlovian CNS properties. For practical purposes the short form (STI-RS), limited to the three scales SE, SI, and MO, seems to be especially useful. However, it should be mentioned that the scales are composed in such a way as to ensure that each scale comprises the best items of all definitional components of the given scale (Strelau *et al.*, 1990).

THE RATIONALE FOR STUDYING THE CONSTRUCT VALIDITY OF THE STI-R

The STI-R and personality/temperament dimensions referring to the level of arousal

Pavlov's (1951–1952) idea of explaining individual differences in the efficiency of conditioning by means of particular features of CNS processes—excitation and inhibition—was for Eysenck (1970) one of the starting points in the development of his view on the physiological bases of extraversion–introversion. Thus, it is not an accident that Eysenck (1966) was the first to try to show the links between the Pavlovian types of CNS, with special attention to strength of excitation, and his most popular personality (temperament) dimension—extraversion–introversion. An essential contribution in searching for links between the Pavlovian typology of CNS properties and biologically based personality/temperament concepts as developed in the West should be ascribed to Gray (1964). Analysing in detail the concepts of arousal and strength of excitation, he came to the conclusion that arousal as a state may be compared with the intensity (strength) of excitation understood as a process. Strength of excitation treated as a trait, i.e. as a temperament characteristic, has much in common with the concept of arousability, the latter referring to more or less stable individual differences in the level of arousal (Gray, 1964; see also Strelau, 1987a).

By showing the similarities between arousability and strength of excitation, Gray (1964) has given grounds to the search for links between (a) personality/temperament dimensions based in a given way on the concept of activation/arousal and (b) the Pavlovian properties of the CNS, especially strength of excitation. Several dimensions such as extraversion–introversion, neuroticism, psychoticism, sensation seeking, impulsivity, reactivity, and reducing–augmenting have been related to CNS properties (Barnes, 1976; Buchsbaum, 1976; Eysenck, 1972; Mangan, 1982; Rawlings, 1987; Strelau, 1969, 1987a; Zuckerman, 1979). In many studies these temperament (personality) dimensions were studied in relation to the CNS properties as measured by the STI [for a thorough review see Strelau (1983) and Strelau *et al.* (1989)].

Since the aim of the present paper is to demonstrate the validity of the STI-R, it seems reasonable to confront the STI-R data first of all with questionnaires aimed at the assessment of temperament dimensions referring to the concept of arousal. For this purpose, data will be presented in which the STI-R scores will be correlated with inventories measuring extraversion, neuroticism, psychoticism, sensation seeking, impulsivity, and affect intensity. Taking into account the theories underlying the above-mentioned dimensions as well as the data found in the literature (see, for example, Claridge, 1985; Eysenck, 1947, 1972; Goldman, Kohn and Hunt, 1983;

Larsen and Baggs, 1986; Larsen and Diener, 1987; Strelau, 1983, 1987a; Strelau *et al.*, 1989), we put forward several hypotheses regarding the relationship between the CNS properties as measured by the STI-R and the arousal-oriented temperament/personality dimensions: (1) SE correlates positively with extraversion, sensation seeking, and affect intensity, and negatively with neuroticism. (2) A low level of SI reveals itself in the inability or difficulty to stop given behaviour when needed or to change reactions when required. Thus, there are reasons for assuming that SI has much in common with control of behaviour. This reasoning allows us to hypothesize that SI correlates negatively with impulsivity, sensation seeking, neuroticism, and psychoticism. (3) In many experimental as well as psychometric studies, it has been stated that SE correlates positively and rather highly with MO (cf. Nebylitsyn, 1972; Strelau, 1983; Strelau *et al.*, 1989, 1990; Troshikhin, Moldavskaya and Kolchenko, 1978). This observation allows us to hypothesize that the relationships between MO and the arousal-oriented dimensions under discussion will be similar to those hypothesized for SE.

The STI-R and selected temperament inventories

When discussing the state of affairs in temperament research, Strelau (1991) has paid attention to the fact that one of the conditions for making progress in temperament research is to show how a given diagnostic tool, and the theory lying behind it, is related to other measures and theories of temperament. Bearing this postulate in mind, we compared the STI-R with three other temperament inventories based on three different theories—Buss and Plomin's (1984), Lerner's (Lerner and Lerner, 1983; Windle and Lerner, 1986), and Rusalov's (1989) conceptualizations.

The three inventories chosen have some specific features. All three refer to theories in which temperament is understood in a way that makes it possible to find some relationships with our definition of temperament (see Angleitner and Riemann, 1991; Strelau, 1983; 1987b). Thus, for example, Buss and Plomin (1984) as well as Rusalov (1989) refer to the fact that temperament has a strong biological, genetical component. Lerner (Lerner and Lerner, 1983) and Rusalov (1989) emphasize the formal, stylistic characteristics as being typical for temperament. All three theoretical models conceive of temperament as a phenomenon being present since early childhood.

Two of the temperament inventories that are used in our study—the EASI Temperament Survey (EASI; Buss and Plomin, 1975) and the Revised Dimensions of Temperament Survey (DOTS-R; Windle and Lerner, 1986)—gained popularity in the United States. They refer to well-known theories of temperament, and allow temperament to be diagnosed not only in children, but also in adults. The third temperament inventory is the Structure of Temperament Questionnaire (STQ), recently published by Rusalov (1989). In the area of temperament this is the first psychometric tool constructed by a Russian neo-Pavlovian psychologist.

It might be hypothesized that some of the dimensions composing the structure of temperament according to the theories mentioned above should be related to some extent to psychometrically measured CNS properties. For example, we expect that among the four temperament dimensions as measured by the EASI, activity and sociability will correlate positively, and emotionality negatively with SE and MO. For the reasons given above, impulsivity is expected to correlate negatively with SI.

The relationships between the dimensions composing the structure of temperament according to Lerner and his associates and the Pavlovian CNS properties seem to be more complex. One may assume, however, that such temperament dimensions as general activity level and approach–withdrawal correlate positively with SE (probably also with MO), whereas flexibility–rigidity has much in common with MO. In turn, it is difficult to predict how activity level—sleep, mood, rhythmicity (three different forms), distractability, and persistence are related to the Pavlovian properties of the CNS.

The theory of temperament currently published by Rusalov (1989) has, in spite of a terminology that is far removed from Pavlov's theory of CNS types, much in common with the concept of CNS properties. Taking as a point of departure a systems approach to the neurophysiological mechanisms underlying behaviour (cf. Anokhin, 1968), Rusalov has proposed a structure of temperament comprising four traits—each in two versions: object- and social-related. They are as follows: ergonicity, plasticity, speed or tempo, and emotionality. Ergonicity, which refers mainly to the energetic characteristics of behaviour, resembles the concept of strength of excitation. Therefore, we expected a positive correlation between Rusalov's ergonicity and the SE scale, and maybe also with MO. Plasticity, defined as the ability to switch from one activity to another (Rusalov, 1989), is in fact a substitute for Pavlovian mobility. Thus, we expected positive correlations between plasticity and the MO and SE scales. Since Rusalov's emotionality refers mainly to sensitivity to failures in work and communication, one may predict that this temperament trait will be negatively correlated with SE and MO. The relationship between the STQ-Speed/Tempo and the STI-R scales is difficult to anticipate. The concept of *tempo* (*speed*) as developed by Rusalov (1989) is related to the neo-Pavlovian concept of *lability*. It has been shown that this temporal characteristic does not correlate with mobility of the CNS (Nebylitsyn, 1972; Strelau, 1983).

The STI-R and selected personality scales

In order to estimate the external validity of the STI-R it seems reasonable to compare the STI-R scales with selected inventories aimed at measuring personality traits. It has been stressed by us (Angleitner and Riemann, 1991; Strelau, 1983, 1987b), as well as by others (see, for example, Adcock, 1957; Endler, 1989; Larsen and Diener, 1987; Rusalov, 1989), that temperament and personality should not be regarded as synonyms. Not going into the details and many subtleties regarding this distinction, we assume that temperament refers mainly to the *formal* characteristics of behaviour. Individual differences in this respect have a strong *biological* background. Personality, on the other hand, pertains mainly to the *content* of behaviour, and the social environment is especially important in determining the variance of personality traits. Biologically oriented researchers often do not differentiate between temperament and personality (e.g. Eysenck, 1991; Eysenck and Eysenck, 1985; Gray, 1973, 1991; Zuckerman, 1985). As a result, dimensions such as extraversion, neuroticism, psychoticism, anxiety, impulsivity, sociability, sensation seeking, etc. are labelled, depending on the context or the diagnostic tool aimed at measuring them, either as temperament or as personality traits.

The application of personality inventories allows us to study not only convergent, but also discriminant validity. One may expect that some personality scales, for

example measuring emotionality or endurance, should be supportive for the convergent validity of the STI-R scales. This reasoning is based on the empirically tested similarity between the above-mentioned concepts of personality and the Eysenckian personality/temperament dimensions (see, for example, Eysenck and Eysenck, 1985; McCrae and Costa, 1987) and/or from the content analysis (definitional components) of the personality scales aimed at measuring these traits. In turn, some other personality scales, measuring, for example, openness or understanding, are expected to serve as measures of the discriminant validity of the STI-R. A content analysis of these scales suggests that these concepts have nothing in common with the STI-R temperament traits.

This kind of rationalization motivated us to compare the STI-R with two personality scales—Jackson's (1967) Personality Research Form (PRF), and Costa and McCrae's (1985) NEO Personality Inventory (NEO-PI). The question arises as to why these particular inventories have been chosen among the many assessment instruments that are available. The following reasons may be mentioned: (a) In the last few years, Norman's (1963) five-factor model as measured, amongst others, by the NEO-PI has gained high popularity. These 'Big Five' are considered to be an adequate model for the structure of personality for which there exists large consensus and considerable cross-cultural validity (Angleitner and Ostendorf, 1989; Digman, 1990). (b) The PRF gained high popularity in the United States and is well adapted to the German population (Stumpf, Angleitner, Wieck, Jackson and Beloch-Till, 1985). (c) An informal analysis of the content of the NEO-PI and PRF scales suggests that some personality traits (e.g. NEO-Extraversion or PRF-Endurance) may be related to STI-R temperament characteristics. In contrast, other traits (e.g. NEO-Openness or PRF-Understanding) are assumed to have nothing in common with the STI-R scales. (d) The features of both personality inventories mentioned under (c) allow the convergent as well as the discriminant validity of the STI-R to be measured. (e) The Big Five factors were never compared with the Pavlovian temperament constructs as measured by the STI and the STI-R, whereas the PRF was used only once in a validity study of the old STI (Strelau *et al.*, 1989).

Three of the five NEO-PI scales may be compared with the three Eysenckian personality/temperament dimensions. This concerns the NEO-Neuroticism, NEO-Extraversion, and NEO-Agreeableness (the possible reverse of Eysenck's Psychoticism) scales. Therefore, the predicted relationships with the STI-R scales are similar to the corresponding links between the EPQ and the STI-R. Taking into account the components of Openness (fantasy, aesthetics, ideas, values, etc.), we assumed that this factor was not related to any of the STI-R scales. If NEO-Conscientiousness is treated as a measure of impulse control, as Amelang and Borkenau (1982) and Conley (1985) suggest, then we may expect that NEO-Conscientiousness correlates with the SI scale. However, if conscientiousness is understood as the will-to-achieve factor, expressed in adjectives that suggest a proactive attitude (hardworking, energetic), as proposed by Digman and Takemoto-Chock (1981), then NEO-Conscientiousness should correlate with SE and MO.

Taking into account our former results (Strelau *et al.*, 1989), and especially the content analysis of the PRF scales, we hypothesized that SE correlates positively with Achievement, Dominance, Endurance, and negatively with Harm-avoidance and Succourance. As regards SI, we expected negative correlations with Aggression and Impulsivity. The MO scale was expected to give a configuration of correlations

similar to the one predicted for the SE scale. The content analysis of such PRF traits as Affiliation, Nurturance, Play, Order, and Understanding suggested no relationship between these personality traits and the STI-R characteristics.

Factor analysis of the STI-R and other temperament scales

One more criterion used for assessing the STI-R's external validity was to factor-analyse the *sensu stricto* temperament scales (STI-R, EASI, DOTS-R, and STQ) in order to see whether the relationships found in correlational studies can be summarized to a given extent. Such a factor analysis allows us to scrutinize the relationships between the various temperament scales. This may be regarded as a step forward in the study of the interdependences of some of the most popular temperament inventories. Factor analysis of this particular set of temperament scales has not been conducted until now.

EMPIRICAL EVIDENCE FOR CONSTRUCT VALIDITY: THE STI-R/STI-RS SCALES AND AROUSAL-ORIENTED INVENTORIES

The search for relationships between the STI-R scales and Eysenck's dimensions of temperament/personality seems to be of special importance for assessing the construct validity of the STI-R. This is because the biological bases of extraversion are primarily considered by Eysenck (1966) as having their roots in Pavlov's (1951–1952) conceptualization regarding the functioning of CNS processes—*excitation* and *inhibition*. Therefore, the data comprising STI-R/STI-RS and EPQ-R correlations will be presented first of all.

STI-R/STI-RS and the EPQ-R

Subjects and methods

Three independent studies were conducted. In study 1, aimed at comparing the STI-R (4-point answer format) with the EPQ-R, 159 subjects (86 men and 73 women) aged from 18 to 67 (mean = 33.6; SD = 12.8) were investigated. In study 2, the STI-R (yes/no format) was compared with the EPQ-R. In this study, 102 subjects of both sexes (47 men and 55 women) ranging in age from 19 to 70 years (mean = 32.05; SD = 11.98) took part. In study 3, in which the short form of the STI-R (STI-RS) was used with a 4-point answer format, 74 subjects (31 men and 43 women) aged from 17 to 68 years participated.

The Eysenck Personality Questionnaire—Revised (EPQ-R; Eysenck, Eysenck and Barrett, 1985a; German adaptation by Ruch and Hehl, 1989) was used in all three studies. The German version is a 102-item questionnaire containing four scales: Psychoticism (P), Extraversion (E), Neuroticism (N), and Lie (L).

In study 3 (with the STI-RS), the subjects were administered both inventories twice—with a 4 to 6-week interval.

Results and discussion

The results of the three studies are presented in Table 1. As can be seen, the correlation

Table 1. Pearson correlations between the STI-R/STI-RS and the EPQ-R scales

Scale	SE	SI	MO
EPQ-R with STI-R			
P	0.23*	−0.36† (−0.29*)	
E	0.39† (0.30*)	−0.37†	0.46† (0.42†)
N	−0.46† (−0.41†)	−0.38† (−0.50†)	−0.34†(−0.49†)
L		0.29† (0.36†)	
EPQ-R with STI-RS			
P	0.30*	−0.33†	
E	0.42† (0.34†)	−0.27*	0.54† (0.56†)
N	−0.42† (−0.56†)	−0.48† (−0.54†)	−0.45†(−0.44†)
L			

Note: $*p < 0.01$; $†p < 0.001$.
As regards the STI-R, the correlation coefficients in the first column refer to the 159-Ss sample, whereas those in parentheses apply to the sample of 102 subjects. In the STI-RS, the first column coefficients refer to the $N = 74$ sample and the second column to the follow-up study, conducted after a 4–6-week interval, on the same sample.

coefficients are very consistent across the separate studies.[2] The SE scale correlated in all four cases positively (from 0.30 to 0.42) with EPQ-E, and negatively (from −0.41 to −0.56) with EPQ-N. In two of the four cases, SE also correlated with EPQ-P (0.23 and 0.30).

The relationships between SI and Eysenck's personality/temperament dimensions are displayed in a pattern of negative correlations: for P (three coefficients, from −0.29 to −0.36), for E (two of the four cases: −0.27 and −0.37), and for N (four coefficients, from −0.38 to −0.54).

The pattern of correlations between the MO scale and the Eysenckian dimensions was similar to the one for SE, except that the positive correlations between MO and E were even higher (from 0.42 to 0.56) compared with the SE–E links.

Thus, the configuration of correlation coefficients between the STI-R/STI-RS and the EPQ-R scales obtained in all three studies was in accordance with our hypotheses. A highly reproducible pattern also emerged when the STI-R data were compared with the STI-RS data. So, it might be concluded that the correlations found in our studies confirmed the construct validity of both the STI-R and the STI-RS scales. Our results were also consistent with earlier reported outcomes [for a review see Strelau (1983) and Strelau *et al.* (1989)]. Similar findings were also obtained in a recent study on German samples (Strelau *et al.*, 1989), where the original STI was compared with the EPQ-R.

STI-R scales and the SSS (Form V), I.7, and AIM

The other arousal-oriented personality/temperament dimensions in the present studies were *sensation seeking*, *impulsivity*, and *affect intensity*.

Subjects and methods

In a first sample, the STI-R (4-point answer format), Sensation Seeking and Impulsi-

[2] Many significant correlations refer to the STI-R Social Desirability (SD) scale, Since we are not dealing here with the social desirability issues [for a discussion see Strelau *et al.* (1990)], the results reflecting the relationships between the STI-R SD scale and other temperament and personality scales are not taken into account. This refers to all tables.

vity inventories were given to 85 subjects of both sexes (represented almost equal) aged from 18 to 86 years (mean = 36.05; SD = 16.18). In a second sample, sensation seeking, impulsivity, and affect intensity were compared with the STI-R scales (4-point answer format) in 159 subjects. This sample has already been characterized in the EPQ-R analysis. Finally, the relationship between the STI-R (yes/no format) scales and affect intensity was studied in the 102-Ss sample already described.

For measuring sensation seeking, Zuckerman's (1979) Sensation Seeking Scale (SSS, Form V; German adaptation by Andresen, 1986) was used. The SSS contains four subscales: Thrill and Adventure Seeking (SSS-TAS), Disinhibition (SSS-Dis), Experience Seeking (SSS-ES), and Boredom Susceptibility (SSS-BS). A total score (SSS-Tot) is obtained by summing the scores of the four subscales.

The I.7 Impulsiveness Questionnaire (I.7; Eysenck, Pearson, Easting and Allsopp, 1985b; German translation by Ruch) was used for measuring impulsivity. The I.7 contains three scales—Impulsiveness (I.7-Imp), Venturesomeness (I.7-Vent), and Empathy (I.7-Emp).

Affect intensity (AI) was assessed by means of the Affect Intensity Measure (AIM; Larsen and Diener, 1987; German translation by Ruch). This is a 40-item questionnaire with a 6-point Likert scale format.

Many items of the SSS, I.7, and AIM refer to behaviours that are culturally specific. Moreover, these scales are not satisfactorily adapted to the German population. Therefore, we decided to include also the data characterizing the basic scale statistics of these inventories.

Results and discussion

The results illustrating the relationships between the STI-R and the SSS, I.7, and AIM are presented in Tables 2 and 3.

Table 2. Pearson correlations between the STI-R and the SSS, Form V

Scale	SE	SI	MO
85-Ss sample			
TAS (5.45; 3.64; 0.84)†	0.36**		
Dis (4.47; 2.86; 0.74)		−0.35**	
ES (7.87; 4.11; 0.80)		−0.29*	0.25*
BS (3.60; 2.16; 0.60)	0.26*		
Tot (21.35; 10.35; 0.91)	0.29*	−0.28*	
159-Ss sample			
TAS (6.18; 3.48; 0.82)	0.45**		0.36**
Dis (5.06; 2.82; 0.71)	0.36**	−0.35**	0.22*
ES (10.08; 4.28; 0.82)	0.46**	−0.35**	0.43**
BS (4.53; 2.46; 0.66)	0.31**		0.23*
Tot (25.86; 10.62; 0.91)	0.50**	−0.34**	0.40**

Note: Only correlations statistically significant at the $p < 0.01$ (*) and $p < 0.001$ (**) levels are reported.
† Descriptive statistics for the scales are given in parentheses in the following order: mean, standard deviation, and Cronbach alpha.

According to our hypothesis, SE and MO should correlate positively with sensation seeking. We also predicted a negative correlation between SI and sensation seeking.

As can be seen from Table 2, the data are consistent with our predictions, especially when the results of the 159-Ss sample are considered. Significant correlations between the STI-R and the SSS were obtained for all three STI-R scales. SE was positively correlated with all SSS scales in the 159-Ss sample (from 0.31 to 0.50) and with three of the SSS scales (SSS-TAS, 0.36; SSS-BS, 0.26; and SSS-Tot, 0.29) in the 85-Ss sample. The correlation pattern was very consistent for both samples as regards SI. SI correlated negatively with SSS-Dis (0.35 in both samples), SSS-ES (−0.29 and −0.35), and SSS-Tot (−0.28 and −0.34). The MO scale correlated positively only with SSS-ES in the 85-Ss sample and with all SSS scales in the 159-Ss sample (from 0.22 to 0.43).

Note that there were no results in contradiction to our hypotheses and there were no inconsistencies between both samples. In general, the results were in agreement with our own former studies as well as with the outcomes reported in the literature on the original STI (Strelau *et al.*, 1989). The main difference consists in the fact that the present correlations between the SSS and the STI-R scales are higher compared with former studies; this is especially true for SE. The fact that the SSS-Dis scale correlated with SE (159-Ss sample) is rather unique (see Strelau *et al.* 1989). Interesting enough, the SI scale did not correlate with SSS-TAS or SSS-BS in either sample. As regards SI-TAS, this lack of correlation has also been reported in most of the earlier studies, in contrast to the SSS-BS scale in which case mostly significant negative correlations were obtained (Strelau *et al.*, 1989). The SI scale showed consistent negative correlations with SSS-Dis, SSS-ES, and SSS-Tot (from −0.28 to −0.35). This seems to be logical if we conceive of strength of inhibition as the contrast pole of sensation seeking, impulsivity, and psychoticism (cf. Corulla, 1988).

As regards impulsiveness, venturesomeness, and affect intensity, according to our hypotheses SE (and to a given extent also MO) should correlate positively with Venturesomeness (I.7-Vent) and affect intensity (AIM). SI was expected to be connected negatively with impulsiveness (I.7-Imp). No prediction was made concerning the interdependences of the SI and AIM scales.

The results concerning the relationships between the STI-R, I.7, and AIM scales are presented in Table 3.

In both samples, SE was positively correlated with I.7-Vent (0.51 and 0.54) and in the 159-Ss sample also with I.7-Imp (0.27). The correlational pattern for SI in both samples showed that this CNS property was correlated negatively with I.7-Imp (−0.32 and −0.42), with AIM (−0.36 and −0.48), and in the 159-Ss sample with I.7-Vent (−0.22). Venturesomeness and impulsiveness correlated positively also with MO but only in the 159-Ss sample.

The relationships between the Pavlovian temperament traits and impulsiveness, as measured by the I.7, were in accordance with our hypotheses. The high correlation between the SE and I.7-Vent scales replicates the results found for sensation seeking in several previous studies (e.g. Corulla, 1989). The I.7-Vent scale mainly contains items of the SSS-TAS subscale. As follows from Eysenck's *et al.* (1985a) study, the I.7-Vent scale correlated also with the E scale of the EPQ-R. The negative correlation of SI with I.7-Imp is not surprising if we consider that this trait is consistently correlated with psychoticism and neuroticism (Corulla, 1987, 1988; Eysenck *et al.*, 1985b). Thus, the obtained correlations between SE and I.7-Vent and between SI and I.7-Imp are in agreement with the described theoretical framework.

The lack of correlation between AI and SE did not match our expectation. As

Table 3. Pearson correlations between the STI-R, I.7, and AIM scales

Scale	SE	SI	MO
85-Ss sample			
Imp (7.75; 3.80; 0.76)†		−0.32*	
Vent (7.40; 4.02; 0.83)	0.51**		
Emp (12.60; 3.45; 0.74)	−0.25*		
AI (138.81; 22.7; 0.91)‡		−0.36**	
159-Ss sample			
Imp (6.89; 4.08; 0.80)	0.27**	−0.42**	0.35**
Vent (7.87; 3.91; 0.81)	0.54**	−0.22*	0.40**
Emp (13.77; 2.93; 0.67)	−0.29**		
AI (144.77; 21.73; 0.91)		−0.48**	

Note: Only correlations statistically significant at the $p < 0.01$ (*) and $p < 0.001$ (**) levels are reported.

† Descriptive statistics for the scales are given in parentheses in the following order: mean, standard deviation, and Cronbach alpha.

‡ The AIM data are based in the 102-Ss sample already described in the EPQ-R study.

stressed by the authors of both inventories (AIM and STI-R), AI and SE refer to the concept of *arousal* (Larsen and Diener, 1987; Strelau *et al.*, 1990). In fact, Larsen and Diener (1987) suggest that persons high on the Affect Intensity dimension feel and perform better in highly stimulating situations. In their view, intensity of emotional responses serves as a source of stimulation for use of arousal regulation, and individuals develop strong emotional responsiveness to compensate for chronically low levels of baseline arousal. Thus, a positive relationship between both dimensions was expected. The lack of a significant association may be due to several reasons: (a) both concepts refer to arousability in different systems; i.e. whereas a high level of strength of excitation results from low arousability in the CNS, a high level of affect intensity is a result of high arousability in the autonomic nervous system; (b) affect intensity pertains to sensitivity (of emotions) and strength of excitation to the individual's endurance (functional capacity); (c) affect intensity is limited to the emotional domain, whereas strength of excitation applies to all kinds of behaviour.

A consistent negative correlation was found between the SI and AIM scales (−0.36 and −0.48). This was not predicted by us. However, if we consider that SI correlates negatively with neuroticism and anxiety in almost all studies (see Strelau *et al.*, 1989), this result is not that surprising. Furthermore, Larsen and Diener (1987) have shown that affect intensity correlates positively with emotionality understood as an equivalent of neuroticism.

EMPIRICAL EVIDENCE FOR CONSTRUCT VALIDITY: THE STI-R AND THE TEMPERAMENT SCALES OF THE EASI, DOTS-R, AND STQ

The comparison of the STI scales with arousal-oriented temperament/personality dimensions has gained some popularity, mainly in the context of construct validity

studies. Other inventories labelled as temperamental scales have not been compared with the original STI, and this is definitely true for the STI-R.

Subjects and methods

Eighty-five subjects, already characterized in the previous section on SSS and I.7, took part in this study.

In addition to the STI-R (4-point answer format), the following three temperament inventories were used: The EASI-III Temperament Survey for Adults (Buss and Plomin, 1984),[3] containing four scales: Emotionality (EASI-Emo), Activity (EASI-Act), Sociability (EASI-Soc), and Impulsivity (EASI-Imp). The Revised Dimensions of Temperament Survey—Adult (DOTS-R Adult; Windle and Lerner, 1986). This inventory comprises the following scales: Activity Level—General (DOTS-R-A-G), Activity Level—Sleep (DOTS-R-A-S), Approach–Withdrawal (DOTS-R-A-W), Flexibility–Rigidity (DOTS-R-F-R), Mood Quality (DOTS-R-MQ), Rhythmicity–Sleep (DOTS-R-R-S), Rhythmicity–Eating (DOTS-R-R-E), Rhythmicity–Daily Habits (DOTS-R-R-H), Low Distractability (DOTS-R-LD), and persistence (DOTS-R-Per). The Structure of Temperament Questionnaire (STQ; Rusalov, 1989). The STQ scales are the following: Ergonicity, object-related (STQ-Er); Ergonicity, social (STQ-SEr); Plasticity, object-related (STQ-P); Plasticity, social (STQ-SP); Tempo, object-related (STQ-T); Tempo, social (STQ-ST); Emotionality, object-related (STQ-Em); and Emotionality, social (STQ-SEm). The STQ also contains a Lie (STQ-K) scale.

Results and discussion

The intercorrelations between the STI-R and all the other scales and the statistical characteristics of the three temperament inventories are delineated in Table 4.

As can be seen from Table 4 several scales are lacking reliability. Among the 23 scales being compared with the STI-R, 13 have a Cronbach alpha below 0.70. Especially evident is the low reliability of EASI-Sociability (0.49), DOTS-R-Approach–Withdrawal and DOTS-R-Persistence (0.56 and 0.22, respectively), and STQ-Plasticity, social (0.58), STQ-Tempo, social (0.48), and STQ-Lie (0.44).

Among the 69 correlation coefficients obtained, 36 reached statistical significance at least at the 0.01 level. Most of the substantial correlations were found for the EASI scales (8 out of 12) and for the STQ (18 out of 27).

We did not make predictions regarding all possible relationships among the scales being compared. However, some interdependences were expected. We predicted that STI-R-SE and STI-R-MO would correlate positively with the EASI-Act and EASI-Soc scales, and negatively with EASI-Emo. In all cases but one (the relationship between EASI-Soc and SE), empirical support for our hypotheses was obtained. Among the EASI scales, EASI-Soc [correlating highly with extraversion; see Windle (1989)] was the one which had a very low reliability score. Because of this lack of reliability the relationships between EASI-Soc and the STI-R scales cannot be

[3] The EASI and STQ were translated into German by Angleitner, Hoffmann, Köhler, O'Connor and Thiel. DOTS-R was translated by Angleitner, Köhler, Ruch and Silny. In the meantime, Angleitner and his co-workers have undertaken steps aimed at improving the psychometric quality of these three questionnaires.

Table 4. Pearson correlations between the STI-R scales and EASI, DOTS-R, and STQ scales.

Scale	SE	SI	MO
EASI			
Emo (33.21; 6.28; 0.77)†	−0.42**	−0.39**	−0.46**
Act (25.05; 4.55; 0.68)	0.43**	0.26*	0.42**
Soc (13.01; 2.80; 0.49)			0.33*
Imp (45.39; 6.88; 0.70)		−0.56**	
DOTS-R			
A-G (16.69; 3.57; 0.64)			
A-S (10.89; 3.11; 0.83)			
A-W (19.38; 3.12; 0.56)	0.45**		0.53**
F-R (14.20; 2.95; 0.67)	0.50**		0.49**
MQ (21.91; 3.74; 0.79)		0.32*	0.30*
R-S (15.09; 4.38; 0.76)		0.37**	
R-E (12.59; 3.71; 0.78)			
R-H (11.64; 3.17; 0.64)		0.27*	
LD (12.64; 2.94; 0.69)		0.44**	
Per (8.41; 1.52; 0.22)		0.28*	
STQ			
Er (6.67; 3.00; 0.75)	0.52**	0.32*	0.37**
SEr (7.66; 2.78; 0.73)	0.30*		0.36**
P (7.86; 2.56; 0.68)	0.46**		0.58**
SP (6.64; 2.38; 0.58)			0.35**
T (8.13; 2.75; 0.76)	0.38**		0.29*
ST (7.38; 2.00; 0.48)	0.44**		0.41**
Em (4.16; 3.33; 0.85)	−0.42**		−0.40**
SEm (5.66; 2.50; 0.67)	−0.54**	−0.40**	−0.47**
K (3.31; 1.62; 0.44)		0.39**	

Note: Only correlations statistically significant at the $p < 0.01$ (*) and $p < 0.001$ (**) levels are reported.

† Descriptive statistics for the scales are given in parentheses in the following order: mean, standard deviation, and Cronbach alpha.

taken into account. We also predicted a correlation (with a minus sign) between SI and EASI-Imp. This was confirmed by our data. In general, it can be stated that the configuration of correlation coefficients between the EASI and the STI-R scales confirms to some extent the construct validity of the STI-R.

As regards the comparison between the STI-R and the DOTS-R scales, our predictions were rather parsimonious. For the ten scales being compared with the STI-R, we predicted only that SE, and to some degree also MO, would correlate positively with Activity Level—General (DOTS-R-A-G) and Approach–Withdrawal (DOTS-A-W). We also hypothesized a positive correlation between MO and the DOTS-R-Flexibility–Rigidity scale. With the exception of the relationship between the DOTS-R-A-G and SE, our hypotheses were confirmed. The DOTS-R-A-G scale resembles to a high degree the EASI-Activity scale (EASI-Act) for which a positive correlation with SE was obtained. In a study reported recently by Windle (1989), general activity level (DOTS-R-A-G) correlated positively with EASI-Act and EPI-Extraversion (0.48 and 0.47, respectively). Windle (1989) convinces us that our expectation regarding the relationship between DOTS-R-A-G and SE was fully justified. The rather low reliability of DOTS-R-A-G (0.64) found in the present study probably does

not fully explain the lack of correlation between strength of excitation and general activity level. The data regarding the comparison between DOTS-R and STI-R do not supply much information allowing us to judge the external validity of the STI-R. However, they do not contradict the validity values of the STI-R.

Since Rusalov's STQ has much in common with the Pavlovian constructs of CNS properties, one may expect close relationships between the STI-R scales and Rusalov's temperament dimensions, especially as regards ergonicity (a substitute for strength of excitation) and plasticity (relating to the mobility of the CNS processes). We predicted that SE would correlate positively with the STQ-Ergonicity (both object- and social-related) and STQ-Plasticity scales (P and SP). Furthermore, we predicted negative correlations with both Emotionality scales (STQ-Em and STQ-SEm). The same pattern was predicted for the MO scale. Taking into account the fact that plasticity comes close to the Pavlovian construct of mobility, we assumed that the relationship between these two constructs would be especially evident. As can be seen from Table 4, SE and MO indeed correlated positively with the STQ-Ergonicity scales (for SE: 0.52 and 0.30; for MO: 0.37 and 0.36) and with the STQ-Plasticity scales (0.46 for SE vs. STQ-P; 0.58 and 0.35 for MO vs. STQ-P and MO vs. STQ-SP, respectively). Also, the expected negative correlations for all comparisons between SE and MO, on the one hand, and the STQ-Emotionality scales, on the other hand (STQ-Em: −0.42 and −0.40; STQ-SEm: −0.54 and −0.47), emerged. No specific prediction was made regarding the relationship between SI and STQ dimensions. SI correlated positively with the STQ-Er scale (0.32). This result is rather difficult to explain. The same is true for the positive correlations between the STQ-Tempo scales and SE and MO. Easier to interpret, however, is the negative correlation between SI and the STQ-SEm scale −0.40). For, Rusalov's emotionality construct is very akin to Eysenck's neuroticism dimension. Moreover, it has been shown that social emotionality correlated very highly with neuroticism [0.70; Rusalov (1989)]. In conclusion, it might be stated that the majority of the results point to satisfactory construct validity of the STI-R.

Factor analysis of the temperament scales

In order to clarify further the complex picture of the correlations between the several temperament scales a factor analysis based on the EASI, DOTS-R, STQ, and STI-R scales was performed.

Subjects and methods

The data from the 85-Ss sample were used. The principle component method with Varimax rotation was chosen.

Results and discussion

Six eigenvalues exceeding unity were obtained (6.50, 3.61, 2.08, 1.78, 1.55, and 1.15). The plotting of these values [Scree test; Cattell (1966)] as well as the 5 per cent criterion for factor extraction suggested a five-factor solution, which accounted for 62.1 per cent of the variance. The Varimax rotated factor loadings are given in Table 5.

Factor I explained 17.1 per cent of the variance. High positive loadings were found for the SE and MO scales of the STI-R, and the DOTS-R-Flexibility scale.

Table 5. Varimax rotated five-factor matrix of temperament scales

Scales	Factors I	II	III	IV	V
STI-R-MO	0.78				
STI-R-SE	0.76				
STQ-SEm	−0.70				
EASI-Emo	−0.67	0.32			0.39
STQ-Em	−0.65				
DOTS-R-F-R	0.54	−0.50			
DOTS-R-R-H		0.87			
DOTS-R-R-S		0.81			
DOTS-R-R-E		0.76			
DOTS-R-A-S		−0.34	−0.31		
STQ-T		0.78			
EASI-Act	0.33		0.68		
STQ-Er	0.43		0.66		
DOTS-R-LD		0.44	0.63		
STQ-P	0.50		0.51		0.31
DOTS-R-Per	−0.35	0.34	0.49		−0.35
STQ-ST	0.42		0.44		0.32
EASI-Soc				0.80	
DOTS-R-MQ				0.75	
STQ-SEr				0.70	
DOTS A-W	0.42			0.46	
EASI-Imp					0.81
DOTS-R-A-G			0.34		0.62
STQ-SP					0.62
STI-R-SI		0.33			−0.58

Note: Only factor loadings above 0.30 are presented.

The two STQ-Emotionality scales as well as the EASI-Emotionality scale loaded negatively on this factor. This factor seems to reflect predominantly *Emotional Stability.*

Factor II explained 12.6 per cent of the variance. Marked positive loadings were present for the DOTS-R-Rhythmicity scales. A negative loading was found for the DOTS-R-Activity Level—Sleep scale. This factor clearly represents a DOTS-R specific *Rhythmicity* factor.

Factor III accounted for 12.3 per cent of the variance. The STQ-Tempo scales and the object-related STQ-Ergonicity and STQ-Plasticity scales loaded positively on this factor. The EASI-Activity scale and two DOTS-R scales—Distress and Persistence—also appeared as markers for this factor. The factor clearly refers to *Activity* and *Tempo.*

Factor IV explained 10.1 per cent of the variance. The following scales showed positive loadings: EASI-Sociability, DOTS-R-Mood, DOTS-R-Approach–Withdrawal, and STQ-Ergonicity (social). This factor seems to reflect the tendency of persons to approach people, to be with them, and to interact with them. It clearly represents a *Sociability* factor.

Factor V accounted for 9.9 per cent of the variance. there were loadings on this factor from EASI-Impulsivity, the DOTS-R-Activity Level—General, and the STQ-Plasticity (social) scales. A negative loading appeared for the STI-R SI scale. The factor represents an *Impulsivity versus Impulse Control* dimension.

Even if one considers this factor analytic study as preliminary, because it is based partly on not fully adapted German temperament inventories, a clear picture emerges. This picture may be summarized as follows:

1. The EASI scales seem to be important orthogonal temperament dimensions. The STI-R relates to two of them: Emotionality and Impulsivity. The relation to Emotionality replicates the consistent negative correlation found between the SE and MO scales and Neuroticism scales based on several Eysenckian measures [see Table 1; see also Strelau *et al.* (1989)]. Furthermore, the SI scale consistently shows negative correlations with impulsivity measures [Table 3; see also Strelau *et al.* (1989)] as well as with psychoticism [Table 1; see also Strelau *et al.*, (1989)].
2. The DOTS-R exhibits some specificity not covered by the other temperament inventories. Especially the rhythmicity characteristics are not represented in the other temperament questionnaires.
3. The object- versus social-related distinction of the STQ scales (Rusalov, 1989) is not reflected by the obtained factor structure.

EMPIRICAL EVIDENCE FOR CONSTRUCT VALIDITY: THE STI-R/STI-RS AND THE NEO-PI AND PRF PERSONALITY SCALES

As mentioned above, our expectations were that among the personality dimensions only those will correlate with the STI-R scales which have something in common with temperament, as, for example, extraversion, endurance, or impulsivity. In turn, personality dimensions, the variance of which is mainly a result of individual–social environment interactions, were expected not to correlate with the STI-R scales (e.g. openness, play, or understanding). Thus, the use of personality inventories in our STI-R study allows us to judge not only convergent, but also discriminant validity of our diagnostic tool.

Subjects and methods

In one of the studies (with the PRF) the yes/no format of the STI-R (166 items) was applied, whereas in the NEO study the STI-RS (84 items) was used with the 4-point answer scale. In the STI-R-PRF study, 235 (97 males and 138 females) subjects were investigated. Their age ranged from 18 to 70 years (mean = 29.1; SD = 11.4). The data in which the STI-RS was compared with the NEO inventory are based on 160 subjects [63 males and 95 females (the sex of two subjects is unknown)] aged from 18 to 75 years (mean = 37.0; SD = 13.9).

The two following personality inventories were used: (1) The Personality Research Form (PRF; Jackson, 1967) based on the concept of needs developed by Murray (1938), in the German version from Stumpf *et al.* (1985). The form PRF-KB was applied. It consists of 14 need measures and two control scales. The latter were not taken into account in this study. The 14 content scales are listed in Table 6. (2) Costa and McCrae's (1985) NEO Personality Inventory NEO-PI; German adaptation by Borkenau and Ostendorf (1991). The NEO-PI contains the following five scales: Neuroticism (N), Extraversion (E), Openness to Experience (O), Agreeableness (A), and Conscientiousness (C).

Results and discussion

The results of the study are presented in Table 6, which shows that there are many significant correlations between the STI-R/STI-RS scales and the personality dimensions under study. This is especially evident in the case of the NEO-PI. Among the 15 correlation coefficients, nine reached statistical significance at least at the 0.01 level. Except for Openness to Experience, all other scales of the NEO-PI were in some way correlated with the Pavlovian CNS properties. The SE and MO scales correlated positively with Extraversion (0.47 and 0.53, respectively) and Conscientiousness (0.31 and 0.18, respectively) and negatively with Neuroticism (−0.57 for SE and −0.53 for MO). Moreover, the MO scale correlated poorly with the Agreeableness factor (0.18). Finally, SI correlated positively with Agreeableness (0.29) and negatively with Neuroticism −0.26).

Table 6. Pearson correlation coefficients between the STI-R/STI-RS and the NEO-PI and PRF scales

Scale	SE	SI	MO
NEO-PI			
N (2.75; 0.73; 0.87)†	−0.57**	−0.26*	−0.53**
E (3.26; 0.69; 0.83)	0.47**		0.53**
O (3.57; 0.47; 0.63)			
A (3.54; 0.47; 0.68)		0.29**	0.18*
C (3.78; 0.59; 0.84)	0.31*		0.18*
PRF content scales			
Achievement (Ac)	0.20*		
Affiliation (Af)			
Aggression (Ag)		−0.35**	−0.18*
Dominance (Do)	0.40**		0.30**
Endurance (En)	0.26**		
Exhibition (Ex)	0.25**		0.21*
Harm-avoidance (Ha)	−0.32**		−0.21*
Impulsivity (Im)		−0.33**	
Nurturance (Nu)	−0.17*		
Order (Or)		0.20*	
Play (Pl)		−0.19*	
Social recognition (Sr)		−0.21*	−0.17*
Succourance (Su)	−0.23**	−0.25**	−0.24**
Understanding (Un)			

Note: Only correlations statistically significant at the $p < 0.01$ (*) and $p < 0.001$ (**) levels are reported.

† Descriptive statistics for the scales are given in parentheses in the following order: mean, standard deviation, and Cronbach alpha. For the PRF the descriptive statistics for the separate scales are not presented because this inventory is well adapted for the German population. The Cronbach alpha scores for the 14 scales vary from 0.71 to 0.83 (Stumpf *et al.*, 1985).

If we compare the configuration of correlations obtained in the present study with our hypotheses regarding the relationships between the Big Five and the Pavlovian CNS properties, it has to be said that our predictions were fully confirmed, also as regards discriminant validity. For the reasons given above, we did not expect any correlations between the Openness factor and the STI-R scales. In fact, no

associations were found. The relationships between the N, E, and A NEO-PI factors and the STI-RS scales were very similar to those obtained for the three Eysenckian dimensions. So, our data confirm indirectly the close relationship between Eysenck's E, N, and P, on the one hand, and Costa and McCrae's E, N, and A, on the other hand. The positive correlations between the Conscientiousness scale and the SE and MO scales and at the same time the lack of a significant correlation between Conscientiousness and SI support Digman and Takemoto-Chock's (1981) hypothesis that Conscientiousness should be regarded as a factor characterized by a proactive attitude (hardworking, energetic). In conclusion, it can be stated that the STI-RS–NEO-PI correlational study has given some empirical support for the convergent and discriminant validity of the STI-RS.

Among the 42 correlation coefficients between the PRF and STI-R scales, almost half of them (19) reached the 0.01 level of significance. SE correlated positively with PRF-Achievement, PRF-Dominance, PRF-Endurance, PRF-Exhibition, and negatively with PRF-Harm-avoidance, PRF-Nurturance, and PRF-Succourance. Most of these relationships were predicted by us. The content analysis of the Ac, Do, En, Ha, and Su scales allowed us to hypothesize that they are related to SE in the direction reflected by the present results. We did not make any prediction as regards exhibition and we also assumed that nurturance, expressed mainly in prosocial behaviour, was unrelated to the Pavlovian CNS properties. The MO scale showed to some extent similar associations as SE: substantive links in the predicted direction were found with PRF-Dominance, PRF-Exhibition, PRF-Harm-avoidance, and PRF-Succourance. Finally, we did not make any predictions regarding the relationship between MO and the PRF-Aggression and PRF-Social Recognition scales. However, low but significant correlations were obtained for PRF-Aggression (–0.18) and PRF-Social Recognition (–0.17).

SI correlated negatively with the PRF-Ag, PRF-Im, PRF-Pl, PRF-Sr, and PRF-Su scales, and positively with PRF-Or. The only relationships predicted by us regarding the SI and the PRF were for aggression (PRF-Ag) and impulsivity (PRF-Im). The results obtained for both scales (–0.35 and –0.33, respectively) are in accordance with our expectations.

Interesting are the PRF scales for which a lack of a relationship with Pavlovian CNS properties was predicted. Our hypothesis was that affiliation, nurturance, play, order, and understanding are not related to the particular CNS properties. For the PRF-Af and PRF-Un scales this hypothesis was confirmed for all STI-R scales. Thus, support was obtained for the discriminant validity of the STI-R scales. The three remaining PRF scales, however, only partially confirmed our expectations. Some low correlations were obtained for PRF-Nu and SE (–0.17), PRF-Pl and SI (–0.19), and PRF-Or and SI (0.20). In general, it might be concluded that most of the results presented in Table 6 point to satisfactory convergent and discriminant validity values of the STI-R and STI-RS scales.

CONCLUSIONS

The STI-R (long and/or short form) was related to arousal-oriented scales and several other temperament and personality inventories in order to scrutinize the convergent and discriminant validity. In general, the hypotheses regarding the place of the STI-R

in the temperament and personality domain were confirmed, supporting the construct validity of the STI-R scales in the questionnaire domain.

As regards the arousal-oriented scales, SE seems to be related mainly to the Eysenckian dimensions extraversion and neuroticism. SI is linked predominantly to the Eysenckian dimensions psychoticism and neuroticism, and to a smaller extent, to extraversion. Also consistent with prior theoretical considerations are the relationships with sensation seeking: SE correlates positively and SI negatively with sensation seeking. MO does not show a clear reproducible pattern of associations with arousal-oriented scales.

In the temperament domain, SE and MO are related to emotionality, whereas SI is associated with impulsivity.

In the personality domain, SE and MO appear to be related to the Big Five dimensions neuroticism, extraversion, and conscientiousness. SI, on the other hand, is associated with agreeableness and neuroticism. Finally, the correlations with PRF scales provided an interpretable pattern, showing relations of SE and MO with an energetic life approach and a link of SI with impulse control.

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