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Thinking and Creative Styles: A Validity Study

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The validity evidences of thinking and creative styles were analyzed. Two studies are reported, one analyzing the dimensionality of creative styles and the other verifying their external validity. Participants were Brazilians, 1,752 in the first study (55% women) and 128 in the second study (53% women), among whom 45% had demonstrated creative talent. The instruments were a scale of thinking and creative styles and Torrance's figural and verbal creativity tests. Item analysis used the Rasch model. Two styles were identified: cautious–reflexive and nonconforming–innovative. Linear regression for predicting recognized creative achievements indicated significant contributions from the verbal creativity index and the nonconforming–innovative style. Styles were found to have predictive and constructive validity for creativity.

Personal styles have been an important research topic for more than 60 years, especially among cognitive psychologists interested in better understanding the ways individuals interact with their environment and use information to solve problems (Houtz et al., 2003; Zhang & Sternberg, 2009). Research on the construct of cognitive styles can be traced to studies that began in the 1950s with an initial emphasis cognitive control, a trait identified as a pattern of thinking processes directing the expression of needs in socially and situation-specific ways (Martisen & Kaufmann, 1999).

Various specialties in psychology, including those specializing in cognition, personality and creativity, have contributed to our understanding of personal styles through their research, theory building, and other forms of scholarship. The magnitude of these contributions underscores the considerable interest in this construct among psychologists (Isaksen, 2004; Sternberg, 1994). For example, Messik (1984) identified eight categories for classifying cognitive styles, and Hayes and Allison (1994) later identified 29 definitions for styles. Although the array of definitions reflects the complexity of this construct, there is consensus that cognitive styles are independent of an individual's cognitive abilities and reflect a preference rather than a capacity (Runco, 2007).

The pioneer research on field dependent or independent cognitive styles by Witkins (1967, 1977) exemplifies these early efforts to provided methods to classify ways that people perceive and process information. Other theories proposed that cognitive styles could be understood under different dimensions, including reflexive versus impulsive styles (Kagan, 1965) or abstract versus concrete styles (Harvey, Hunt & Schroder, 1961). Thinking styles proposed by Sternberg (1997, 2005) are consistent with his theory of mental self-government and were classified on the basis of their functions (legislative, executive, and judicial), forms (monarchic, hierarchic, oligarchic, and anarchic), levels (local and global), scope (internal or external), and leaning (liberal or conservative). These styles are largely

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distinct from intelligence (Sternberg & Grigorenko, 1997; Sternberg, Grigorenko, & Singer, 2004).

Other research on cognitive styles examined problem solving and personality. For example, Kirton (1976, 1987) classified cognitive styles in two major dimensions: innovator (seeks change) and adaptor (seeks implementations). Comparisons of data from measures of cognitive styles and various temperament and personality tests (e.g., Myers Briggs Type Inventory, California Personality Inventory, and Cattell 16 Personality Factors) found the innovative style to be related moderately to imagination, flexibility and tolerance for ambiguity (Kirton, 1989; Isaksen, Wilson & Lauer, 2003). The dual aspect of innovative vs. adaptor creative styles seems to be valid cross-nationally, as observed by Tullet (1997) with English, Dutch, French, Italian, and Slovak samples, thus suggesting these creative processes among individuals are similar despite cultural differences.

Cognitive styles as measures of creative problem solving strategies were classified by Selby, Treffinger, Isaksen, and Lauer (2004) according to three major dimensions: orientation to change (explorer or developer), manners of processing information (external or internal), and preferences for making decisions (people or task focused). Validity studies on these styles indicated that the developer style is comparable to Kirton's Adaptor style and the explorer style is similar to Kirton's Innovator style (Treffinger, Selby, & Isaksen, 2008). Four other cognitive styles in creative problem solving, proposed by Puccio, Murdock, and Mance (2007), included clarifier (focused), ideator (imaginative), developer (pragmatic), and implementer (action oriented). Some of these styles were related to temperament or personality styles (e.g., the ideator with intuitive style and the clarifier and developer with organized style), according to Puccio (2002). These results suggest that styles should be seen as an interface between cognition and personality, thus implying that cognitive process as well as personality characteristics can influence the expression on one's personal styles (Martinsen & Kauffmann, 1999).

Kirton (1976) suggested creativity is best understood by separating levels (ability, potential) and styles (modality, preferences). Levels usually are measured by tests of divergent thinking, but styles usually are measured by tests of processes and attitudes (Isaksen, 2004; Kirton, 1999). These authors believe few if any measures assess both the level and type dimension. This belief raises the question as to which dimensions are measured by the Torrance Tests of Creative Thinking (TTCT; Torrance, 1966, 1990)—the mostly widely used measures of creativity (Kaufman, Plucker, & Baer, 2008). Research comparing TTCT with Kirton's Adaptor and Innovator styles (KAI) indicated the TTCT measures both level and style (Isaksen & Puccio, 1988; Kirton, 1987). Exploratory factor analysis comparing the figural TTCT with KAI indicated the TTCT measures two creative styles (Kim, 2006). The first style (fluency, originality, and resistance to closure) was related to the Innovator style; the latter (elaboration, abstractness of titles and creative closure) was related to the Adaptor style.

Studies on creativity have to be spread among international communities in order to understand better the creative process and styles. Therefore, this study was designed to understand Brazilian's creative styles. The validity of a scale designed to measure thinking and creative styles among Brazilian adults was examined. Two studies were conducted: (a) to investigate styles validity through the internal structure of the scale; (b) to explore styles validity by comparing their data with external criteria that reflects real life creative achievements.

METHOD

Study 1

Participants

Participants were 1,752 Brazilians (55% women), ages 17 through 70 ($M = 24.5$; $SD = 8.9$), who resided mainly in São Paulo state (93%). All individuals had high school or undergraduate university educational levels and came from middle-class families.

Instrumentation: Styles of Thinking and Creating (STC)

This scale consisted originally of 100 items, presented in a 6-point Likert-type scale: totally disagree, disagree, partially disagree, partially agree, agree, and totally agree (Wechsler, 1999, 2006a). These items reflect well-established creative personality characteristics. The factor analysis of this scale (Oblimin rotation) with a sample over 1,000 Brazilians indicated 5 factors or styles, accounting for 38.38% of variance, which were named: cautious–reflexive, nonconforming–innovation, logical–objective, intuitive–emotional, and divergent–relational. Reliability coefficients (alpha) ranged from .80 to .96 for the first three styles and for .51 to .53 for the remaining two styles. Additional research indicated the nonconforming–innovative style was able to differentiate business managers from regular employees and the intuitive–emotional style to distinguish sex differences among them (Mundin & Wechsler, 2007). Furthermore, learning motivation was observed to be positively related to cautious–adaptive style and negatively associated with intuitive–emotional style among high school students (Siqueira & Wechsler, 2009).

Procedure

Participants were contacted at university classrooms and invited to participate in the study. After completing

the informed consent form, they completed the Scale of Thinking and Creating in groups or individually in approximately 30 minutes.

The capacity of the items to extract logical and consistent responses to the 6 response categories was examined by calculating the thresholds between the six response categories for each item, using Winstep software, which employs Rasch-models (Linacre, 2010). Next, it was verified if the measurement capacity of the instrument could be improved by deleting certain items, on the assumption that the modified instrument would be a more accurate measure, using Item Response theory model.

The Rasch analysis was used in order to test the construct validity of a hypothesized model of STC and the capacity of the instrument to measure the hypothesized components. This analysis of residuals was designed to help identify the least number of contrasts to explain as much variance as possible. Rasch-residuals are interpreted based on principal components analysis (PCAR), where the components show contrasts between opposing factors rather than loadings on one factor.

Results

First, the 6-option Likert-scale items were examined using the Winstep format, one that compares the cross-over, equal probability points (“thresholds”) using parameters of the partial credit model (Figure 1).

The category probability curves of two items are demonstrated in Figure 1 (item 20 and item 51). Some generality of meaning was lost as a result of using 6-point scale. The category probability curves indicate that 45% of all items were like item 20 that uses a 4-point scale and 36% of all items were similar to item 51 that utilizes a 5-point scale. Therefore, we can consider using 4-point scale and to eliminate the middle categories (i.e., partially agree and partial disagree).

Next, principal component analysis was utilized to investigate the internal structure of the Scale of Thinking and Creating. The results revealed that 41.7% of the variance in the data was explaining by model. The largest secondary dimension, *the first contrast in the residuals*, explains 10.2% of the variance. In these data, the variance explained by the items, 32.0% is only three times the variance explained by the first contrast 10.2%, so there is a noticeable secondary dimension in the items (Linacre, 2010; see Table 1).

Items whose misfit values were greater than 1.5 were removed. The resulting principal component analysis is presented in Table 2. Two main styles were observed. The 34 items composing Style 1 revealed the following preferences: likeness to work with facts, prudence and order when making decisions, critical and reflexive attitudes, fear of taking risks, need for structured situations, logical and systematized thoughts, difficulty of expressing

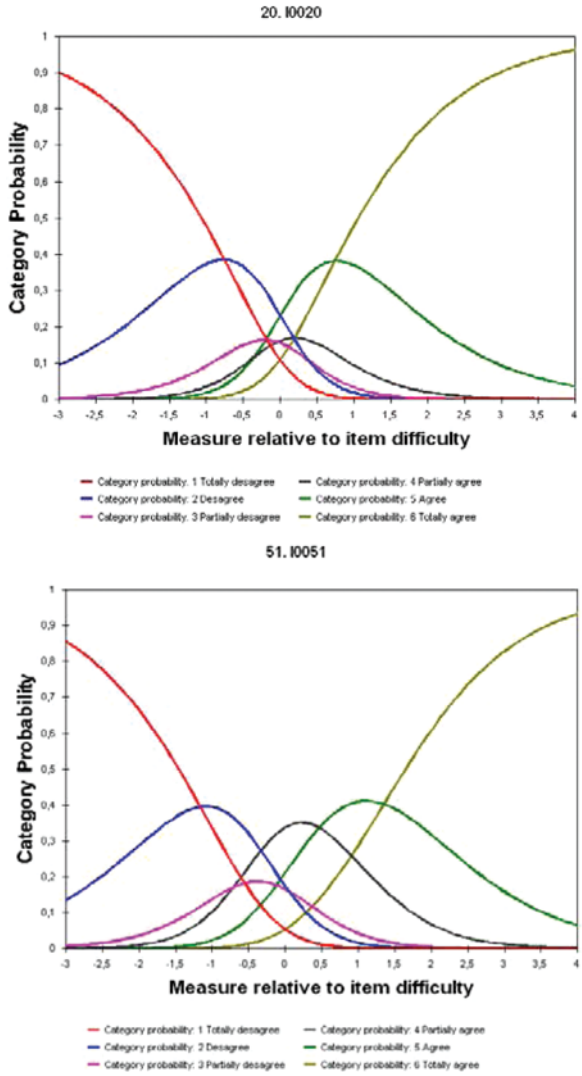

FIGURE 1 Category probability curves of the items 20 and 51. (Figure is provided in color online.)

ideas and to interact with groups. The 39 items composing Style 2 indicated the following preference: likeness of new ideas, tendency to visualization, optimistic attitudes, self-confidence, dynamism, motivation, leadership abilities, penchant to work with simultaneous information, pursuit of a life mission. The composition of these styles is similar to the ones found by Wechsler (2006) using traditional factor analysis and thus retains their names: cautious–reflexive (Style 1), nonconforming–innovation (style 2). The KR-20 reliability of these styles, were .94 and .92, respectively.

Study 2

A second study was conducted to gather further validity evidences of the Scale of Thinking and Creating. Two questions were addressed: Can these styles predict

TABLE 1
Standardized Residual Variance From Principal Component Analysis

Variance	*Eigenvalue*	*Empirical (%)*	*Modeled (%)*
Raw variance explained by measures	52.3	41.7	35.2
Raw variance explained by persons	12.2	9.8	8.2
Raw variance explained by items	40.1	32.0	27.0
Raw unexplained variance (total)	73.0	58.3	64.8
Unexplained variance in 1st contrast	12.8	10.2	17.6
Unexplained variance in 2nd contrast	2.8	2.2	3.9
Unexplained variance in 3rd contrast	2.2	1.8	3.0
Unexplained variance in 4th contrast	1.9	1.5	2.5
Unexplained variance in 5th contrast	1.7	1.3	2.3
Total raw variance in observations	125.3	100%	100%

creative Brazilians' creative achievements in real-life situations? Are these styles related to characteristics measured by the Torrance's creativity tests?

Participants

The sample was composed of 128 individuals (53% women), ages 18 through 70 ($M = 33.6$, $SD = 12.8$), who resided in Brazilian cities in the state of São Paulo. All individuals had a high school or undergraduate university level education and came from middle class families.

Sixty-three individuals (51% women) were located based on references obtained about them as having received public recognition of their achievements previously through awards at the local, state, or national levels. Thus, these individuals were considered as *recognized creative* based on the external criterion of recognition by society. The recognized creative group received various types of awards, including those in visual arts, choreography, publicity, literature, sports, music, education, medicine, psychology, philosophy, engineering, and sociology. A parallel sample by age and educational level was selected of 65 individuals (55% women) who had no recognition of their achievements at the time of the study.

Instrumentation

STC. The 73 items measure of creative styles, derived from Study 1 were used (i.e., that which assess the cautious–reflexive and the nonconforming–innovative styles).

Survey of creative achievements. This survey was composed of open-ended questions designated to evaluate the type and quantity of both creative achievements recognized through awards and special distinctions as well as those that did not generate any prizes or other forms of recognition. The questions related to achievements were in the following areas: poetry, literature, painting, music, drama, journalism, publicity, sports, sciences, etc. This survey was elaborated based on Torrance's (1980) longitudinal study to investigate the validity of the TTCT to predict creative achievements in the United States.

Individuals had to indicate what type of creative achievement they had produced and whether they received public recognition by means of local, state or national distinctions. Therefore, the evaluation if their achievement could be considered as creative was dependent upon subjects' information, a well-established and frequently used method to obtain information (Hocevar, 1981). The number of achievements was classified under the following categories: (a) recognized creative achievements (reception of awards or distinctions); (b) nonrecognized creative achievements (products or activities with no special distinction); and (c) total creative achievements (sum of recognized and nonrecognized achievements).

Thinking creatively with pictures–Figural A (Torrance, 1966, 1990). This test is composed of different forms to be completed through drawings. The scoring system used in this research was based on the streamlined procedure presented by Torrance (1990, 1998; Torrance, Ball, & Safter, 1999). The use of this scoring system enables to identify the well-known creativity indicators (fluency, flexibility, originality, elaboration) as well as nine other creative strengths found to be predictors of creativity (Torrance, 1980): emotional expressiveness, fantasy, movement, internal visualization, unusual visualization, story articulateness, synthesis of incomplete figures, extension of boundaries, and expressiveness of titles. Originality scores were based on Brazilian norms (Wechsler, 2004a, 2006b).

Torrance recommended the use of the total number of creative indicators to assess creativity instead of relying on an isolated analysis of each of them. Thus, two indexes were constructed in other to better understand individuals' performance, one measuring cognitive characteristics (Figural Creativity Index I) and the second assessing cognitive as well as emotional characteristics or strengths (Figural Creativity Index II). The Figural Creativity Index I was derived by adding the first four figural creativity characteristics (fluency, flexibility, elaboration, and originality), qualities generally regarded as measures of divergent thinking. All 13 creativity indicators comprised a Figural Creativity Index II, since they could represent both cognitive and emotional domains and thus provide a better understanding of figural creativity.

TABLE 2
Standardized Residual Loading for Item in the Contrast 1 From Principal Component Analysis

Positive Loading (Style 1)					*Negative Loading (Style 2)*				
Item	*Measure*	*Infit*	*Outfit*	*Standardized Residual Loading*	*Item*	*Measure*	*Infit*	*Outfit*	*Standardized Residual Loading*
1	.33	.99	1.07	.24	3	–.77	1.07	1.11	–.37
6	.32	.67	.75	.48	9	–.87	1.09	1.09	–.38
11	.32	.69	.70	.48	10	.39	1.47	1.51	–.33
15	.35	1.04	1.06	.13	12	.02	1.24	1.31	–.38
20	.33	.66	.67	.52	13	–.06	1.12	1.12	–.45
25	.28	.49	.46	.72	14	–.50	1.16	1.25	–.35
26	.34	.68	.69	.53	16	–.27	1.11	1.14	–.36
34	.39	.95	1.02	.26	17	–.64	1.15	1.20	–.42
35	.38	.84	.84	.30	18	.36	1.50	1.56	–.36
36	.41	.81	.84	.37	19	–.39	1.12	1.19	–.39
40	.30	.66	.65	.54	21	–.36	1.17	1.20	–.46
43	.26	.66	.68	.51	22	.29	1.51	1.65	–.37
44	.33	.54	.55	.64	27	–.29	1.17	1.32	–.38
47	.35	.69	.78	.42	28	.15	1.33	1.37	–.33
55	.37	.80	.81	.38	29	–.52	1.19	1.33	–.34
57	.38	.64	.64	.51	31	–.24	1.20	1.21	–.48
58	.42	.98	1.13	.20	37	.15	1.32	1.39	–.33
62	.32	.96	.98	.22	41	–.27	1.29	1.39	–.40
67	.33	.72	.72	.43	45	–.24	1.26	1.33	–.39
70	.35	.65	.68	.51	46	–.50	1.11	1.23	–.35
71	.32	1.03	1.07	.18	48	–.57	1.20	1.34	–.36
72	.30	.52	.53	.68	49	–.69	1.14	1.22	–.33
73	.35	.63	.65	.55	50	–.37	1.21	1.42	–.33
75	.35	.62	.68	.51	51	.05	1.31	1.33	–.50
79	.32	.78	.78	.40	52	–.18	1.18	1.21	–.39
82	.45	1.03	1.05	.14	53	.27	1.38	1.43	–.35
85	.40	.90	.94	.24	56	–.73	1.08	1.10	–.37
86	.32	.62	.63	.59	59	–.60	1.08	1.13	–.41
88	.37	.97	1.00	.15	60	–.32	1.12	1.11	–.39
91	.35	.70	.72	.49	61	–.72	1.01	.99	–.45
93	.33	.94	.98	.19	66	–.74	1.06	1.05	–.46
95	.33	.59	.60	.60	68	–.54	1.11	1.10	–.44
96	.37	.77	.82	.36	69	–.59	1.07	1.04	–.44
98	.33	.56	.58	.57	74	–.54	1.04	1.04	–.35
					76	–.63	1.04	1.04	–.47
					77	.27	1.21	1.24	–.47
					87	–.02	1.41	1.67	–.37
					92	.12	1.13	1.14	–.40
					94	–.66	1.11	1.14	–.44

Thinking creatively with words–Form A (Torrance, 1966, 1990). This test is composed of six activities, that requires asking questions, imagine causes and consequences, and suggest new ideas for improving a toy. The scoring of this test was based on Torrance' (1990) scoring procedure, which enables to identify three indicators of creativity (fluency, flexibility, and originality), and complemented by Wechsler's procedure (1985, 2006b) which yields five other creative strengths (emotional expressiveness, fantasy, unusual perspective, elaboration, and analogies/metaphor). Originality scores were based on Brazilian validations studies and norms by Wechsler (2004b).

A Verbal Creativity Index I was developed by adding four verbal creativity indicators (figural, flexibility, originality, and elaboration), which measured the cognitive components of creativity or divergent thinking. A Verbal Creativity Index II was developed by adding these four cognitive characteristics with the other ones (emotional expressiveness, fantasy, unusual perspective, elaboration, and analogies/metaphors), thus providing a better indicator of emotional and cognitive components of verbal creativity.

Procedure

Creative individuals were referred by professionals in different areas, as those who had received public recognition at national, regional or local levels. These individuals were contacted by different means (phone, e-mails,

letters), and invited to participate in the study. The interview lasting approximately 2 hours, during which time they completed the survey of creative achievements, the STC, as well as TTCT figural and verbal. A comparable sample was composed by professionals in the same area and similar age, contacted on convenience criteria. These persons also answered the instrument during individual interviews with the same duration.

Creative achievements were scored through the survey and categorized as recognized, nonrecognized, and total (sum of both measures). Figural and verbal creativity tests were scored and categorized using two indexes: I (cognitive characteristics) and II (cognitive and emotional characteristics).

Sex differences within the creative and noncreative groups as to type of achievements (recognized and nonrecognized) were investigated by *t*-tests. Pearson correlations were employed to compare associations among styles with Torrance's creativity tests. In addition, a step-wise regression analysis was used to analyze the contribution of the two styles and the TTCT figural and verbal indexes to predict recognized creative achievements.

Results

The mean numbers of recognized achievements in the creative group were 1.9 ($SD = 1.0$) for women and 2.3 ($SD = 1.2$) for men. The mean numbers of nonrecognized achievements were 2.4 ($SD = 1.7$) for women and 2.6 ($SD = 1.7$) for men in the creative group. Among those in the noncreative group the mean number of nonrecognized achievements were 2.2 ($SD = 1.6$) for women and 2.5 ($SD = 1.7$) for men.

Sex differences within the creative and noncreative groups according to type of achievements (recognized and nonrecognized) were investigated by *t*-tests. No sex differences were observed for the recognized creative achievements, $t(61) = -1.24$, $p = .221$], and the same occurred for the nonrecognized achievements either for the creative group, $t(61) = -.34$, $p = .738$] or the noncreative group, $t(63) = -.69$, $p = .493$]. Therefore, creative productivity did not differ significantly between men and women within their respective groups.

The relationships among creative achievements, verbal and figural creative index as well as the two styles (cautious–reflexive and nonconforming–innovative) were examined by Pearson Correlations. Recognized creative achievements were significantly related to cautious–reflexive style ($r = .22$, $p = .011$), Nonconforming–innovative style ($r = .28$, $p = .002$) as well as to TTCT creativity indexes (Figural I: $r = .22$, $p = .013$; Figural II: $r = .27$, $p = .002$; Verbal I: $r = .31$, $p = .001$; Verbal II: $r = .31$, $p = .001$). The same pattern was observed when comparing the total number of creative achievements. The two styles indicated to be significantly related to the TTCT creative indexes, and the verbal creativity indexes were more related with TTCT than the figural creative indexes. Thus, cautious–reflexive style was related to Verbal Index I ($r = .18$, $p = .038$) and to Verbal Index II ($r = .18$, $p = .047$), and the nonconforming–innovative style was related to Verbal Index I ($r = .25$, $p = .005$) and Verbal Index II ($r = .24$, $p = .007$).

In addition, linear regression (stepwise procedure) was used to estimate the contribution of the two styles as well as the figural and verbal creativity indexes to predict creative achievements (Table 3). The prediction of recognized achievements had only two variables in the model, which regression coefficient (b) and standardized coefficient (β) were: Verbal Creativity Index II ($b = .006$, $\beta = .261$, $t = 3.055$, $p = .003$) and the Style 2 (nonconforming–innovative style; $b = .015$, $\beta = .215$; $t = 2.514$, $p = .013$). However, when considering the total number of creative achievements (recognized as well as nonrecognized), three predictors appeared in the model: nonconforming–innovative style ($b = .039$, $\beta = .350$, $t = 4.532$, $p < .001$), Figural Creativity Index II ($b = .049$, $\beta = 1.242$, $t = 3.522$, $p = .001$) and Figural Creativity Index I ($b = -.050$, $\beta = -.988$, $t = -2.802$, $p = .006$). The reversed sign for Figural Creativity Index I suggests that an increase in this variable has a negative impact on total number of creative achievements.

TABLE 3
Stepwise-Regression on Recognized Creative Achievement

		Coefficients			*t-Test*	
		Unstandardized Coefficients		*Standardized Coefficients*		
Model	*Variables*	*b*	*Std. Error*	*β*	*Value t*	*Significance p*
1	(Constant)	.086	.282		.305	.761
	Verbal Creativity Index II	.007	.002	.311	3.677	.000
2	(Constant)	–2.441	1.042		–2.342	.021
	Verbal Creativity Index II	.006	.002	.261	3.055	.003
	Style 2 (Nonconforming – Innovative style)	.015	.006	.215	2.514	.013

DISCUSSION

An understanding of creativity is enhanced through an assessment of individual differences portrayed by the styles—that is, preferred way of thinking and behaving. Research on creative styles during the last decade (Zhang & Sternberg, 2009) reveals the need to understand creative people's cognitive and personality processes portrayed by their styles. This study was designed to contribute to this literature, in part, through empirical studies that examine Brazilians' creative styles and to determine their correspondence with literature from other countries.

Two styles were observed with Brazilian samples using IRT models. They were found to be similar to the first two factors, previously observed by Wechsler (2006a), albeit derived through the use of traditional factor analysis. Those who display a cautious–reflexive style are careful and prudent persons who prefer to work with facts and to analyze information. In contrast, those who display a nonconforming–innovative style are idealistic persons, self-motivated, who prefer original thinking. This dual dimension is somewhat consistent with the well-known Kirton's measure (1976, 2003) of creative styles, namely Adaptor and Innovator styles. The similarities among the profiles of the cautious–reflexive and Adaptor, and the nonconforming–innovation with the Innovator styles lead to the conclusion these are main creative styles, thus suggesting creative processes are comparable across-nationally and consistent with prior international research (Tullet, 1997).

Evidences of construct and predictive validity of creative styles were obtained when comparing Wechsler's Scale of Thinking and Creating (2006a) with Torrance's (1966, 1990) creativity tests. Both styles were related to the verbal creativity and not to figural creativity. Therefore, creative styles can be better expressed or identified through words than drawings. The relationships observed among the Torrance's tests with the two styles confirm findings from other researches (e.g., Isaksen & Puccio, 1988; Kim, 2006; Kirton, 1987), pointing that the TTCT can be considered as a mixture measure of level and styles.

The Verbal Creative Index II as well as the nonconforming innovative style were the best predictors of recognized creative achievements. These results emphasize the contribution of individuals who are able to express creatively through words and are motivated to strive for a vision on the production of recognized creative achievements. Therefore, in despite the of the association of the cautious–reflexive style with recognized creative achievements, possibility reflecting the adaptor's contribution to creative productivity as remarked by Kirton (1987, 1999), this style had a minor role when comparing to the nonconforming innovative style. Figural indicators of creativity were found to be relevant only when considering total achievements (recognized as well as nonrecognized). Nevertheless, these results indicate the importance of figural indicators when assessing creative potential, as they can later be translated into real creative performance.

Sex differences were not observed either on creative achievements or on the styles measures. These results are important as they endorse the concept of similarities among creative men and women in relation to their thinking processes as well as their personality characteristics, thus confirming the concept of psychological androgyny (Runco, 2007). Although many questions have been raised on the ways that traditional education has limited women to express their creativity, apparently those who achieve high creative production reveal similar profiles to creative men (Baer, 1999; Wechsler, 2006a, 2008). The possibility of identifying Brazilians' creative styles through a valid and reliable measure was verified. The similarities of the observed styles with other international known creativity measures indicated the relevance of understanding creativity under a cross-cultural approach. Furthermore, the results obtained indicated that styles can bring important information about creativity, in addition to other divergent thinking measures which have been widely used to assess creativity in different contexts.

LIMITATIONS

Some limitations on this study have to be considered. First, there were not sufficient participants in each area of knowledge to investigate relationships among styles and types of achievements. Creativity may be composed of both general as well as domain-specific abilities (Sternberg, 2005; Sternberg, Grigorenko, & Singer, 2004). Thus, creative production in specific domains may require different styles.

Information about the participants' creative achievements was both determined and acquired post-factum. Access to the criteria used by judges to assign rewards to these individuals was not possible. Future studies are encouraged to strive to compare criteria for creativity in different domains with styles.

Whether males and females differ in the public versus personal creative achievements also deserves further exploration. Although gender differences in public achievements was not observed, future studies should investigate if types of achievement differ for Brazilian men and women—a finding observed in the United States by Runco, Millar, Acar, and Cramond (2010).

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