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Confirmatory factor analysis of Intellectual Styles Inventory – Revised 2: High School Sample

Análise fatorial confirmatória do Inventário de Estilos Intelectuais – Revisado 2: amostra do Ensino Médio

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Abstract

Objective
This study aimed to test, using the Confirmatory Factor Analysis model, the factor structure proposed in the Intellectual Styles Inventory – Revised 2.

Method
The study involved the participation of 1,556 High School students with a mean age of 16 years and 4 months (*SD* = 1.17).

Results
Confirmatory Factor Analysis was used and the model was based on the structure of 46 items distributed in nine dimensions, having demonstrated good rates of fit and accuracy. It was verified that the model originally indicated by the scientific literature was not confirmed in the Brazilian context, being proposed modifications that bring the current model closer to the national reality.

Conclusion
There was an adjustment in the estimates of the parameters used, and stability and generality can be considered in the way the model was organized.

Keywords: Education; Intelligence; Psychometrics.

Resumo

Objetivo
Este estudo teve por objetivo testar, por meio do modelo da Análise Fatorial Confirmatória, a estrutura fatorial proposta no Inventário de Estilos Intelectuais – Revisado 2.

Método

O estudo envolveu a participação de 1.556 alunos do Ensino Médio, com média de idade de 16 anos e 4 meses (DP = 1,17).

Resultados

A Análise Fatorial Confirmatória foi empregada e o modelo foi baseado na estrutura de 46 itens distribuídos em nove dimensões, tendo demonstrado bons índices de ajustes e de precisão. Verificou-se que o modelo indicado originalmente pela literatura científica não se confirmou no contexto brasileiro, sendo propostas modificações que aproximem o modelo vigente da realidade nacional.

Conclusão

Houve uma adequação nas estimativas dos parâmetros empregados, podendo-se considerar estabilidade e generabilidade na forma como o modelo ficou organizado.

***Palavras-chave*:** *Educação; Inteligência; Psicometria.*

The educational context has been strengthened by the study of the most different factors involved with learning, such as school structure, curriculum development, teachers' education, neurodevelopmental disorders, students´ abilities and motivation, among others. These factors can be clustered into three main groups, namely biological (genetic, neurological and their relevant equivalences), environmental (physical contextual characteristics such as room lighting) and cognitive (motivation, attention, memory, reasoning and language) (Lemos et al., 2008; Lima et al., 2019; Zhang, 2013).

Given this division, intellectual styles are understood based on a broader perspective, since this term includes beyond cognitive processes, affective, physiological, psychological and sociological facets (Miranda, 2002; Zhang, 2013). Intellectual or cognitive styles area more related to the functioning the intelligence than how much intelligence is present as in psychometric tradition (Bariani & Santos, 2000). Studies on this construct have been conducted for approximately 80 years in the scientific field, but with a resumption of interest in this area in the last two decades (Fan et al., 2018).

Conceptually, intellectual styles correspond to individual differences with respect to predilection in the use of problem-solving, information processing, and task-execution skills (Fan et al., 2019; Zhang & Sternberg, 2005). This model was suggested after empirical studies and the conceptualization of the different styles exposed in Sternberg's Theory of Mental Self-Governance (1997). The theory proposes that just as there are several types of government in a society, metaphorically, there are also different forms of personal management of activities and responsibilities. Thus, the styles exhibited in people can be understood in terms of function (legislative, executive and judiciary), form (monarchical, hierarchical, oligarchic and anarchic), level (global and local), scope (internal and external) and leaning (conservative and progressive).

The function of government comprises the legislative, executive and judicial styles. People who use the first style prefer freedom, using creativity to create their own ways of performing the activities. In turn, executive people prefer performing tasks following rules for their execution. Finally, the judicial style encompasses all those people who prefer to deal with judgment and comparison when evaluating people, their performances, and their projects (Miranda, 2002; Zhang et al., 2018; Zhang & Sternberg, 2005).

Within the forms monarchy, hierarchy, oligarchy and anarchy are present. Monarchical style is understood as the style in which people decide to select activities that can be performed with a

view to selecting a single focus at a time. People with hierarchical style are people who prefer to use their skills for tasks that are sorted according to importance and urgency. The oligarchic style engages in various tasks without establishing any form of priority, and the anarchic turns to whatever activity arises, preferring to be free in every way to do that activity (Zhang, 2015).

The authors also note that levels separate into local and global. Local people deal better with activities based on the assumptions of engagement with nitty-gritty details and concrete ideas; on the other hand, global style people prefer to work with abstract ideas and the vision of the whole. The scope is internal and external and deals with sociability during the performance of activities. In this connection, internal people tend to be more introverted, preferring to work independently while external people tend to be extroverted, dealing better when activities can be performed in a group. Finally, the last separation covers the inclinations of government, which may be liberal (progressive) or conservative. People with a liberal style exhibit a predilection for performing tasks that allow engaging in new forms of thinking and the use of ambiguity, while conservative style is represented by people seeking activities that follow a traditional thinking/achievement model, avoiding changes and ambiguity (Zhang, 2015; Zhang & Sternberg, 2005).

Although Sternberg (1997) initially proposed this division into five dimensions, in his 2005 publication together with Zhang (Zhang & Sternberg, 2005) the thirteen styles were reclassified into three types/dimensions (hence the name Threefold Model), where the characteristics of each style are shared among all styles that make up that type. Thus, Type I styles, the so-called creative styles, include the legislative, judicial, liberal, global and hierarchical styles and their main characteristics are the use of creativity, higher levels of cognitive complexity, nonconformity and autonomy (Fan, 2016). On the other hand, Type II encompasses people who prefer to follow rules/norms to perform activities, express respect and compliance towards authorities, and choose tasks with less cognitive complexity. It aggregates executive, conservative, local and monarchical styles, being named analytical styles. The Type I and Type II styles when compared to Type III styles correspond to more stable styles, since the styles in this last group do not exhibit fixed characteristics. Type III is composed of oligarchic, anarchic, internal and external styles, adopting different attributes present in the other two types depending on the context, activity and personal interest (Fan, 2016; Inácio et al., 2017).

The construct of intellectual styles is investigated through self-report questionnaires, in which the respondent indicates how much a specific statement says about himself/herself. After an initial version of questionnaire (Sternberg & Wagner, 1992), the Thinking Styles Inventory - Revised II (TSI-R2) (Sternberg et al., 2007) has been the most widely used instrument in research on the theory of mental self-government. However, their studies focus mostly on other countries, such as the United States (Zhang & Sternberg, 2005), China (Fan et al., 2018; Fan et al., 2019), Spain and Portugal (Bernardo et al., 2009; Miranda, 1994) and results present difficulties to confirm theoretical model in its globality.

The instrument is of American origin, authored by Sternberg and Wagner (1992). Its first English version consisted of 65 items, encompassing the 13 styles, with five statements to measure each of the theoretically proposed styles. The TSI was translated and back translated between English and Chinese in 1996. Its revised version (TSI-R), prepared by Sternberg et al. (2003), yielded good construct validity and Cronbach's alpha coefficients (between 0.70 and 0.80) for all styles, except for the anarchic scale where alpha coefficient was 0.50. With the modification of the items associated to the anarchic style, the second revised version (TSI-R2) was developed in 2007 (Sternberg et al., 2007), with alpha considered high, above 0.60 (Zhang & Sternberg, 2005).

The process of translation and adaptation of the TSI-R2 into Portuguese, used in this study, was conducted by Oliveira et al. (2018a). Two independent referees took care of the translation. The reverse translation into American English was made by a native referee in the language. Two other referees verified the adequacy of the items for application in elementary school, in which there was a concordance index of at least 80% of all the items corresponding to each dimension. Then the instrument was evaluated by the target audience, which in this case were elementary school students, where the students' understanding percentage was around 94%.

With this purpose, studies were conducted in Brazil with the instrument throughout Basic Education and in College Education (Oliveira et al., 2018b). In elementary school, these investigations were developed by Inácio et al. (2018) and Oliveira et al. (2016). In High School, studies were conducted by Oliveira et al. (2017) and Inácio et al. (2020). In the first one, the objective was to map the styles used by the students, as well as to look for possible differences between the beginning and the final school years. Students from the states of Paraná and Minas Gerais scored more in the legislative, hierarchical and external styles, which means that students use these styles more when they are studying. Significant differences were found between the 1st and 3rd years for the local, hierarchical and anarchic styles, and for these three styles the 3rd year scored higher than the 1st. However, the authors indicate the need for further studies to be carried out with a version adapted and validated for the Brazilian setting.

The study by Inácio et al. (2020), sought to analyze reading comprehension and its relationship with school performance and intellectual styles, as well as possible differences due to the school year. The results showed the existence of gaps in the training of young High School students regarding reading comprehension and that they prefer styles with characteristics such as creativity and greater cognitive complexity. A significant correlation was found between reading comprehension and intellectual styles and grades in the subjects assessed. In view of this, the authors question the relevance of reading comprehension for High School and show that knowledge about intellectual styles can help the teacher in educational practices that are more consistent with the needs of students in the classroom.

As to Middle/High School this educational stage was only recognized as the last stage of basic education with mandatory attendance after the publication of Constitutional Amendment nº 59 dated 2009, which expanded compulsory education from 4 to 17 years and, consequently, the Government responsibility for providing education in all these age groups (Ferreira & Silva, 2017; Ramalho et al., 2018). However, by looking at even the most current government data on access to this stage, one can perceive the need for more scientific work that could enhance significant and personalized changes for students in these school years.

According to the Education module of the National Continuous Household Sample Survey of the *Instituto Brasileiro de Geografia e Estatística* (Brazilian Institute of Geography and Statistics) out of the 48.5 million young people between 15 and 29 years of age, 25.2 million had not completed or attended any regular educational institution in 2017, which shows an increase of 330 thousand people in this condition compared to 2016. Specifically, among the 15-17 age group, there are about 1.5 million young people who are out of school. The reasons most commonly reported were related to the need to work (39.6%), lack of interest (20.1%) and housework/taking care of someone else (11.9%) (Instituto Brasileiro de Geografia e Estatística, 2018).

Given the relevance of intellectual styles for Basic Education in the Brazilian context, this study aimed to test the factorial structure proposed in the Inventory of Intellectual Styles - Revision 2, using the Confirmatory Factor Analysis (CFA) model. This study is intended to contribute to the

expansion of the theme in Brazil and to provide new information especially for the educational area and for the development of Public Policies involving the last stage of Basic Education in Brazil.

Method

Participants

A total of 1,556 students enrolled in High School were drawn to participate. The schools were: four State schools 69.4% (*n* = 1080), and two private schools 30.6% (*n* = 476) of the State of Paraná. Males were 50.3% (*n* = 783) and females 49.7% (*n* = 773) of the population. The average age was 16 years and 4 months (*SD* = 1.17), with a minimum age of 14 years and a maximum of 31. Out of the total participants, 36.3% (*n* = 565) were attending the 1st year of High School, 31.7% the second year (*n* = 494) and 31.9% the 3rd year (*n* = 497).

Instrument

The Thinking Styles Inventory (TSI-R2) (Sternberg et al., 2007) was used. In our study, we used the Revised II version of the instrument, which is composed of 13 dimensions, each with 5 items, totaling 65 items that were scored on a Likert-type scale ranging from 1 to 7 points, as follows: "Not at all" (1 point), "Not very well" (2 points), "A little" (3 points), "Well somehow" (4 points), "Well" (5 points), "Very well" (6 points) and "Extremely well" (7 points). The instrument is of US origin and has validity evidence for that cultural reality, with Cronbach's alpha coefficients ranging from 0.70 to 0.80. In Brazil the inventory has evidence of content validity performed by Oliveira et al. (2018a).

Data Analysis

The analyses were conducted with the MPlus 7.11 program, initially using Parallel Analysis as a factor retention method. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were performed. The estimator used was the Weighted Least Square Mean and Variance Adjusted, which uses polychoric correlations. The rotation used was the oblique (Geomin). Fit indices were analyzed from the chi-square by degrees of freedom ratio ($X^2/df < 3$), Confirmatory Fit Index (CFI > 0.90), Tucker-Lewis Index (TLI > 0.90), Root Mean Square Error of Approximation (RMSEA < 0.05), Weighted Root Mean Square Residual (WRMR < 1) and Standardized Root Mean Square Residual (SRMR < 0.05) (Hu & Bentler, 1999). Furthermore, the JASP 0.16.2.0 program was used to calculate Cronbach's alpha, McDonald's Omega and for descriptive analyses.

All ethical procedures were followed and are in compliance with Resolution 510/2016 and its complements issued by the National Health Council. The project was approved by the Ethics Committee of a public university in northern Paraná under number 3.004.082 (CAAE: 99762218.3.0000.5231, protocol nº 3.004.082). All adolescents signed a Free and Informed Assent Form (FIAF) and the guardians of adolescents under 18 signed a Free and Informed Consent Form (FICF). The application was performed in schools collectively, in a meeting that lasted approximately 50 minutes. The adolescents were assured that all information would be maintained confidential, that their participation would take place voluntarily and that withdrawal would be accepted at any time in the investigation.

Results

Initially, three CFAs with thirteen, five and three factors were performed as a factorial structure, following the international theoretical model of the scale (Sternberg et al., 2007) that groups the items into 13 styles, five dimensions and three types. Table 1 below shows the fit indices of the three factor structures initially tested.

Table 1
Fit indices of the three factor structures tested

Factors	χ^2/df	RMSEA	WRMR	CFI	TLI
13 factors	6.07	0.06	2.67	0.77	0.75
5 factors	10.97	0.08	3.99	0.53	0.51
3 factors	10.34	0.08	3.87	0.56	0.54

Note: CFI: Comparative Fit Index; df: Chi-square/freedom degrees; RMSEA: Root Mean Square Error of Approximation; TLI: Tucker Lewis Index; WRMR: Weighted Root Mean Square Residual.

As can be seen in Table 1, the best fit indices were for the 13-factor structure. In contrast, the three-factor structure presented unsatisfactory fit indices, suggesting that the theoretical structure of the instrument could not be observed in the Brazilian reality. Also, as it´s observed less number of factors produce lower fit indices traducing autonomy in assessed dimensions. Thus, the next analyses focused on identifying the best TSI-R2 structure for the Brazilian context.

As there were factors to be tested in terms of the best fit, a Parallel Analysis was chosen. Thus, nine factors were obtained as the best factor structure for the instrument. Then, AFE was performed from three to 13 factors. In order to consider the structure as acceptable, the following criteria were used: (a) to present acceptable fit indices, and (b) to have at least three items with factor load magnitudes above 0.30 in each factor.

Following these criteria, structures with three (χ^2/df = 4.80; RMSEA = 0.05; SRMR = 0.05; CFI = 0.83; TLI = 0.81) and four factors (χ^2/df = 3.98; RMSEA = 0.04; SRMR = 0.04; CFI = 0.87; TLI = 0.85) presented unsatisfactory fit indices and were therefore disregarded as being the best factor structure for the instrument. Regarding the other established criterion, only the structures with nine, six and five factors presented at least three items with loads above 0.30. In order to maintain the factorial structure as close as possible to the 13 styles and more theoretically interpretable, the nine-factor structure was chosen.

In the nine-factor structure, 17 items were excluded because they had no factor load greater than 0.30 in no factor. The factorial structure with nine factors represented by 48 items presented good fit indices (χ^2/df = 2.69; RMSEA = 0.03; SRMR = 0.02; CFI = 0.96; TLI = 0.94). However, when analyzing the items they carried in each factor, two items (items 19 and 51) were excluded because they demonstrated theoretical inconsistency. Thus, the factor loadings of the remaining 46 items and the precision indices per factor will be presented in Table 2.

This factorial structure described in Table 2 demonstrated adequate adjustment indices on CFA (χ^2/df = 2.75; RMSEA = 0.03; SRMR = 0.02; CFI = 0.96; TLI = 0.94). The number of items per factor ranged from three to eight items. Precision indices calculated using the alpha coefficient and McDonald's Omega, were mostly satisfactory, ranging from 0.65 to 0.80. Items 33, 35, 36, 41, 48 and 63 had cross factor loadings, i.e. greater than 0.30 in two factors.

Table 2

Exploratory factor analysis and factors description

Items	F1	F2	F3	F4	F5	F6	F7	F8	F9
1	0.07	0.07	0.04	-0.01	-0.06	0.02	0.10	-0.06	**0.50**
2	0.05	0.03	0.07	-0.03	0.03	0.01	-0.02	**0.42**	-0.03
3	0.03	-0.03	**0.45**	0.21	0.06	0.17	-0.05	-0.12	-0.07
4	-0.03	-0.02	0.06	0.00	-0.03	**0.77**	0.00	-0.02	0.00
5	**0.54**	0.00	-0.02	0.00	-0.01	0.00	0.09	-0.06	0.03
8	0.01	**0.49**	0.01	0.00	0.03	0.06	0.11	0.08	0.10
12	0.21	**-0.34**	0.12	-0.01	0.07	-0.03	0.14	-0.01	0.02
13	-0.08	**0.70**	0.02	0.03	-0.02	-0.02	-0.01	0.00	0.02
14	**0.50**	-0.24	0.16	-0.06	0.01	0.00	0.12	-0.06	0.03
15	**0.64**	-0.08	-0.01	0.04	0.01	-0.06	-0.09	0.06	0.01
17	0.00	0.03	**0.58**	0.14	0.11	0.10	-0.02	-0.14	-0.05
20	0.17	-0.10	**0.38**	-0.05	-0.01	0.02	0.16	0.03	0.18
22	0.04	**0.35**	0.13	-0.02	0.08	0.04	0.02	-0.06	0.00
23	0.09	0.03	**0.50**	-0.02	-0.06	-0.03	0.15	0.08	0.05
24	0.11	0.05	0.23	-0.03	0.05	0.00	0.00	0.01	**0.41**
25	**0.37**	0.01	0.05	0.11	-0.01	0.07	-0.04	0.14	0.17
26	0.18	**0.52**	-0.03	-0.02	0.04	0.09	-0.23	-0.02	0.05
27	-0.03	0.04	0.25	0.00	**0.51**	-0.03	-0.07	-0.02	0.02
28	-0.04	**0.73**	0.04	-0.03	0.01	0.01	-0.03	0.05	0.04
29	0.00	0.13	0.27	0.04	**0.51**	-0.02	-0.03	0.00	-0.03
30	0.22	-0.02	0.01	-0.03	**0.53**	0.00	0.02	0.07	-0.02
32	**0.58**	-0.05	0.01	-0.06	-0.03	0.02	0.04	0.00	0.02
33	**0.34**	0.06	-0.01	0.03	-0.01	**0.31**	-0.03	0.08	0.07
34	0.16	0.03	0.02	**0.80**	-0.06	0.03	0.17	0.02	0.00
35	0.21	0.18	-0.05	0.10	0.06	0.02	**0.37**	**-0.36**	0.03
36	**0.47**	**0.31**	-0.01	0.04	0.06	-0.05	0.02	-0.03	-0.10
37	0.24	0.14	0.04	**-0.69**	-0.01	-0.01	0.07	0.02	0.01
39	0.01	**0.74**	0.05	-0.08	-0.01	0.02	0.01	0.04	-0.01
41	-0.08	0.05	**0.54**	**0.32**	0.02	-0.04	0.07	0.10	-0.01
42	-0.03	-0.04	**0.55**	0.09	-0.09	0.00	0.23	0.16	0.05
43	0.03	0.02	-0.02	0.03	0.03	0.06	0.02	**0.62**	0.08
44	0.00	0.05	-0.03	0.03	0.09	-0.01	0.05	0.08	**0.81**
45	0.06	-0.06	0.08	-0.03	-0.01	-0.01	**0.44**	0.01	0.21
46	0.01	0.02	0.08	**0.77**	0.03	-0.02	0.20	0.03	-0.02
47	-0.02	0.16	-0.01	0.05	0.12	-0.01	**0.43**	-0.06	-0.04
48	0.07	0.22	0.03	0.01	0.05	-0.01	**0.41**	0.05	**-0.50**
52	-0.03	-0.01	-0.04	-0.02	**0.64**	0.00	0.18	-0.01	0.01
53	0.05	-0.01	0.03	0.07	-0.01	-0.03	**0.54**	0.02	0.08
54	0.02	0.06	-0.01	-0.02	0.03	0.01	0.04	**0.75**	-0.04
56	0.00	0.05	-0.04	-0.02	0.01	**0.74**	0.07	0.07	0.00
58	0.02	-0.08	0.00	-0.07	0.06	0.02	**0.57**	-0.05	0.07
59	0.01	-0.01	0.02	0.08	**0.51**	0.05	0.21	0.14	0.04
60	0.02	0.02	0.00	0.05	0.13	0.09	-0.02	**0.57**	0.00
63	**0.39**	0.06	-0.03	**-0.38**	-0.08	0.04	0.26	0.07	-0.12
64	0.02	-0.15	0.06	0.02	0.01	0.05	**0.52**	0.07	0.02
65	-0.01	-0.03	0.08	-0.04	-0.04	0.05	**0.52**	-0.06	0.14
No. items	8	8	6	5	5	3	8	5	4
Alpha	0.78	0.68	0.75	0.80	0.71	0.65	0.71	0.70	0.65
Omega	0.79	0.68	0.76	0.81	0.73	0.66	0.72	0.71	0.66

Note: Factor loadings ≥ 0.30 are in bold. F1: Self-centered; F2: Executive/Conservative; F3: Opening; F4: External; F5: Oligarchic; F6: Hierarchical; F7: Liberal/Decentralizer; F8: Monarchic; F9: Local.

Table 3 shows the organization of the items in its new proposition involving 9 factors adjusted to the Brazilian reality.

Table 3

Description of Styles Organization into 9 Factors

Items	Description	Factor and precision
5	Legislative: When I encounter a problem, I use my own ideas and strategies to solve it.	Factor 1 Self-Centered Style $\alpha = 0.78$; $\omega = 0.79$
14	Legislative: I like problems where I can try my own ways to solve them.	
15	Internal: When I try to make a decision, I trust my own opinion about the situation.	
25	Hierarchical: When dealing with difficulties, I am able to find out which ones are the most important and what to do to face them.	
32	Legislative: When working on a task, I like to start with my own ideas.	
33	Hierarchical: When there are many things to do, I have a clear sense of the order in which to perform them.	
36	Conservative: When I face a problem, I like to solve it in a way that I already know.	
63	Internal: I prefer situations in which I can implement my own ideas, without depending on others.	
8	Executive: I like to figure out how to solve a problem by following certain rules.	Factor 2 Executive/ Conservative Style $\alpha = 0.68$; $\omega = 0.68$
12	Executive: I like activities that I can perform without following models.	
13	Conservative: I prefer to follow rules or ready-made ways of doing things.	
22	Conservative: When I'm in charge of something, I like to follow past models and ideas.	
26	Conservative: I like situations where I can follow a set routine.	
28	Conservative: I like tasks and problems that have fixed rules to be followed in order to complete/solve them.	
36	Conservative: When I encounter a problem, I like to solve it in a way that I already know.	
39	Executive: I like to follow definite rules or directions when solving a problem or performing a task.	
3	External: When I start a task, I like to discuss the matter with my friends and colleagues.	Factor 3 Opening Style $\alpha = 0.75$; $\omega = 0.76$
17	External: In a school activity, I like to combine my own ideas with those of others.	
20	Judicial: I like situations where I can compare and evaluate different ways of doing things.	
23	Judicial: I like to check and evaluate different points of view.	
41	External: When I work in an activity, I like to share ideas and receive suggestions from others.	
42	Judicial: I enjoy activities where I can study and evaluate different views or ideas.	
34	External: I enjoy participating in activities where I can interact with other people as part of a team.	Factor 4 External Style $\alpha = 0.80$; $\omega = 0.81$
37	Internal: I like to work alone on a task or problem.	
41	External: When I work in an activity, I like to share ideas and receive suggestions from others.	
46	External: I like situations where I interact with others and we all work together.	
63	Internal: I prefer situations where I can come up with my own ideas without relying on others.	
27	Oligarchic: When discussing or writing about a topic, I get my views accepted by my colleagues.	Factor 5 Oligarchic Style $\alpha = 0.71$; $\omega = 0.73$
29	Oligarchic: I prefer to work on a project or task that is acceptable and approved by my colleagues.	
30	Oligarchic: When there are several important things to do, I do them first for people who are most important to me and to my colleagues.	
52	Oligarchic: When there are several important things to do, I choose the most important ones for my friends and colleagues.	
59	Oligarchic: When I start a task or project, I focus on the parts that are most relevant to my group of friends.	
4	Hierarchical: I like to list the most important things I need to do before I start doing them.	Factor 6 Hierarchical Style $\alpha = 0.65$; $\omega = 0.66$
33	Hierarchical: When there are many things to do, I have a clear sense of the order in which they should be done.	
56	Hierarchical: When I start something, I like to make a list of things to do and sort things by importance.	
35	Anarchic: I tend to face several problems at the same time because they are often equally urgent.	Factor 7 Liberal/ Decentralizing Styles $\alpha = 0.71$; $\omega = 0.72$
45	Liberal: I like to challenge old ideas or ways of doing things and look for better ones.	
47	Anarchic: I think that when I get involved in a problem, another one pops up always just as important.	
48	Global: I like to work on activities that deal with general issues and not in small details.	
53	Liberal: When I face a problem, I prefer to try new strategies or methods to solve it.	
58	Liberal: I like to do things in new ways that have not been implemented by others in the past.	
64	Liberal: I like to change routines to improve the way tasks are done.	
65	Liberal: I like to face old problems and find new ways to solve them.	
2	Monarchical: When I write or talk about ideas, I prefer to focus on one idea at a time.	Factor 8 Monarchical Style $\alpha = 0.70$; $\omega = 0.71$
35	Anarchic: I tend to face several issues at the same time because they are often equally urgent.	
43	Monarchic: I tend to give full attention to one thing at a time.	
54	Monarchic: I like to focus on one task at a time.	
60	Monarchic: I have to finish one project before starting another.	
1	Local: I prefer to deal with problems that require me to pay attention to many details.	Factor 9 Local Style $\alpha = 0.65$; $\omega = 0.66$
24	Local: I prefer to work on activities that allow me to use small details at the same time.	
44	Local: I like problems where I need to pay attention to details.	
48	Global: I enjoy working on activities that deal with general issues rather than small details.	

Discussion

When considering the theoretical proposition by organizing 13 factors for the scale in the Brazilian reality, at first it can be said that in this sample the CFA does not indicate a fit according to the reviews performed. From this perspective, the theoretical proposition now presented by Zhang and Sternberg (2005) was not supported in this sample, as indicated by the adjustments in Table 1.

The first table also shows that the adjustments achieved with the AFC for a 5 factor model do not seem plausible either. In this model, proposed by Sternberg (1997), styles are understood because of 5 major organizations of the form of government (Function, Form, Level, Scope and Leaning). Function encompasses the legislative, executive and judiciary styles. Form includes the monarchical, hierarchical, oligarchic and anarchic styles. Level includes the global and local styles. In the case of the Scope internal and external styles would be involved and finally Leaning could be conservative or liberal (Zhang & Sternberg, 2005).

Likewise, when assuming in AFC the organization by Types I (legislative, judicial, liberal, global and hierarchical), II (executive, conservative, local and monarchic) and III (oligarchic, anarchic, internal and external) it was also not possible to evidence acceptable fit parameters. Thus, the Parallel Analysis indicated that the 9-factor model would be the best fit, in the sense that one can seek, on the one side, organizational theoretical explanations in what the authors Zhang and Sternberg (2005) propose in terms of the taxonomies used to define the intellectual styles and, on the other side, to observe that, in fact, this structure would not remain complete in the Brazilian reality. This condition is pertinent, considering that the pedagogical organization of educational institutions in Brazil differs from that of other countries, as well as due to the cultural and social access that these students from public schools have in their reality.

In this connection, the 9-factor model led to an organizational logic in which the name of the factors was respected when it mostly merged into a given factor. In addition to the factors that brought together items of different definitions, we sought to study the definitions of the items and propose a more reliable nomenclature for this representation. It should be noted that items 33, 35, 36, 41, 48 and 63 had cross loads in more than 2 factors, which does not necessarily reveal a problem. The organizations obtained in each of the 9 factors will be discussed further on.

Therefore, Factor 1 encompassed the legislative (3 items), internal (2 items), hierarchical (2 items) and conservative (1 item) styles; so, when reviewing the logic of the formulation of the items, it was conventionally called "Self-centered Style" Factor. It is possible to observe therein decision styles that imply an assessment of self/potentiality, dealing with subjects who first assess their potential before taking decisions.

Factor 2 has clustered executive (3 items) and conservative (5 items) styles. This factor should be called "Executive/Conservative Style" Factor. But still, when studying the structuring of the items, it may be noted that there is a predominance of the conservative style, because the executive items are tangent to the establishment of fixed rules in their operation and this, in a way, is also a conservative behavior. However, in order not to change what had already been proposed in theory, we sought to maintain in the nomenclature the working profile of both styles.

In Factor 3 the external (3 items) and judicial (3 items) style items emerged. The analysis of the items and their formulation led to the indication of a Factor called "Opening Style" that would correspond to the willingness towards new ideas and experiences upon decision making. Factor 4 aggregated the external (3 items) and internal (2 items) style items. This organization can be understood as external style only, because the internal styles that clustered in this factor had negative charges, denoting an understanding contrary to its construction. In this analysis it can be

assumed that both the item "I like to work alone on a task or problem" (factorial load = -0.69) and the item "I prefer situations where I can come up with my own ideas, without depending on other people" (factorial load = -0.38) can be a negative pole of the same factor, in this case, the external style. That is why it is conventional to call it "External Style" Factor.

Factors 5 and 6 neatly aggregated items of the same dimension. In Factor 5 it can be observed that the 5 Oligarchic style items were aggregated and in Factor 6, 3 Hierarchical factor items appear clustered. Therefore, these Factors can be recognized as "Oligarchic Style" Factor and "Hierarchical Style" Factor, respectively.

In Factor 7 the anarchic (2 items), liberal (5 items) and global (1 item) styles were identified. In the analysis of the items one can notice an organizational trend in liberal ideas in the mode of organization as well as in actions aimed at non-centralization. For this reason, the Factor was considered as "Liberal/Decentralizing" Styles. In Factor 8, the convergence of monarchic (4 items) and anarchic (1 item) styles was observed. When evaluating the wording of the anarchic item 'I tend to face several problems at the same time because they are often equally urgent' (factorial load = -0.36) it can be noted that according to its load it can be an opposite pole. of the same factor, in this case, the monarchic style. So this was called the "Monarchic Style" Factor.

Finally, in Factor 9 there were the local (3 items) and global (1 item) styles. Again, looking at the overall style items that grouped into this factor ("I like to work on activities that deal with general issues rather than small details"), it can be noted that its factorial load was negative (-0.50). Similarly, it is hypothesized that this item may be representing an opposite pole of the same factor, in this case, the local factors. In this case, the factor was then defined as "Local Style" Factor.

The proposition of differentiation in the nomenclatures of some of the factors was because they grouped items representing different styles. For this reason, we essentially focused on the analysis of the organization of the items for their original theoretical formulation, to preserve as much as possible most of the model proposed in the Theory of Mental Self-Government (Zhang & Sternberg, 2005).

The McDonald's Omega and Cronbach's alpha values of the factors, although acceptable (Maroco & Garcia- Marques, 2006), in some cases they can still be considered low (< 0.70), which could indicate that the results obtained in the present study should be considered with caution in connection with the Brazilian reality; they even indicate the need for further studies in order to make the factors purer and, therefore, closer to the organization of the Theory of Mental Self-Government. Likewise, the relevance of investigating the instrument in samples of Brazilian university students is advisable, assuming that at this level of schooling there may be a better understanding and discrimination of the items in their complexity.

Given such considerations, it can be concluded that the model of the Theory of Mental Self-Government applies to the Brazilian reality, but not in its original formulation, as in other countries like Spain and Portugal (Bernardo et al., 2009; Miranda, 1994), perhaps because different sociocultural reality compared to that in which the instrument was developed. Therefore, since the reality of formal education presents many challenges to be overcome, including the quality of youth education, studies on Intellectual Styles in the Brazilian reality need to be further developed so that the mapping of the thinking styles of our students can give us valuable clues that can drive a more customized intervention when teaching students. For this reason, the contribution of theory and the search for evidence of the internal structure of the instrument

is beneficial for the psychoeducational area. Allied to this, it is suggested as a future agenda that the relationship between intellectual styles and constructs such as learning strategies and motivation to learn be investigated and, also, that data such as school repetition and different teaching modalities be better explored.

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