

## Age and gender impact on thinking and creating styles

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Styles of thinking and creating indicate the preferable ways that individuals process information. This study aimed to investigate the impact of sex and age on creative styles. The sample was composed of 1.752 subjects (780 men, 972 women), ages ranging from 17-72, living in 4 Brazilian states. The scale "Style of Thinking and Creating" was administered to groups in various environments. Results analyzed by the Analysis of Variance indicated significant differences between sexes and age ranges ( $p \leq .001$ ) for the following styles: Cautious-Reflexive; Non-Conforming/Transformer; Logical-Objective and Emotional-Intuitive. Significant interaction between sex and age were also observed for the Cautious-Reflexive, Logical-Objective and Relational-Divergent styles. In conclusion, the importance of considering gender as well as developmental influences for understanding creative expression was demonstrated.

*Key words:* Creativity, assessment, test, style, culture.

*Impacto de la edad y del género en los estilos de pensar y crear.* Los estilos de pensar y crear indican las maneras preferenciales que los individuos procesan las informaciones. Entender las variables que tienen impacto sobre los estilos creativos fue el objetivo de este estudio, con el foco sobre las posibles influencias de sexo y edad. La muestra fue compuesta por 1.752 individuos (780 hombres, 972 mujeres), edades desde 17 hasta 72 años, residentes en 4 estados brasileños. La escala de Estilos de Pensar y Crear fue administrada, en formato colectivo, en estos individuos. Los resultados obtenidos pela Análisis de Variancia indicaron diferencias significativas de sexo y edad ( $p \leq 0,001$ ) para los siguientes estilos: Cauteloso-Reflexivo, Inconformista-Transformador, Lógico-Objetivo y Emocional-Intuitivo. En conclusión, fue demostrada la importancia de considerar el género y las fases del desarrollo para la comprensión de la expresión creativa.

*Palabras clave:* Creatividad, evaluación, teste, estilos, cultura.

The need to understand creative individuals' intellectual processes and behaviors has resulted in several investigations aimed to identify if there were common characteristics or styles among these persons (Houtz, Selby, Esquivel, Okoye & Treffinger, 2003; Martisen & Kauffann, 1999). The concept of "style" is found since the 50's on studies about emotional processes regulation (Monreal, 2000). A possible explanation for the interest on styles can be its potential for clarifying psychological processes, as this concept seems to be a bridge between cognition and affection (Sternberg, 1994).

Styles have been defined in various ways, under different theoretical perspectives, for example: cognitive styles (Sternberg, 1997; Witkin, Moore, Goodenough & Cox, 1977), learning styles (Dunn, Dunn & Price, 1984), personality styles (Millon, 1994) and creative styles (Kirton, 1987; Torrance, 1982). However, there are debates about these concepts, as proposed by Sternberg and Grigorenko (1997), raising questions if styles are related to specific abilities or if they can be conceived as representing thinking and behavioral preferences.

The range of definitions on styles has generated a great variety of classifications for this concept. Under Messiks' revision (1984) there were already 8 categories or ways for classifying cognitive styles. Ten years later, Hayes and Allison (1994) identified 29 ways for understanding styles. Furthermore, in the study by O'Hara and Sternberg (1999), 12 styles were found exclusively related to the learning area. The vast diversity of categories for styles up to today indicates this is a complex term, although there is now a scholar consensus that styles can be distinguished from abilities, thus reflecting more a preference than a capacity, as stated by Runco (2007).

It is important to distinguish "creative styles" from "levels of creativity" as emphasized by Kirton (1976). Historically, creative individuals have been studied according to the level or quantity of creative ideas presented either on divergent thinking tests or throughout their creative production. However, the notion of creative styles brings another dimension for understanding creative thinking, as they are related to the diversity on ways that creativity may be expressed, not to quantity or level of creative ideas, thus indicating there is not a unique form of being creative (Puccio, Murdock & Mance, 2007).

One of the main contributions for understanding creative styles came from Torrance (1982), who tried to explain the relationship between creativity and thinking style based on hemispheric brain functioning. Therefore, he elaborated a test named *Human Information Processing Survey Survey* (Torrance, Tagart & Tagart, 1984) in order to investigate creative people's thinking styles based on the predominant role of the left, right or integrated brain hemispheres. Another important contribution to assess creative styles on organizational environments was made by Kirton (1976, 1987). His test "*Kirton-Adaptation-Innovation Inventory*" (Kirton, 1999) indicated the possibility

of identifying two creative styles, named as “innovative style” characterizing undisciplined and non-conforming persons, and “adaptive style” which is present on individuals mostly concerned with putting into practice ideas than generating changes.

Thinking styles can be highly important for understanding the different phases of creative problem solving, as pointed by Puccio (2002). The four creative styles recognized during this process, assessed by the test *Four Sights* (Puccio, Murdock & Mance, 2007) are the Clarifier, the Idealist, the Developer and the Implementer. On the other hand, the proposal by Selby, Treffinger, Isaksen and Laure (2004) indicated that three cognitive styles could be identified during the creative problem solving process. These styles could be understood according to the following dimensions: orientation to change (Exploratory/Developer), ways of processing information (External/ Internal) as well as to the preferable manners for making decisions (Focus on People/Tasks).

Cultural influences on thinking and creating styles were investigated by Wechsler (1999). Thus, she elaborated the test “*Styles of Thinking and Creating* (Wechsler, 2006) in order to assess Brazilians’ creative styles, which indicated the possibility of assessing five creative styles, named as Cautious-Reflexive, Non-Conforming/Transformer, Logical-Objective, Emotional-Intuitive, Relational-Divergent. Studies carried on Brazilian organizations indicated that these styles could identify leadership, having women obtained higher scores than men on the Emotional-Intuitive style, indicating more emotional sensibility than her work partners (Mundim & Wechsler, 2006). On the other hand, school motivation defined as curiosity and persistence for learning was found to be related to all these five styles among Brazilian high school students (Siqueira & Wechsler, 2004). Although no significant relationships were observed among creative styles and the extroverted and introverted psychological types, gender as well as area of study differentiated college students’ thinking and creative styles. Women were found to be more conservative than their male colleagues, while students majoring in Biology demonstrated to be more innovative than their peers enrolled in Business Administration, Mathematics or Computer Sciences courses (Homsí, 2006).

Considering the need for further understanding on the variables exerting impact on creativity, this study aimed to investigate the influences of age and gender on Brazilian’s thinking and creating styles.

## METHOD

### *Participants*

The participants were 1.752 individuals (780 men, 972 women) living in three Brazilian states: Sao Paulo (93%), Minas Gerais (3%), Paraiba (2.5%) and

Brasília (1.5%). These subjects' ages ranged according to the following: 17-24 (68.7%), 25-32 (15.1%), 33-40 (8.2%), 41-48 (5%), 49-56 (1.9%), 57-64 (0.7%), 65-72 (0.4%). As to their educational level, 43.4% have finished elementary school, 54.2% had graduated in different areas and 2.4% had obtained a graduate degree.

### *Instruments*

The scale "Styles of Thinking and Creating" (Wechsler, 2006) was utilized in this study. This scale is composed of 100 items, answered through a 6-points *likert* scale (total disagreement, disagreement, partial disagreement, partial agreement, agreement, total agreement). This scale provides the assessment of five thinking and creating styles: Cautious-Reflexive, Non-Conforming/Transformator, Logical-Objective, Emotional-Intuitive and Relational-Divergent.

The styles evaluated by this scale were derived from studies with factor analyses with samples greater than 1,000 individuals, which demonstrated the existence of 5 factors or styles accounting for 42.5% of the variance. Reliability investigated for each one of these styles through Alpha Coefficients reached the following levels: .98 (Cautious-Reflexive), .89 (Non-Conforming/Transformator), .82 (Logical-Objective), .54 (Emotional-Intuitive), .52 (Relational-Divergent). Thus, reliability was considerable higher for the first three styles.

The validity of these five styles were observed with a sample of 59 persons who had received awards, thus defined as creative, compared with 60 individual who had not received any distinction, considered as regular. Four styles demonstrated to be significantly related to the recognized production, which were: Cautious-Reflexive, Non-Conforming/Transformator, Emotional/Intuitive and Relational Divergent. The Logical-Objective style had significant correlations only with the total production, indicating that convergent thinking is also important for creativity, however only at the last part of the creative process when it comes to elaborate a product. Moreover, the four above mentioned styles also demonstrated to distinguish significantly the creative group from the regular one.

According to the factor analysis, the Cautious-Reflexive style was composed of 32 items, describing a person's which prefers to be prudent and to reflect quite well before making decisions, thus avoiding improvisations (Example: I am afraid of accepting projects that are dependent only upon me). The Non-Conforming/Transformator style was composed of 32 items, representing a person who is dynamic, inquisitive and idealist, preferring activities which involve changes and innovations (Ex: To solve problems in different ways is something that fascinates me). The Logical-Objective style was organized upon 11 items, revealing a rational and pragmatic person, who prefers working with structured tasks, based on facts and acquired knowledge (Ex: I prefer to utilize rules and methods when working). The

Emotional-Intuitive style was based on 7 items reflecting a person who prefers relying on emotions, intuitions and subjective perceptions when making decisions (Ex: I make decisions based on my feelings). Finally, the Relational-Divergent style was composed of 8 items representing individuals to whom is easy to work and lead groups, trying to integrate and combine members' opinions (Ex: I look for various points of view before making decisions).

### *Procedure*

Individuals were contacted by university teachers or work peers at the different Brazilian states. After they answered the informed consent sheet, the scale was administered to them in group or private situations.

In order to investigate age and sex differences, the sample was divided in two main age ranges: 17-24 (701 women, 503 men), 25 years or above (271 women, 277 men). Multivariate as well as Univariate Analysis of Variance were employed to investigate age and sex differences. The relationships among the styles were investigated by Pearson Correlations.

## RESULTS

Initial analysis considering means and standard deviations for men and women on each style according to their age range is presented in Table 1.

*Table 1. Means and standard deviations on styles for each sex*

Styles	Age Ranges	Women		Men	
		Mean	Stand. Dev.	Mean	Stand. Dev.
Cautious-Reflexive	17-24	111.89	36.61	127.22	33.10
	≥25	111.56	42.17	113.32	40.27
Non-Conforming/Transformator	17-24	148.59	15.34	152.14	15.11
	≥25	155.07	14.70	156.91	14.68
Logical-Objective	17-24	37.51	9.79	33.64	9.26
	≥25	36.88	8.51	37.78	10.25
Emotional-Intuitive	17-24	29.64	4.24	28.91	4.43
	≥25	28.55	4.47	27.73	4.57
Relational-Divergent	17-24	36.03	4.06	35.62	4.33
	≥25	35.97	4.13	36.46	4.37

The results presented on Table 1 indicated there were sex as well as age differences on thinking and creating styles. Among women, with ages ranging from 17-24, the means were higher for the Logical-Objective, Emotional-Intuitive and Relational-Divergent styles. However, the opposite was observed for the

Non-Conforming/Transformator style which had higher mean for women above 25 years old.

For the men, in the age ranges of 17-24, higher means were obtained for the Cautious-Reflexive, Emotional-Intuitive and Relational Divergent styles. However, for those men with ages 25 years or above, the higher means were observed for two styles, which were the Logical-Objective and Non-Conforming/Transformator.

The Multivariate Analysis of Variance was performed in order to observe if these differences were significant for all styles. As highly significant results were derived for sex, age and their interaction ( $p \leq .001$ ), further examination of each style was done by the use of Analysis of Variance. The results obtained through this analysis indicated that sex had significant effects upon four styles, which were: Cautious-Reflexive ( $F=20.47$ ,  $p \leq .0001$ ), Non-Conforming/Transformator ( $F=12.22$ ,  $p \leq .0001$ ),

Figure 1. Cautious-Reflexive Style

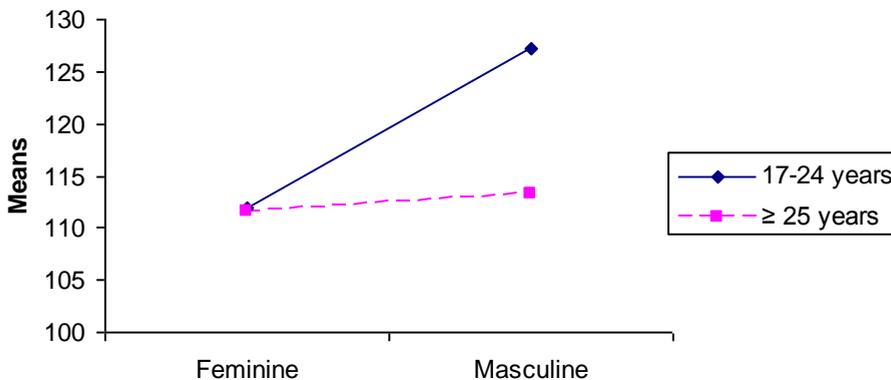
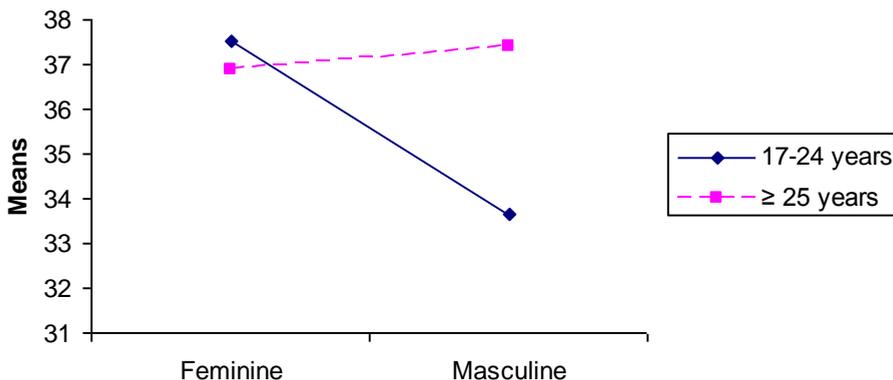
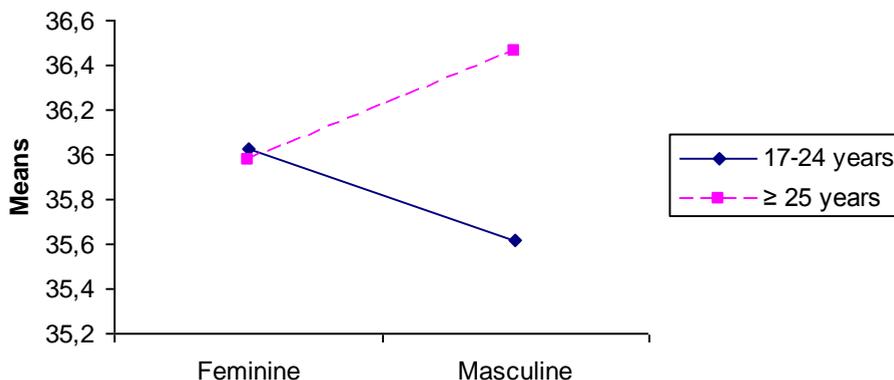


Figure 2. Logical Objective Style



Logical-Objective ( $F=9.20$ ,  $p \leq .001$ ) and Emotional-Intuitive ( $F=12.11$ ,  $p \leq .001$ ). Highly significant effects ( $p \leq .0001$ ) were also observed from age upon these same styles, as following: Cautious-Reflexive ( $F=13.68$ ), Non-Conforming/ Transformator ( $F= 52.43$ ), Logical-Objective ( $F=12.47$ ) and Emotional-Intuitive ( $F= 25.70$ ). The interactions between sexes and ages were significant for three styles: Cautious-Reflexive ( $F=12.97$ ,  $p \leq .0001$ ), Logical-Objective ( $p \leq .0001$ ) and Relational-Divergent ( $F= 4.31$ ,  $p \leq .05$ ). These interactions were plotted in Figures 1-3 for better illustration.

Figure 3. Relational-Divergent Style



On Figure 1 are depicted the interactions between sex and age for the Cautious-Reflexive style. As can be seen, men had higher scores than women on the age-range of 17-24 years, while small differences occurred for the ages 25 or above. On Figure 2 are represented the interactions between sex and age for the Logical-Objective style. In this style women had higher scores than men on the first age range, that is, from 17-24, but differences were very small for the age range of 25 years of above. The results obtained for the Relational-Divergent style are demonstrated on Figure 3. Women had higher scores than men on the first age range (17-24), while the opposite occurred, that is, men obtained higher scores on the second age range ( $\geq 25$  years).

The relationships among the five styles for the entire sample were further studied through the Pearson Correlation as presented in Table 2. Results presented on Table 2 indicated there were positive as well as negative significant correlations among the styles. The Cautious-Reflexive style had significant relationships with two styles, being positively associated with the Non-Conforming/Transformator style but negatively related to the Logical-Objective style. In addition, the Non-Conforming/Transformator style had positive significant associations with the

Emotional-Intuitive and the Relational-Divergent style. These last two styles were also significantly and positively related.

Table 2. Pearson Correlation among the styles

Styles	CR	IT	LO	EI	RD
CR-Cautious-Reflexive	-----	.58**	-.64**	-.04	-.03
IT- Non-Conforming Transformator		-----	-.05	.20**	.34**
LO-Logical Objective			-----	-.01	.02
EI- Emotional Intuitive				-----	.18**
RD- Relational Divergent					-----

\* $p \leq .05$ ; \*\* $p \leq .001$

## DISCUSSION

Thinking and creative styles can give important information on preferable ways of expressing creativity. This study confirmed the impact of age and gender upon Brazilians' styles, thus indicating that these variables have to be taken into consideration to promote further understanding of creativity in a different culture.

At the age of 17-24 years old, men tended to be more cautious than women, although these differences tended to be smaller when they reached approximately 25 years or above. In addition, men tended to have higher scores than women on the Non-Conforming/Transformation style, in spite of the age ranges.

These results are contradictory to Kirton's finding when comparing British and Indian business people, where women demonstrated to have a more conservative and adaptative profile than men. However, as indicated by this author, the opposite tendency could be verified if both sexes were compared in the same professions, where women were found to be more innovative than men. In the same way, Homsí (2006) has alerted that differences among sexes had to take into consideration the area of study, as college women majoring in Biology tended to be more conservative than men enrolled in other courses, such as Business Administration and Computer Sciences.

The influence of age and gender on the Logical-Objective style was also observed. Thus, at the age of 17-24 years the women tended to be more logical than men, while small differences occurred among sexes above this age range. In addition, women tended to demonstrated more preferences for the Emotional-Intuitive Style than men, in spite of age differences.

The predominance of the Emotional-Intuitive style among Brazilian women had already been observed. In the study by Mundin and Wechsler (2007), for example, when comparing business people, they observed that women had a style demonstrating more emotional sensibility than men. The same tendency was verified among high school students, as female students preferred to be more intuitive and emotional than

their male colleagues (Siqueira & Wechsler, 2004). Therefore, as pointed by Runco (2007), there are incongruous results when comparing sex differences among creative people, leading to the conclusion that creative individuals could be better described as presenting a “psychologically androgynous personality” that is, combining masculine and feminine characteristics.

Developmental differences have also to be considered on their impact upon thinking and creative styles. Men had higher scores on Relational-Divergent style when they reached 25 years or above. A possible explanation for men to be more relational and divergent as they mature may be the fact that this is the time they tend to enter the working environments, where they are expected to listen more to other group members before making decisions, instead of relying on his only point of view. On the other hand, other developmental needs can also affect old age people, as pointed by Oliveira (2004). In her study with people aged over 60 years it was observed that women tended to have a more sociological learning style, that is, to prefer classes where they could learn through group interactions instead of individualized tasks.

Change on creative styles according to age, thus impacting on the preferable ways of expressing creativity, had already been remarked by several authors (Levy & Langer, 1999). Experience as well as greater domain upon an area can influence the creative expression, thus bringing a sense of more freedom and less concern with the existing limitations within a specific field of knowledge. (Csikszentmihaly, 1996). As pointed by Gardner (1993), when reviewing the biographies of Freud, Einstein, Picasso and Stranvisnky, these eminent people continued to work intensively at old ages, exhibiting more freedom through their productive styles. These observations confirmed the tendency toward a more innovative style for both sexes, with ages 25 years of above.

Interesting associations were observed among the thinking and creating styles. The Cautious-Reflexive style was significantly related to the Non-Conforming/Transformator style, thus indicating that the characteristics associated with these styles, for example prudence versus risk-taking, which tend to be considered as antagonist, may coexist in the same individual. In the same way, persons with Non-Conforming styles may also have traits which are common to those to have Emotional-Intuitive or Relational Divergent styles. Therefore, one can conclude that there are not pure styles, but they exist in high or less grades, indicating they can be considered as preferences for dealing with the reality.

The negative association observed between the styles Logical-Objective and the Cautious-Reflexive can be explained considering that the first aims to put ideas into practice whereas the other is insecure to act. Previous studies by Wechsler (2006) had already indicated that the Logical-Objective style had only significant relations with creative production at the final stage of the creative process, that is, when there is the

need to implement an idea. Therefore, the relationships obtained among these styles indicated they may have different functions on the production and executing stages of creativity.

Limitations of this study have to be considered. The participants are mainly from a southeast Brazilian state, thus may not be considered as characterizing the styles of the Brazilian population. On the other hand, professional areas or working environments were not available from the individuals, which could have brought more information on their impact on sex differences, for example, the predominance of the emotional style among women. More investigations will also to be done comparing Brazilian styles with samples from other countries, in order to verify if the observed sex and age differences are replicable in other countries or if they could be understood as representing cultural characteristics. In conclusion, more studies investigating the gender as well as developmental impacts on creative styles among the cultures are necessary to provide a comprehensive understanding on the creative expression.

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