

Colors by pair of Pfister's colored pyramids test in children

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Received: November 30th, 2020.

Accepted: March 30th, 2022.

Section editor: Luiz Renato Rodrigues Carreiro.

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Source of funding: This study's data were collected with the support of the National Council for Scientific and Technological Development (*Conselho Nacional de Desenvolvimento Científico e Tecnológico* [CNPq]) under process No. 408554/2013-4.

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Abstract

The colors by pair, one of the indicators of the Pfister test, are pre-established combinations of two colors, which, when used together, suggest interpretations about emotional dynamics. We looked for validity evidence based on relations with other variables for the use of colors by pair with children. In the Pfister protocols of children between six and 11 years, the four most frequent colors by pair were Vd↓Vm↑, La↓Vi↓, Vm↑Br↑ and Vm↑Pr↑. When we compare the protocols of 172 children by age, older children tend to have more colors by pair than the younger children. In addition, we compared the results of the Zulliger test of these children according to the presence or absence of the most frequent colors by pair. There were few differences found in Zulliger's performance associated with the colors by pair of the color pyramid test (CPT), and more research is needed to understand the meaning of this indicator.

Keywords: color pyramid test, psychological assessment, children, test validity, personality measures

CORES POR DUPLA DO TESTE DAS PIRÂMIDES COLORIDAS DE PFISTER EM CRIANÇAS

Resumo

As cores por dupla, um dos indicadores do teste de Pfister, são combinações preestabelecidas de duas cores que, quando usadas em conjunto, sugerem interpretações sobre a dinâmica emocional. Buscamos evidências de validade baseadas nas relações com variáveis externas para o uso das cores por dupla com crianças. Nos protocolos do Pfister de crianças entre seis e 11 anos, as quatro cores por dupla mais frequentes foram Vd↓Vm↑, La↓Vi↓, Vm↑Br↑ e Vm↑Pr↑. Quando comparamos os protocolos de 172 crianças por idade, crianças mais velhas tenderam a apresentar mais cores por dupla do que as mais novas. Além disso, comparamos os resultados do teste de Zulliger dessas crianças conforme a presença ou ausência das cores por dupla mais frequentes. Houve poucas diferenças no desempenho do Zulliger associadas às cores por dupla do teste das pirâmides coloridas (TPC), sendo necessárias mais pesquisas que possibilitem compreender o significado desse indicador.

Palavras-chave: teste das pirâmides coloridas, avaliação psicológica, crianças, validade do teste, medidas da personalidade

COLORES POR PAR DEL TESTE DE LAS PIRÁMIDES COLORIDAS DE PFISTER EN NIÑOS

Resumen

Los colores por par, uno de los indicadores del test Pfister, son combinaciones preestablecidas de dos colores que sugieren interpretaciones sobre dinámicas emocionales. Buscamos evidencia de validez basada en relaciones con variables externas para el uso de colores por par con niños. En los protocolos de niños de seis a 11 años, los cuatro colores por par más frecuentes fueron Vd↓Vm↑, La↓Vi↓, Vm↑Br↑ y Vm↑Pr↑. Al comparar los protocolos de 172 niños por edad, los niños mayores tendían a tener más colores por par que los niños más pequeños. Además, comparamos los resultados del test de Zulliger según la presencia o ausencia de los colores por par más frecuentes. Hubo pocas diferencias en el rendimiento de Zulliger asociadas con los colores por par, y se necesita más investigación para comprender el significado de este indicador.

Palabras clave: teste de las pirâmides coloridas, evaluación psicológica, niños, validación de teste, medidas de la personalidad

Children experience various physical, cognitive, and psychosocial changes that influence their development throughout life. Hence, monitoring the different stages of child development is essential to prevent situations that may hinder healthy development or facilitate and enhance an adaptive and healthy process.

Psychological assessments measure whether a child is reaching the milestones expected at each developmental stage to propose preventive or interventional actions if needed (Borges & Baptista, 2018). The psychological tests used in psychological assessments must meet minimum requirements concerning the standardization of psychometric parameters, validity evidence, and precision estimates established by the Federal Council of Psychology (Conselho Federal de Psicologia [CFP], 2018) guidelines.

One psychometric parameter required from all psychological tests is validity. Validity concerns the extent to which a test's scores and interpretations actually measure a given phenomenon (Ambiel & Carvalho, 2017). There are different ways to verify a test's validity, and, in this study, we analyze validity evidence based on the relationships established between external variables and the color pyramid test (CPT) proposed by Pfister (Villemor-Amaral, 2005, 2014).

The CPT is an easy-to-apply method that can be used even when an examinee has speech difficulties, enabling them to express more particular functioning characteristics using pyramid schemes with colored squares and combining the colors (Villemor-Amaral, 2005, 2014). Studies present validity evidence for the CPT to be used among children concerning the percentage of color use indicators, chromatic syndromes, and formal aspects. These studies report that older children tend to present greater cognitive maturity and instability due to conflicts, and these findings are interpreted in the light of development theories and difficulties that emerge in early adolescence (Villemor-Amaral et al., 2012; Villemor-Amaral & Quirino, 2013; Cardoso et al., 2018).

These indicators have been extensively studied in recent years; however, identifying validity evidence of other CPT indicators of clinical relevance is also important. For example, based on clinical experiences, Villemor Amaral (1978) identified 20 two-color combinations (colors by pair), which present specific meanings when increased or decreased (i.e., appear more or less frequently) in the same protocol.

The 20 colors by pair described by Villemor Amaral (1978) are increased blue and yellow (Az↑Am↑), increased blue and gray (Az↑Ci↑), increased blue and black (Az↑Pr↑), increased gray and red (Ci↑Vm↑), increased orange and violet (La↑Vi↑), decreased orange and violet (La↓Vi↓), increased brown and white (Ma↑Br↑), increased brown and black (Ma↑Pr↑), increased black and yellow 1 (Pr↑Am1↑), increased black and gray (Pr↑Ci↑), Increased Green and Orange (Vd↑La↑), Increased Green and Stimulus Syndrome (Vd↑SE↑), increased green and violet (Vd↑Vi↑), decreased green and increased blue (Vd↓Az↑), decreased green and increased red (Vd↓Vm↑), increased red and white (Vm↑Br↑), increased red and brown (Vm↑Ma↑), increased red and black (Vm↑Pr↑), increased red and green (Vm↑Vd↑), increased red and violet (Vm↑Vi↑). Each pair has

specific interpretations provided by the manuals developed in Villemor Amaral (1978) and Villemor–Amaral (2005), both intended to use the CPT with an adult population.

The CPT manual for children and adolescents does not mention this indicator (Villemor–Amaral, 2014). A search conducted on the Virtual Health Library in Psychology (Biblioteca Virtual em Saúde – Psicologia Brasil [BVS–Psi Brasil]) and Scientific Electronic Library Online (SciELO) databases identified only one study addressing the use of colors by pair (CPT) among children (Farah et al., 2014).

The study conducted by Farah et al. (2014) sought evidence of validity and precision estimates of the CPT to be used among children aged between six and ten. Two hundred children of both sexes attending public and private schools located in the capital and interior of São Paulo, in Brazil, participated in the study. The children completed the CPT and house, tree, person (HTP) drawing – the latter was used as an external measure. The children's HTP protocols were considered to gather two extreme groups, with and without indicators of emotional adequacy. The CPT indicators were compared regarding the presence or absence of HTP emotional adequacy indicators. Children in the group with greater difficulty dealing with the HTP emotional demands more frequently presented increased red and brown colors ($Vm\uparrow Ma\uparrow$) in the CPT. Note that this combination of colors in the CPT has a negative meaning, suggesting regress and abrupt emotional discharge (Villemor–Amaral, 2005), which is certainly related to difficulties in dealing with the emotional demands identified in the HTP.

Analysis of the interpretations of colors by pair (CPT) revealed that most of these combinations of colors suggest difficulties dealing with emotional conflicts, immaturity, irritability, impulsive behavior or explosive emotional discharges, decreased or inconstant productivity, and dissatisfaction. The only combination that denotes healthy functioning is $Vd\downarrow Az\uparrow$, which indicates a tendency toward deep and authentic relationships, even if more socially restricted (Villemor Amaral, 1978; Villemor–Amaral, 2005).

Given the scarcity of studies addressing the psychometric qualities of the CPT's colors by pair among children, the objective was to seek validity evidence based on the relationships between external variables and colors by pair among children. Considering that the Zulliger test in the comprehensive system (ZCS) (Villemor–Amaral & Primi, 2009) and the CPT assess personality aspects, providing information regarding the examinees' cognitive and affective functioning, we choose ZCS as an external variable. Three hypotheses are proposed: one is related to the respondents' age, and two concern the correlations between the colors by pair and the variables of the ZCS.

We expected that older children would present a more significant number of colors by pair. This hypothesis is based on previous studies reporting that preadolescents presented greater cognitive maturity and evidence of emotional conflicts (Villemor–Amaral et al., 2012; Villemor–Amaral & Quirino, 2013; Cardoso et al., 2018).

Regarding the correlations with ZSC, we hypothesized that children presenting the $Vd\downarrow Az\uparrow$ pair would present more variables in the ZSC, suggesting a healthy development. In turn,

children presenting a higher frequency of the remaining colors by pair would present variables in the ZSC that indicate less healthy development. This hypothesis is based on the interpretation proposed for the colors by pair, in which most combinations suggest emotional conflicts, immaturity, irritability, and impulsive behavior, among other aspects that indicate a less healthy functioning (Villemor Amaral, 1978; Villemor-Amaral, 2005).

Method

Ethical procedures

This study used all the protocols in the database developed for a study conducted between 2014 and 2016. The Institutional Ethical Committee of the State University of Ceará (UECE) approved the study project, Opinion Report No. 618.913. The database provided information characterizing each of the participating children and their respective variables of the coding protocols of both the CPT and ZSC.

Undergraduate Psychology students and psychologists were trained to administer and code the instruments and collect data correctly. The student assistants had been approved in specific psychological assessment courses of the Psychology's undergraduate program.

Participants

The databases contained the CPT protocols of 207 children aged between six and 11 ($M = 8.50$, $SD = 1.49$) attending private and public schools located in a capital city in the North-east of Brazil; 53.6% were girls ($n = 111$). Inclusion criteria were being enrolled in one of the schools, aged between six and 11, having the parents signing the Free and Informed Consent Form, and children's consent, also by signing a form. Exclusion criteria were children who had received psychological and/or psychiatric care or school failure.

The frequency of colors by pair found in the protocols of 207 children was relatively low, and the most frequent ones occurred in less than 10% of the sample. Table 1 shows that the most frequent colors by pair were $Vd\downarrow Vm\uparrow$ ($n = 19$), $La\downarrow Vi\downarrow$ ($n = 13$), $Vm\uparrow Br\uparrow$ ($n = 11$), and $Vm\uparrow Pr\uparrow$ ($n = 11$). The remaining pairs occurred in less than 5% of the sample.

Table 1

Frequency of colors by pair (n = 207)

Colors by pair	F	%
Vd↓Vm↑	19	9.2
La↓Vi↓	13	6.3
Vm↑Br↑	11	5.3
Vm↑Pr↑	11	5.3
Az↑Am↑	10	4.8
Vd↓Az↑	10	4.8
Vm↑Vi↑	9	4.3
Vm↑Vd↑	9	4.3
Vm↑Ma↑	6	2.9
Az↑Pr↑	6	2.9
Vd↑La↑	5	2.4
Ma↑Br↑	5	2.4
La↑Vi↑	4	1.9
Ci↑Vm↑	4	1.9
Az↑Ci↑	3	1.4
Vd↑Vi↑	2	1.0
Ma↑Pr↑	2	1.0
Pr↑Ci↑	2	1.0
Pr↑Am↑	2	1.0
Vd↑SE↑	0	0.0

Note. Vd = green; Vm = red; La = orange; Am = yellow; Vi = violet; Az = blue; Br = white; Ci = gray; Pr = black; SE = stimulus syndrome; ↓ = decreased; ↑ = increased.

Considering that ZCS was used as an external criterion to assess validity evidence of colors by pair, we selected only the protocols of children who had also completed the ZSC. Therefore, the sample considered in this study was composed of 172 children.

Instruments

- *Pfister’s Color Pyramid Test – CPT* (Villemor–Amaral, 2005, 2014): Pfister’s CPT is a projective instrument that assesses emotional dynamics and cognitive functioning. The instrument comprises three pyramid schemes, a response sheet, a color swatch, colored squares arranged in ten colors with 24 shades, and a manual. The test is individually administered and lasts from 15 to 20 minutes on average. It can be administered to children, adults, and elderly individuals. The respondents are asked to complete the pyramid schemes with the colored squares according to their preferences, after which they answer a questionnaire concerning the pyramids just

built. We consider how the examinee arranges the squares in the pyramids, performs the task, and organizes the pyramids' structure.

- *Zulliger test* (Villemor–Amaral & Primi, 2009): the Zulliger test is designed to assess personality, providing information about one's cognitive, affective, and perceptive functioning. The instrument generates data regarding resources and controls to deal with stressful situations, affectivity, self–perception, relationships, processing, ideation, and information mediation. It may be individually applied to individuals between 18 and 67 years old and takes approximately 50 minutes. The application material consists of three cards printed with inkblots, a response sheet, a location chart, and the material to write the answers. The Zulliger test was administered, coded, and interpreted according to the comprehensive system. The test comprises two phases. In the first phase, named response phase, examinees are asked to observe the inkblot and answer the question, “What does it look like?”. The second phase concerns the questionnaire, and examiners verify at which spot of the inkblot the respondent saw what they reported and what features of the inkblot the respondent considered to provide their answer. This information enables assessing the results' quantitative and qualitative aspects.

Note that the decision to use the ZSC as an external measure is based on the fact that both tests assess aspects related to an individual's cognitive and emotional aspects (Villemor–Amaral & Primi, 2009; Villemor–Amaral, 2005, 2014), and also because the ZSC accumulates validity evidence recently gathered by studies addressing children (Villemor–Amaral & Quirino, 2013; Tavella & Villemor–Amaral, 2014; Villemor–Amaral et al., 2016; Villemor–Amaral & Vieira, 2016; Carvalho & Resende, 2018; Cardoso & Oliveira, 2018).

In summary, Villemor–Amaral and Quirino (2013) verified that the variable ZCS pure color, which indicates impulsiveness, was positively correlated with the CPT formal aspect. Tavella and Villemor–Amaral (2014) found evidence of validity for the use of cognitive and affective indicators in the ZSC [R, M active (Ma) and passive indicators (Mp), P and FQ–] to discriminate between children with different levels of creativity. Villemor–Amaral et al. (2016) compared the ZSC emotional and cognitive indicators among children in different development phases and observed that ZCS could discriminate emotional, social, and cognitive characteristics between the different age groups. Finally, Villemor–Amaral and Vieira (2016) found evidence validity for using the ZSC to assess the children's maturity in interpersonal relationships.

Carvalho and Resende (2018) compared the performance of seven- to 12-year-old children in the ZSC and found that younger children express themselves in a more immature and fanciful manner, while adolescents tend to develop more strategies to relieve affective conflicts. Finally, Cardoso and Oliveira (2018) compared children's performance in the ZCS according to sex. They identified that girls expressed affective needs and immature cognitive functioning

more easily, while boys presented meticulousness and a tendency to fantasize, adopted distorted language and showed difficulties in interpersonal relationships.

Data analysis

Initially, information that characterized the sample was extracted from the database together with the indicators related to the use of colors within the CPT and the variables of the ZSC structural summary of the 172 children who answered both the instruments. Then, the parameters for coding the colors by pair were coded according to the instructions provided in the manual for adults (Villemor-Amaral, 2005). A zero score was assigned to the absence of colors and one to the presence of colors by pair. The frequency of each pair was also verified.

For the ZCS analysis, we extracted the information from the tables at the bottom of the structural summary of each protocol, totaling 60 variables. These variables concerned decision-making, self-perception, interpersonal relationship, affectivity, and the cognitive triad. The data of the protocols were exported from Excel to the statistical software IBM Statistical Package for the Social Sciences (SPSS) version 23.

We worked with the four most frequent colors by pair ($Vd\downarrow Vm\uparrow$, $La\downarrow Vi\downarrow$, $Vm\uparrow Br\uparrow$, and $Vm\uparrow Pr\uparrow$) and $Vd\downarrow Az\uparrow$. Two groups of children (with and without colors by pair) matched according to sex, age, and answers provided to the ZSC were gathered. Sex and age were paired to control potential sociodemographic biases, while the number of answers provided to ZCS was controlled to prevent such a variation interfered with the ZSC remaining indicators.

The ZSC protocols of 16 children who presented the pair $Vd\downarrow Vm\uparrow$ were gathered in group 1, and the same number of protocols of children without this indicator was gathered in group 2, totaling 32 protocols. The same procedure was adopted to compose the remaining groups, so that 21 ZCS protocols were compared to analyze $La\downarrow Vi\downarrow$, ten of children who presented these colors by pair and ten of children who did not. Eleven children presenting $Vm\uparrow Br\uparrow$ were compared to 11 children who did not present this pair, as well as the ten children presenting $Vm\uparrow Pr\uparrow$. The same procedure was used for $Vd\downarrow Az\uparrow$, for which 16 protocols were compared. Half presented these colors by pair, and half did not. The chi-square test was used to make the comparisons.

Results

First, we distributed the colors by pair according to age and verified that 64 (37%) children out of the 172 who answered both the instruments presented at least one of the colors by pair. Next, because a protocol may have more than one colors by pair indicator, we verified the distribution according to the number of colors by pair; the ones with the highest number of indicators included four pairs (Table 2).

Table 2

Distribution of colors by pair of children answering the CPT and ZSC (n = 172)

Age	n	Absence of colors f (%)	Presence of colors by pair f (%)	One indicator of colors by pair	Two indicators of colors by pair	Three indicators of colors by pair	Four indicators of colors by pair
6	15	8 (53)	7 (47)	6	1	0	0
7	29	20 (69)	9 (31)	3	3	3	0
8	30	25 (83)	5 (17)	3	1	1	0
9	38	25 (66)	13 (34)	6	5	2	0
10	49	26 (53)	23 (47)	15	4	2	2
11	11	4 (36)	7 (64)	2	0	4	1
Total	172	108 (63%)	64 (37%)	35	14	12	3

The Chi-square test was used to verify whether there were statistically significant differences between the presence and absence of colors by pair according to the sociodemographic variables (sex and age). No significant differences were found for sex ($\chi^2 = 0.11, p = 0.515, Eta = 0.007$) but were found for age ($\chi^2 = 12.484, p = 0.029, Eta = 0.246$). Eleven-year-old children presented more colors by pair than younger ones, while eight-year-old children presented the lowest number of colors by pair.

We also compared the number of colors by pair according to the children's age, and a statistically significant difference was found ($\chi^2 = 42.063, p = 0.03, Eta = 0.243$). Note that the 11-year-old children presented more than one color per pair and the younger children presented fewer combinations of colors per pair per protocol.

Table 3 presents the variables of the ZSC structural summary that presented statistically significant differences after comparing the presence and absence of each of the four most frequent colors by pair (Vd↓Vm↑, La↓Vi↓, Vm↑Pr↑, and Vd↓Az↑) and the pair suggesting healthy functioning (Vd↓Az↑) between the groups. The number of children with each of these pairs, as shown in Table 3, is smaller than the number of children presenting these pairs in Table 1, considering that not all the children in the database had completed the ZSC protocol. Therefore, we emphasize that the number of participants considered in each group is presented in Table 3.

Table 3

Zulliger structural summary variables and colors by pair of the CPT

ZSC variables	Presence of colors by pair	Absence of colors by pair	U	p
	Vd↓Vm↑ (n = 16)	Vd↓Vm↑ (n = 16)		
M	13.31	19.69	77	0.04
Hd	14	19	88	0.035
PHR	12.34	20.66	61.5	0.006
	La↓Vi↓ (n = 10)	La↓Vi↓ (n = 10)		
FC'	8.4	12.6	29	0.049
COP	8.5	12.5	30	0.03
	Vm↑Br↑ (n = 11)	Vm↑Br↑ (n = 11)		
Y	9.5	13.5	38.5	0.031
Es	8.73	14.27	30	0.036
esAj	8.73	14.27	30	0.036
	Vm↑Pr↑ (n = 10)	Vm↑Pr↑ (n = 10)		
P	8	13	25	0.048
D	8.65	12.35	31.5	0.045
DAj	8.65	12.35	31.5	0.045
	Vd↓Az↑ (n = 8)	Vd↓Az↑ (n = 8)		
F%	6	11	12	0.03
Es	12.13	4.88	3	0
esAj	12.13	4.88	3	0
C'	10.5	6.5	16	0.03
Blend%	11	6	12	0.01
PHR	10.88	6.13	13	0.03
H	10.75	6.25	14	0.04
Hd	10.5	6.5	16	0.05

Note. Hd = content of human body parts; PHR = poor human representation; M = determinant of human movement; FC' = determinant of form with achromatic color; COP = cooperative movement; Y = diffuse shading determinant; es = experienced stimulation; esAj = adjusted experienced stimulation; P = popular response; D = grade D; DAj = adjusted grade D; F% = percentage of determinant form; C' = determinant of achromatic color; blend% = percentage of answers with mixed determinants; H = human content; Vd = green; Vm = red; La = orange; Vi = violet; Br = white; Pr = black; Az = blue; ↑ = increased; ↓ = decreased.

Table 3 shows that 11 of the ZSC variables presented significant differences ($p < 0.05$) because some pairs were more frequent than others, and each of them enabled differentiating two or three of the ZSC variables. The analysis of Vd↓Az↑ showed that nine variables presented significant differences.

Discussion

We opted to emphasize the understanding of CPT's colors by pair in this study because there is a lack of studies addressing validity evidence for this indicator. However, before discussing the results concerning the colors by pair, we note that three of the four most frequent pairs in the CPT database included the red color (Table 1). This color is associated with more excited states, extroversion, impulsiveness, and aggressiveness (Villemor-Amaral, 2005, 2014). Farah et al. (2014) also report that red was a predominant color among children, and red is mentioned as one of the three most frequent colors found in children's protocols (Villemor-Amaral, 2014).

Regarding the understanding of colors by pair, the four most frequent pairs were $Vd\downarrow Vm\uparrow$, $La\downarrow Vi\downarrow$, $Vm\uparrow Br\uparrow$, and $Vm\uparrow Pr\uparrow$. According to Villemor-Amaral (2005), $Vd\downarrow Vm\uparrow$ refers to irritability and impulsiveness without the individual having the resources to elaborate further, which hinders coordinated and coherent actions. $La\downarrow Vi\downarrow$ suggests a sluggish and not very productive attitude, while $Vm\uparrow Br\uparrow$ reveals excitability and impulsiveness in a weakened structure, indicating uncontrolled actions and a disorganized attitude. Finally, $Vm\uparrow Pr\uparrow$ indicates accentuated conflicts with a profound feeling of dissatisfaction. Villemor Amaral (1978) noted that, in general, the colors by pair would be related to the examinee's particular functioning, possibly associated with clinical conditions with a tendency toward emotional disorganization.

The comparisons based on age revealed an increase in the frequency of colors by pair among 11-year-old children (Table 2). Villemor Amaral (1978) had already reported that two of the four most frequent pairs found in this study, $Vd\downarrow Vm\uparrow$ and $Vm\uparrow Pr\uparrow$, are frequently found among adolescents. The increased frequency of colors by pair among preadolescents and adolescents may be associated with conflicts typical of this stage of development. Studies addressing other indicators also found age differences explained by puberty (Villemor-Amaral et al., 2012; Villemor-Amaral & Quirino, 2013; Cardoso et al., 2018).

The results concerning ZSC show that few variables presented significant differences due to the CPT's colors by pair (Table 3). Thus, even though we may explore various potential interpretations, caution is needed regarding the generalization of the results.

Regarding the most frequent colors by pair, the M, Hd, and PHR variables in the ZSC were less frequent in the group that presented the pair $Vd\downarrow Vm\uparrow$. M is part of the indicators related to processing. It indicates abstract reasoning and superior forms of conceptualization, while Hd and PHR concern interpersonal relationships and can only be interpreted when increased or compared to the remaining answers involving a perception of human content (Villemor-Amaral & Primi, 2009). As previously mentioned, $Vd\downarrow Vm\uparrow$ suggests irritable and impulsive behavior without resources to elaborate and, due to decreased green, social restriction, possibly resulting in a difficulty keeping coordinated and coherent actions (Villemor-Amaral, 2005). Therefore, decreased M in the group of children presenting $Vd\downarrow Vm\uparrow$ suggests that the more irritable and impulsive behaviors in the sample are potentially associated with difficulties in interpersonal relationships and decreased abstract reasoning.

Another piece of information provided in Table 3 concerns a decrease in the FC' and COP indicators among the children presenting La↓Vi↓. FC' is present in the ZSC affection dimension and suggests not expressed negative affects that are being internalized, while COP indicates a tendency to perceive interpersonal relationships positively and being available to establish cooperative relationships (Villemor-Amaral & Primi, 2009). Considering that La↓Vi↓ suggests low productivity and a sluggish attitude (Villemor-Amaral, 2005), there is evidence of a relationship between more inactive functioning with less tendency toward cooperative behavior and less tendency to internalize negative affect.

Table 3 also shows a decrease in the Y, es, and esAj indicators among children presenting Vm↑Br↑. These indicators belong to the ZSC control and stress tolerance. The Y indicator suggests an intense load of emotional stress, and when es and esAj are increased, they suggest intense stimulation above that an examinee can tolerate when making decisions or implementing actions (Villemor-Amaral & Primi, 2009). Even though decreased Y, es, and esAj were related to the presence of the pair Vm↑Br↑, which indicates excitability and impulsiveness, potential uncontrolled actions, and disorganized behavior (Villemor-Amaral, 2005), these ZSC indicators would only have interpretative meaning when in increased levels.

Table 3 shows decreased P, D, and DAj in the group of children presenting the pair Vm↑Pr↑. A decrease in P answers, incorporated in the ZSC mediation, suggests difficulty perceiving the environment's conventional aspects, while decreased D and DAj, which belong to control and stress tolerance, indicate difficulty managing stressful situations that hinder decision-making (Villemor-Amaral & Primi, 2009). Furthermore, because the pair Vm↑Pr↑ reflects accentuated internal conflicts and feelings of dissatisfaction (Villemor Amaral, 1978), these colors suggest a tendency toward decreased perceptions of the environment's conventional aspects and difficulty dealing with stressful situations among the children who, according to the CPT, expressed dissatisfaction and internal conflicts.

The Chi-square test, used to compare the two groups according to the Vd↓Az↑ pair, revealed nine variables with statistically significant differences (Table 3). The only variable with decreased values in this group was F%, while the remaining variables appeared at increased levels.

The F%, es, esAj, and C' variables belong to the ZSC control and stress tolerance. Decreased F% suggests excessive openness to experiences and a very broad focus of attention, which indicates that the individual may sometimes fail to process information in its entirety. The es, esAj, and C' variables indicate that the intensity and frequency of a stimulus are more demanding than the actions an individual can prepare and implement at a given time. Hence, the individual tends to refrain from emotionally expressing unpleasant affect (Villemor-Amaral & Primi, 2009).

The interpretation of an increase in blend% would depend on the remaining ZSC indicators, considering that, when combined with good resources, blend% suggests that the individual can entirely consider stimuli and has a good ability to work. Nonetheless, the combination of

this indicator with insufficient resources suggests control difficulties and disorganization (Villemor–Amaral & Primi, 2009).

The PHR, H, and Hd indicators need to be analyzed together because they are all associated with interpersonal relationships and self-image. An increase in these variables suggests an interest in others associated with difficulty establishing relationships due to a partial and suspicious perception of others, with conduct less adapted than expected in interpersonal relationships (Villemor–Amaral & Primi, 2009).

The interpretation of both CPT and ZSC variables suggests that establishing social restrictions to attempt to control and maintain more authentic relationships of $Vd\downarrow Az\uparrow$ in the CPT (Villemor Amaral, 1978; Villemor–Amaral, 2005) may be related to the containment of unpleasant affect and restricted affective contact due to a partial and suspicious perception of others, as indicated by ZSC (Villemor–Amaral & Primi, 2009). Hence, after obtaining a theoretical understanding of the results, we need to relate these findings to our proposed hypotheses.

As for the hypothesis related to the children's age, we expected that older children would present a more significant number of colors by pair. The reason is that previous studies (Villemor–Amaral et al., 2012; Villemor–Amaral & Quirino, 2013; Cardoso et al., 2018) report that pre-adolescents presented evidence of emotional conflicts. The results found here corroborated this interpretation.

Even though the hypothesis that children who presented $Vd\downarrow Az\uparrow$ would also more frequently present variables in the ZCS that suggest healthy development was not confirmed, interpretation of both tests' indicators provided complementary information about how these children relate. Likewise, the hypothesis that children more frequently presenting the remaining colors by pair would also present more ZCS variables suggesting less healthy development was not confirmed. These results suggest that, even though both the CPT and ZSC assess aspects of emotional dynamics and cognitive functioning, the ways these tests assess these aspects differ. Hence, further studies are needed to understand the correspondences and differences between these two methods.

Regarding this study's limitations, although various studies have investigated Zulliger's validity to be used among children, no manual or scientific publication provides national normative tables establishing the expected scores among children. Therefore, the analyses considered the raw scores of each indicator without effectively understanding what decreased or increased scores represented.

Note that the database used in this study was composed of the protocols of children without a history of psychological/psychiatric care or school failure. Perhaps, establishing criteria with specific emotional or cognitive functioning characteristics would result in a more significant number of children presenting colors by pair. Therefore, we suggest that future studies establish clinical criteria when considering colors by pair – for instance, composing a group of children considered aggressive and another group composed of non-aggressive children to compare the colors by pair associated with irritability and explosive emotional discharges.

Studies like this support understanding the possibilities and limitations of the integrated use of different projective methods. Additionally, studies can also contribute to the instruments' psychometric quality (Ambiel & Carvalho, 2017; CFP, 2018) and promote a reflection upon the extension and practical use of these resources to measure children's adaptation (Borges & Baptista, 2018). Therefore, even though the meaning of each of the colors by pair was not identified when the combined use of the ZCS variables was considered, this study contributes to the literature on colors by pair by showing the importance of new studies in understanding the psychometric quality of this seldom investigated indicator.

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