ARTIGO ORIGINAL

Brazilian norms for the International Affective Picture System (IAPS) – comparison of the affective ratings for new stimuli between Brazilian and North-American subjects

Normas Brasileiras para o International Affective Picture System (IAPS) – estudo comparativo dos novos estímulos para avaliações afetivas entre sujeitos brasileiros e norte-americanos

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ABSTRACT

Objective: *The study presents the Brazilian norms for 240 new stimuli from International Affective Picture System (IAPS), a database of affective images widely used in research, compared to the North-American normative ratings.* ***Methods:*** *The participants were 448 Brazilian university students from several courses (269 women and 179 men) with mean age of 24.2 (SD = 7.8), that evaluated the IAPS pictures in the valence, arousal and dominance dimensions by the Self-Assessment Manikin (SAM) scales. Data were compared across the populations by Pearson linear correlation and Student's t-tests.* ***Results:*** *Correlations were highly significant for all dimensions; however, Brazilians' averages for arousal were higher than North-Americans'.* ***Conclusion:*** *The results show stability in relation to the first part of the Brazilian standardization and they are also consistent with the North-American standards, despite minor differences relating to interpretation of the arousal dimension, demonstrating that IAPS is a reliable instrument for experimental studies in the Brazilian population.*

Keywords
Expressed emotions, cross-cultural comparison, visual perception, projective techniques/standards.

RESUMO

Objetivo: Este trabalho apresenta as normas brasileiras de 240 novos estímulos do *International Affective Picture System* (IAPS), instrumento de imagens afetivas amplamente utilizado em pesquisas, e estabelece comparações com os valores da normatização americana. **Métodos:** Participaram voluntariamente 448 estudantes universitários brasileiros (269 mulheres e 179 homens), com idade média de 24,2 anos (DP = 7,8), que avaliaram as fotografias do IAPS pelas dimensões prazer, alerta e dominância por intermédio das escalas do *Self Assessment Manikin* (SAM). Os dados foram comparados entre as populações por correlações lineares de Pearson e testes t de Student. **Resultados:** As correlações foram altamente significativas para todas as dimensões, porém as médias de alerta dos brasileiros foram mais elevadas do que as dos norte-americanos. **Conclusão:** Os resultados mostram estabilidade com a primeira parte da normatização brasileira e boa consistência com os valores da normatização norte-americana, a despeito de pequenas diferenças concernentes à interpretação da dimensão alerta. Fica demonstrado que o IAPS é instrumento confiável para estudos experimentais na população brasileira.

Palavras-chave
Emoções manifestas, comparação transcultural, percepção visual, técnicas projetivas/normas

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As a product of selective evolutionary processes, emotion is the facility of gauging values for different life events[1]. Its complexity rises through phylogeny and, so more than any other species, human beings are the greatest beneficiaries and victims of their varied emotional repertoire[2]. Among the methods developed to elicit emotions in laboratory, the International Affective Picture System (IAPS) has proved to be one of the most versatile instruments for research. IAPS is a database of complex and highly symbolic visual stimuli presenting an extensive repertoire of situations that reproduce many aspects of real life, and act as potent generators of emotions[3]. Its versatility is due to the ease presentation in laboratory, enabling researchers to control intensity and exposure time, and employ reliable measuring methods. IAPS has been widely used in research, especially in areas as complex as those involving the study of emotions such as cognition[4], personality[5,6], language[7] and social attitudes[8,9]. More recently, regarding the popularization of fMRI studies in neuroscience, IAPS has been included in a variety of neuroimage research protocols. A good example are the studies conducted by Moll and colleagues[10,11], in which normal subjects were scanned while viewing IAPS pictures that they were asked to rate for emotional valence, arousal and moral content. These affective and moral ratings permitted the investigators to identify neural correlates of moral sensitivity and valence perception.

Shedding a clinical insight, another example is the study of Berntson[12], that assessed the capacity of patients with amygdala lesion to evaluate neutral and emotional stimuli of IAPS in the valence and arousal dimensions by self-report scales. According to their findings, the amygdala damage impaired the arousal responses for negative but not positive stimuli, while the evaluations of valence did not differ from control subjects. In addition, there has been an increasing interest from clinicians to associate IAPS with classic neupsychological tests for the research and diagnosis of neural lesions, especially in structures related to the emotional experience[13].

GRAPHIC REPRESENTATION OF IAPS PICTURES IN THE AFFECTIVE SPACE

The motivational organization of affective states is defined by a "valence" dimension, characterized by approach or avoidance behaviors (reflecting the appetitive-aversive system); an "arousal" dimension, which represents intensity or level of activation; and finally by the controllability of response, defined as "dominance" dimension. Emotional states may be represented in an affective space composed by two orthogonal dimensions: arousal on the x axis (abscissa) and valence on the y axis (ordinate)[14], as shown in Figures 1, 2 and 3. IAPS stimuli are well distributed in the affective space, although unpleasant pictures causing low arousal levels are rare[15]. Furthermore, Lang do not mention the existence of pleasant figures associated with low levels of arousal, as seen by psychophysiological experiments performed by Ribeiro[16].

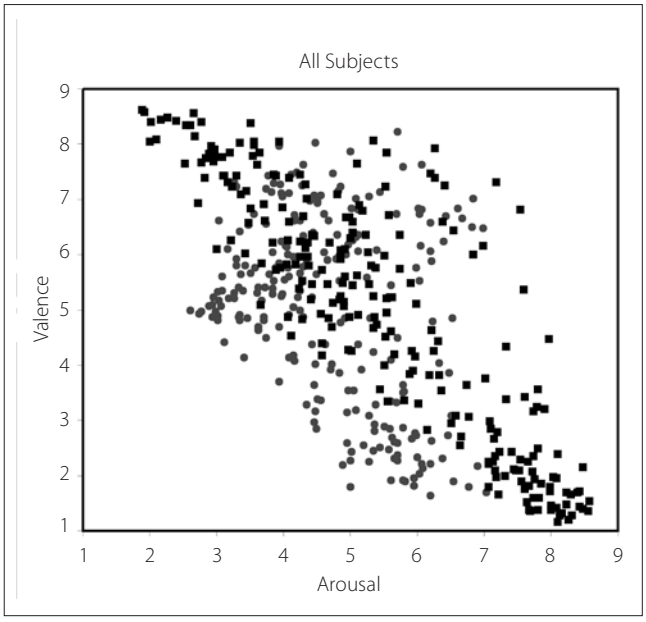

Figure 1. Dimensional representation of emotional states in the sample.

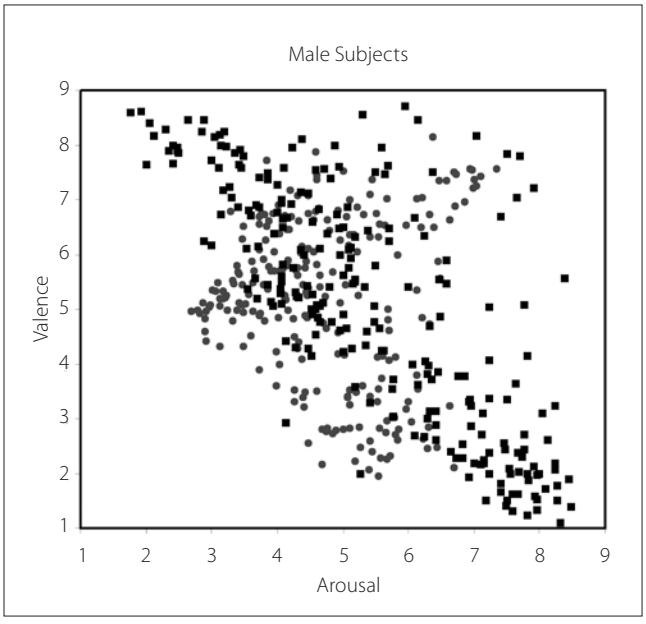

Figure 2. Dimensional representation of emotional states in the male sample.

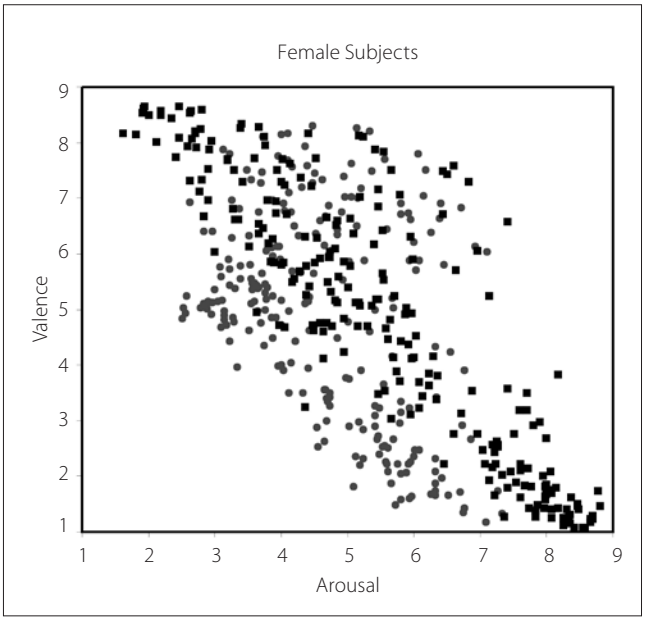

Figure 3. Dimensional representation of emotional states in the female sample.

In the North-American[15] and Spanish[17] standardizations the distribution of IAPS stimuli in the valence-arousal affective space shows a "boomerang" pattern where two branches bifurcate from an affectively neutral base towards two extremes of valence (pleasant in the upper quadrant and unpleasant in the lower), both of them describing high arousal states. This pattern may be a consequence of the association of neutral pictures with low arousal states and emotional pictures (including both pleasant and unpleasant stimuli) with high arousal states. As a consequence of this response pattern, there is only a slight linear correlation between valence and arousal dimensions. However, the Brazilian standardization performed by Ribeiro[18] found a different pattern of distribution of stimuli in the affective space, in which the neutral pictures are located in the center of the graph (taking the number 5 as neutral point for arousal and valence), unpleasant pictures are in the lower right quadrant, while pleasant pictures may be subdivided in relaxing (upper left quadrant) and arousing (upper right quadrant).

IAPS is constantly being updated and new sets of pictures have been added in recent years. The Brazilian standardization initiated by Ribeiro[18,19] included 707 stimuli, corresponding to sets 1 to 12 of the original study. The present study updates the Brazilian norms to cover 240 new stimuli and aims to compare the affective appraisals of Brazilian and North-American subjects.

METHODS

Subjects

The Brazilian sample consisted of 448 university students (179 men and 269 women) with a mean age of 24.2 (SD = 7.8), all native speakers of Portuguese, selected from different courses (medicine, biomedicine, psychology, accounting, administration and physical education) at private and public universities in the city of São Paulo. As mentioned in previous studies[18,19], some data from the North-American sample, as average age and number of subjects that evaluated each picture, were not specified in the manual for the North-American standardization neither provided by the authors.

Material

Presently, IAPS consists in a database of 950 high resolution photographs that exhibit a great variety of situations present in the daily life of many populations, including cultural values and social norms, as though other features broadcasted by the international media[15]. In the valence range, the pictures vary from very positive and pleasant situations (as romantic couples, babies, landscapes, food, money) to very negative and unpleasant ones (as accidents, mutilations, natural disasters, violence scenes), admitting in the middle of this spectrum a number of neutral stimuli (like neutral objects, indifferent faces and abstract art). In an arousal range, the pictures vary from soothing or relaxing (babies, landscapes, cute pets) to very arousing or alertant ones (scenes of sex intercourse, extreme sports, mutilation, and assaults).

In this study were included 240 stimuli from IAPS (corresponding to the sets 13 to 16 of the original standardization)[15], randomly rearranged into 8 sets of 30 pictures. We limited the number of slides in each session in order to minimize potential fatigue and attentional confounds over time.

Procedure

Methodology was the same as in the preliminary studies[18,19], and the instructions can be found at the website: www.unifesp.br/psicobio/adap/adapta.htm.

The design was approved by Federal University of São Paulo – EPM/Unifesp ethics committee. Subjects were told they would be participating in a study on emotional images and signed an informed consent form. The experiments were conducted in a classroom with a data-show type projector. Volunteers were given a printed version of the Self Assessment Manikin (SAM)[20], a system of graduated scales of designs used to rate each picture on three 9-point scales, namely "valence" (ranging from 1 for most pleasant to 9 for most unpleasant), "arousal" (ranging from 1 to calm/relaxed to 9 for agitated/aroused) and "dominance" (ranging from 1

for submissive to 9 for dominant). Subjects evaluated each picture shown by marking an "x" on each of the three scales.

In all, 494 subjects took part in the study. Data for a total of 9.3% of the participants were excluded from the analysis for defective eyesight, not stating their sex, or being negligent in filling out the scales.

Each experimental session included a preliminary explanation of the experiment and instructions on how to use the SAM scale. In addition to the 30 images shown in each session, the same 3 pictures were presented as examples and subjects evaluated their emotional content on a trial sheet of paper. During the experiment, each evaluation began with a 5-second preparatory slide showing the number (1-30) of the next picture. Then the target picture was displayed on the screen for 5 seconds. In the 15 remaining seconds, no picture was presented and subjects made their evaluations on the pleasure, arousal and dominance dimensions. Each experimental session was held in groups of 13 to 60 students with appropriate lighting for showing slides.

Statistical analysis

The data for the 8 sets of stimuli studied were rearranged to result in the 4 sets of the original study[15]. For each picture, averages and standard deviations for affective evaluations of all subjects were determined, and data for men and women were also determined separately, for the three dimensions (valence, arousal and dominance). Units of measurement used in the statistical analysis were mean average evaluations of all pictures in each set for all subjects and by sex, as well as the mean averages of all pictures in all of the sets, also for all subjects and by sex. Brazilian sample data variations were compared with those obtained from the North-American norms by Student's t tests for independent variables and Pearson correlation coefficients. A significance level of 5% was used for all analyses.

RESULTS

Figures 1, 2 and 3 show ratings in affective space (pleasure × arousal) for the 240 IAPS pictures, for data obtained in Brazil and in the USA for all subjects, men and women.

Correlations between valence and arousal for all Brazilian subjects, men and women were negative and higher (r=−0.85; −0.74 and −0.87, respectively; p≤0.05) than the North-Americans (r= −0.28*; −0.03 and −0.37*, respectively; *p≤0.05).

No significant differences were found between the Brazilian and North-American samples in any of the 4 sets in terms of evaluations by all subjects, men and women, for the dimensions valence and dominance (p=0.68) (Table 1). However, on the arousal dimension, Brazilians attributed higher values for all sets (p≤0.05) and this significant difference appeared equally in all sets, except set 16 for men (p=0.06).

On the comparison between samples for all 240 pictures (Table 2), Brazilian men attributed lower dominance values than North-Americans (p≤0.05), while on the arousal dimension, Brazilian subjects attributed higher arousal values than North-Americans for all the groups studied (p≤0.05).

Table 1. Means (standard deviation) for Brazilian and North-American ratings of pictures in sets 13 to 16 for dimensions valence, arousal and dominance, for all subjects, men and women (BRAZIL, n=448 for total subjects).

		Set 13		Set 14		Set 15		Set 16	
		BR	USA	BR	USA	BR	USA	BR	USA
Pleasure	**Total**	5.15	5.14	4.93	4.89	4.93	4.94	4.97	5.04
		(1.79)	(1.66)	(1.79)	(1.54)	(1.73)	(1.41)	(1.75)	(1.42)
	Men	5.30	5.22	4.98	5.05	5.12	5.17	5.04	5.18
		(1.68)	(1.44)	(1.71)	(1.43)	(1.75)	(1.37)	(1.67)	(1.34)
	Women	5.07	5.05	4.90	4.75	4.76	4.83	4.91	4.94
		(1.75)	(1.69)	(1.68)	(1.53)	(1.60)	(1.35)	(1.70)	(1.42)
Arousal	**Total**	5.37*	4.61	5.61*	4.85	5.44*	4.61	5.46*	4.74
		(1.93)	(2.19)	(1.96)	(2.14)	(1.88)	(2.13)	(1.95)	(2.16)
	Men	5.24*	4.57	5.56*	4.76	5.40*	4.68	5.40	4.92
		(1.73)	(2.02)	(1.93)	(2.06)	(1.84)	(2.02)	(1.99)	(1.92)
	Women	5.45*	4.67	5.64*	4.94	5.45*	4.56	5.49*	4.57
		(1.88)	(2.30)	(1.92)	(2.16)	(1.83)	(2.15)	(1.88)	(2.29)
Dominance	**Total**	5.03	5.25	4.86	5.21	4.95	5.10	5.00	5.17
		(2.01)	(2.15)	(2.01)	(2.10)	(1.98)	(1.98)	(1.98)	(1.96)
	Men	5.17	5.41	5.05	5.33	5.13	5.48	5.14	5.27
		(1.95)	(2.15)	(1.97)	(2.15)	(1.98)	(1.97)	(1.99)	(1.87)
	Women	4.93	5.11	4.73	5.02	4.78	4.87	4.89	5.09
		(1.99)	(2.11)	(1.95)	(2.04)	(1.90)	(1.95)	(1.87)	(2.01)

*p≤0.05

Table 2. Average Brazilian and North-American ratings for all 240 IAPS pictures studied (sets 13 to 16), for dimensions valence, arousal and dominance for all subjects, men and women (n=488).

	Total		Men		Women	
	BR	USA	BR	USA	BR	USA
Pleasure	5.13	5.09	5.26	5.27	5.03	4.98
Arousal	5.46*	4.80	5.42*	4.85	5.47*	4.77
Dominance	5.05	5.21	5.21*	5.43	4.94	5.06

*p≤0.05

All correlations between samples were significant ($p \leq 0.05$), both for the results of each set analyzed separately, and for all sets combined, for all subjects, men and women (Table 3). The highest levels of correlation between the Brazilian and American ratings were found for the valence dimension, followed by dominance, and finally arousal, for all subjects ($r = 0.96$; 0.83 and 0.66, respectively), men ($r = 0.94$; 0.82 and 0.60. respectively) and women ($r = 0.95$; 0.84 and 0.66, respectively) ($p \leq 0.05$).

Table 3 - Linear correlations (r) between Brazilian and North-American evaluations for dimensions valence, arousal and dominance for all subjects, men and women. by set (13 to 16).

		Set 13	Set 14	Set 15	Set 16
Pleasure	**Total**	0.96	0.94	0.98	0.93
	Men	0.91	0.94	0.96	0.94
	Women	0.95	0.95	0.98	0.91
Arousal	**Total**	0.74	0.58	0.70	0.60
	Men	0.62	0.59	0.63	0.56
	Women	0.73	0.57	0.69	0.61
Dominance	**Total**	0.82	0.77	0.85	0.88
	Men	0.75	0.86	0.78	0.87
	Women	0.79	0.87	0.88	0.83

*$p \leq 0.05$

DISCUSSION

In general, the data are consistent with those obtained in the first part of the Brazilian adaptation of the IAPS standards[18] and similarly retain certain differences in relation to the American and Spanish standards. Reproducing the trends observed in the first part of the study, Brazilian subjects attributed higher arousal values than North-Americans or Spaniards. On the dominance dimension, Brazilians attributed lower values than North-Americans and higher ones than Spaniards. An interesting point is that standardizations for the three countries show almost no differences in ratings for valence, while the largest variations are found on the arousal and dominance dimensions. These differences do not mean that the IAPS stimuli induce different affective states for Brazilians, North-Americans or Spaniards, but may be due to differences in the interpretation of the dominance dimension, and in particular of arousal, which are apparently the terms most susceptible to semantic and conceptual variations between the different languages and populations.

The present study has confirmed the pattern of distribution in the affective space of pleasure v. arousal found on the Brazilian previous studies[18], which took on a format quite unlike the "boomerang" pattern of the American and Spanish norms. As seen in Figures 1, 2 and 3, the distribution graphs show a diagonal branch that reaches from the end of the upper left quadrant (corresponding to relaxing pleasant stimuli) to the end of the lower right quadrant (corresponding to unpleasant stimuli). We also observed a dispersal line from the upper left quadrant to the right relating to the category of pleasant-arousing stimuli. This distribution shows a high negative correlation between the dimensions "valence" and "arousal", generally higher than in the North-American and Spanish studies.

The distribution in affective space of positive stimuli on a bipolar arousal scale ranging from "relaxed" to "aroused", is supported by psychophysiological evidences. Ribeiro[16] have found that pleasant pictures rated as relaxing (such as babies or landscapes) produce lower physiologic arousal (lower levels of skin conductance, lower corrugator and higher zygomatic muscle activity) than pleasant pictures rated as arousing (such as photographs showing erotic couples or extreme sports).

Another point for consideration is that Vila[21] noted that the "boomerang" pattern of the valence v. arousal affective space is repeated when other types of stimuli are used, such as sounds[22], words[23] and instrumental music[24]. For these cases, a reinterpretation of the affective space based on a bipolar arousal scale, may provide a more accurate and pertinent rating for neurobiological responses by extending the range of stimulus categories, and enabling more sophisticated data collection in accordance with the potentialities offered by these instruments.

CONCLUSION

We conclude that this study fulfilled the objective of updating the Brazilian norms for the IAPS and found values that are very consistent with the standards obtained in the first part of the study, thus adding greater psychometric value to this instrument for research on the Brazilian population.

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