

Validation of Affective Images of the IAPS Set in Children

Noemí Gabriela Gómez Ochoa¹, P. Ortega-Chasi², M. Cobos-Cali³,
O. Alvarado-Cando⁴, and K. Andrade-Castro¹

¹Neurosciences Group, University of Azuay, Cuenca - Ecuador

²School of Computer Science, University of Azuay, Cuenca - Ecuador

³School of Psychology, University of Azuay, Cuenca - Ecuador

⁴School of Electronic Engineering, University of Azuay, Cuenca - Ecuador

ABSTRACT

Emotions, in the field of Neuropsychology, are a topic of contemporary relevance due to the impact they have on a person's development. At the brain level, emotions arise from the activation of brain circuits in response to stimuli. Treatments have focused on traditional psychological intervention, which today, thanks to technological advances, includes the use of technology, so it is necessary to have available material that has been validated and standardized in the area where it is to be used, which is the subject of this study. The validation of 16 affective images from the International Affective Picture System (IAPS) set was carried out with the participation of 223 children between 6 and 8 years of age from a private, co-educational educational institution in Cuenca, Ecuador applying validation processes followed in other countries, adjusted to our context. The children's emotional responses were similar to those of the original test according to the statistical tests applied.

Keywords: IAPS, Emotions, Emotional response, Validation, Emotional evaluation, Neuropsychology

INTRODUCTION

At the brain level, emotions arise from the activation of brain circuits in response to stimuli, which activate one of the human body's primary motivational systems: the appetitive or defensive system, generating approach or avoidance behavior. Activation demands the intervention of 3 levels of response: physiological, motor, and cognitive, the latter comprising 3 dimensions: valence (pleasant–unpleasant), arousal (activated–calm) and control or dominance of the person over the emotional response (Bradley, 2009; Bradley et al., 2001; Lang, 1995). If the stimulus is positive, the appetitive system is activated, producing a feeling of security and stability; on the other hand, if the stimulus is negative, the defensive system is activated, generating a state of fear, insecurity, and avoidance. The emotional environments in the two cases are different, the second being more complex and affecting learning and levels of attention, since the individual's thoughts are concentrated on how to solve or escape from the problem at hand, i.e., they remain in a state of constant alert in the face of situations that could be adverse (Fredrickson, 1998).

Emotions are classified as discrete and dimensional. Those that correspond to the first classification are commonly called basic emotions and are six in number: anger, disgust, fear, happiness, sadness and surprise (Ekman, 1972). Dimensional emotions are classified according to their location in a space that is determined by two axes: arousal (intensity of emotions) and valence (appraisal of emotions) (Kragel and Labar, 2013). The latter is used in the field of psychology for self-report assessment.

In childhood, emotions develop from an early age. Observation, to be able to recognize and discriminate the expressions of the nearby adult, evolves into the ability to recognize and understand emotions, leading to self-awareness and self-understanding, that are strengthened along with the social spaces in which they are performed. The more a child's social circle expands to include peers and adults in addition to their parents, the more they establish an understanding of their own emotions and those of others and strengthen emotional bonds (Thompson, 2001; Loeches et al., 2004; Maguire et al. 2016). From this, the importance of emotionally stable childhoods arises, since experiences, coupled with personality and life background, will lead individuals to express their emotions in a unique way in the different environments in which they develop (Thompson, 2001).

In the field of research, the evaluation of emotions is relevant and complex as it demands ethical, methodological, and instrumental processes that are in line with current needs. Images are an appropriate instrument for the evaluation process; existing scientific studies carried out with affective images include those using the International Affective Picture System (IAPS) developed by Lang et al. (2008), which is restricted and requires the signing of confidentiality protocols to access the 1195 color photographs. These pictures of objects, people, landscapes and everyday life are categorized according to the three dimensions: valence, arousal and dominance and are assessed by self-report using the Self-Assessment Manikin (SAM), which is a pictographic scale with values 1 to 9 that can be selected for analysis (Lang and Bradley, 1994).

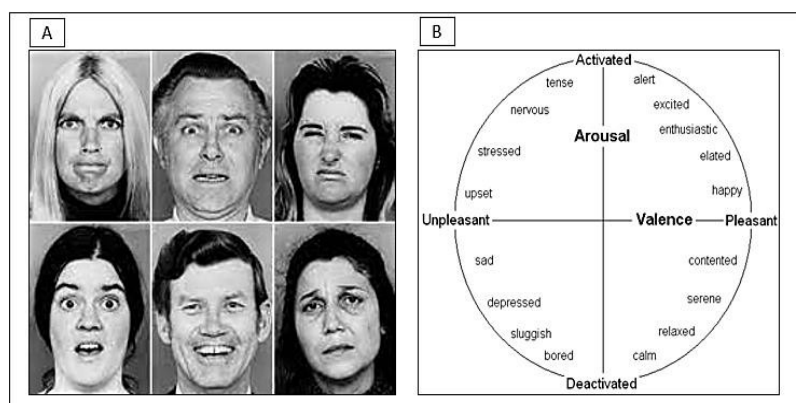


Figure 1: Classification of emotions. A. Ekman's discrete emotions, 1972. B. Representation of Russell's circumplex model (Trimmer et al., 2013).

METHODOLOGY

The validation of the 16 images of the IAPS set was developed in a quantitative and inferential study that made use of statistical values to determine the validity of the images used and to undertake a comparison between the original test and the study test.

Instruments

For validation, a digital presentation was prepared containing the script of the study presentation, 2 DEMO images, 16 study images on black backgrounds with appropriate labelling (lettering for demo images and numbers for study images), as well as the SAM scale. The 2 DEMO images were used to give instructions on how to carry out the activity, with no time limit for their execution. Each study image was projected for 6.5 seconds, of which 0.5 seconds were accompanied by a sound element to alert the child to the image already on the screen, and followed by a black screen for 15 seconds, which was the time allowed to record the assessment on the registration sheet using the SAM.

Complementing the digital presentation, the registration sheet included the Self-Assessment Manikin or SAM with a Likert scale from 1 to 9 in accordance with the original study. The registration sheet was placed in a booklet, which included a cover sheet with identification data: code, group, date and name of the image set, followed by 18 sheets with the SAM pictograms (2 for the DEMO images and 16 for the study images).

Population and Sample

The study population consisted of 343 students between 6 and 8 years of age from a private, co-educational school in the city of Cuenca, Ecuador, who were sent informed consent forms to be signed by their legal representatives, leaving a sample, following return of the forms, of 223 boys and girls.

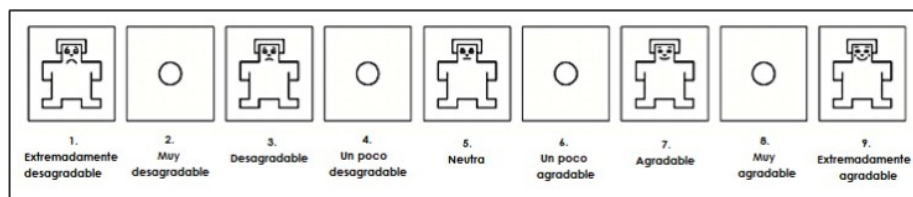


Figure 2: SAM self-assessment manikin (Lang and Bradley, 1994).

Table 1. Study sample (own elaboration).

Sample	n
Children	117
Girls	106
Total	223

Procedure

Access to the Study Group

In order to carry out the study, it was necessary to engage in dialogue with the authorities of the institution where it was to be carried out to obtain a letter of authorization. It was also necessary to present the necessary documentation to the Human Research Committee of the University of Azuay (CISH UDA) to get permission to carry out the research, which included consent and informed consent forms addressing ethical issues such as: confidentiality, the right to anonymity, voluntariness, return of results, and the right to withdraw from the study.

Selection of Images

To obtain images of the set, the intervention of the director of the Neurosciences Group of the University of Azuay was required, who carried out the due process with the Center for the Study of Emotion and Attention of the National Institute of Mental Health of the United States (NIMH). Having obtained access to the images, the 18 images for the study were randomly selected, from subsets of images with valences of 1–4 and with valences of 6–9, leaving aside the images with a neutral valence of 5 due to the origin of the study. In addition, exclusion criteria were established with respect to explicit sexual content and depictions of extreme violence due to the age of the participants; instead, the images immediately above in the list of valence measurements were chosen.

Due to the importance of the valence hierarchy, we chose to assess this dimension (Bradley, 2009; Bradley, Codispoti, Cuthbert and Lang, 2001; Lang, 1995).

Image Evaluation

For the evaluation, a pilot phase was carried out to identify relevant issues with children of a similar age group and with similar characteristics to the sample; the results of this process determined the form of presentation of the booklet.

For the evaluation, groups of 8–11 students were assembled in the morning in a comfortable and well-lit room. A person trained in the assessment process with the children was available for support.

The screening began with the presentation of the study, the assent was read out and the process was explained using the DEMO images and the booklet.

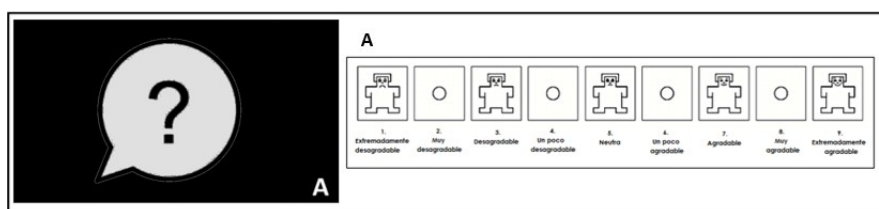


Figure 3: Example of screen projection and evaluation in the self-assessment manikin (own elaboration).

When observing the projected image, the children had to indicate whether they found it pleasant or unpleasant using the SAM scales by marking the corresponding box in the booklet with an X.

After the demonstration with the DEMO images, the study images were evaluated.

Statistics

Following the assessment by the 223 students, the data obtained were tabulated in three tables: overall (all participants), male and female, as was done in the original test. The data were processed using the R tool, from which descriptive data were obtained, as well as mean and standard deviation values for comparison using chi-square. A comparative analysis between the study test and the original test was conducted using Spearman's test, and coefficient of coincidence values were calculated as percentages.

RESULTS

The data obtained from the affective imagery assessment are presented below.

Image Validation

Validation of the 16 images of the IAPS set is realized in the three tables showing overall, male and female mean and standard deviation values.

Table 2. Overall validation.

Image	M	SD
Image 1	6.52	2.70
Image 2	6.36	2.84
Image 3	3.30	3.20
Image 4	7.19	2.68
Image 5	2.23	2.48
Image 6	5.17	3.11
Image 7	1.74	1.80
Image 8	8.41	1.75
Image 9	8.50	1.46
Image 10	2.33	2.39
Image 11	7.54	2.34
Image 12	4.15	3.40
Image 13	7.75	2.34
Image 14	8.15	1.90
Image 15	2.97	2.90
Image 16	2.16	2.28

Note: Application of the study to all male and female students using the images from the IAPS set.

Table 3. Validation: males.

Image	M	SD
Image 1	6.47	2.77
Image 2	6.32	2.76
Image 3	4.20	3.59
Image 4	7.71	2.37
Image 5	2.72	2.92
Image 6	5.26	3.20
Image 7	1.62	1.50
Image 8	8.52	1.59
Image 9	8.58	1.49
Image 10	2.35	2.47
Image 11	7.62	2.31
Image 12	5.47	3.52
Image 13	8.32	1.79
Image 14	7.92	2.18
Image 15	3.66	3.25
Image 16	2.29	2.39

Note: Application of the study to all male students using the images from the IAPS set.

Table 4. Validation: females.

Image	M	SD
Image 1	6.58	2.65
Image 2	6.42	2.94
Image 3	2.30	2.35
Image 4	6.61	2.90
Image 5	1.70	1.75
Image 6	5.08	3.03
Image 7	1.89	2.10
Image 8	8.29	1.92
Image 9	8.41	1.45
Image 10	2.31	2.33
Image 11	7.44	2.40
Image 12	2.70	2.61
Image 13	7.11	2.71
Image 14	8.41	1.51
Image 15	2.22	2.26
Image 16	2.02	2.15

Note: Application of the study to all female students using the images from the IAPS set.

Comparison

To determine the level of coincidence or not between the original test and the study test, data analysis was carried out using chi-square (χ^2).

The values of the study test set were compared with the values of the study test set with an alpha value of 0.01. The p-values obtained from the comparison are greater than the alpha value, suggesting significant overlap.

Table 5. Overall comparison.

Image	M		SD	
	χ^2	P	χ^2	P
Image 1	0.77194	0.3796	0.17074	0.6795
Image 2	0.005141	0.9428	0.30761	0.5792
Image 3	0.57137	0.4497	0.9066	0.341
Image 4	0.042228	0.8372	0.19537	0.6585
Image 5	0.10172	0.7498	0.065628	0.7978
Image 6	0.58867	0.4429	0.49781	0.4805
Image 7	0.066389	0.7967	0.0005646	0.981
Image 8	0.29722	0.5856	0.0059496	0.9385
Image 9	0.087693	0.7671	0.020636	0.8858
Image 10	0.10243	0.7489	0.47888	0.4889
Image 11	0.16763	0.6822	0.22143	0.638
Image 12	0.48711	0.4852	0.67578	0.411
Image 13	0.12268	0.7261	0.14342	0.7049
Image 14	0.0014392	0.9697	0.051582	0.8203
Image 15	0.0026021	0.9593	0.14557	0.7028
Image 16	0.033645	0.8545	0.2537	0.6145

Table 6. Comparison: males.

Image	M		SD	
	χ^2	P	χ^2	P
Image 1	0.59335	0.4411	0.28752	0.5918
Image 2	0.073287	0.7866	0.55938	0.4545
Image 3	0.8562	0.3548	1.087	0.2971
Image 4	0.060947	0.805	0.20764	0.6486
Image 5	0.13104	0.7174	0.40789	0.523
Image 6	0.38402	0.5355	0.62385	0.4296
Image 7	0.5455	0.5455	0.092311	0.7613
Image 8	0.36946	0.5433	0.014258	0.905
Image 9	0.057027	0.8113	0.0009297	0.9757
Image 10	0.028227	0.8666	0.30769	0.5791
Image 11	0.23355	0.5214	0.41121	0.5214
Image 12	0.91561	0.3386	0.8338	0.3612
Image 13	0.15161	0.697	0.0045452	0.9462
Image 14	0.020002	0.8875	0.035933	0.8497
Image 15	0.0026991	0.9586	0.21917	0.6397
Image 16	0.016061	0.8992	0.22581	0.6346

The results of application of Spearman's test using the mean values of the 16 images indicate a positive correlation in all three tables (overall, males and females) with proportions greater than 75%.

Table 7. Comparison: females.

Image	M		SD	
	χ^2	P	χ^2	P
Image 1	0.9816	0.3218	0.099369	0.7526
Image 2	0.0061891	0.9373	0.31509	0.5746
Image 3	0.18347	0.6684	0.42826	0.5128
Image 4	0.014669	0.9036	0.20716	0.649
Image 5	0.19302	0.6604	0.021256	0.8841
Image 6	0.7615	0.3829	0.45558	0.4997
Image 7	0.0008678	0.9765	0.15322	0.6955
Image 8	0.24102	0.6235	0.060265	0.8061
Image 9	0.1082	0.7422	0.040685	0.8401
Image 10	0.18228	0.6694	0.73683	0.3907
Image 11	0.12108	0.7279	0.1566	0.7279
Image 12	0.085578	0.7699	0.24855	0.6181
Image 13	0.062641	0.8024	0.34081	0.8024
Image 14	0.001065	0.974	0.20457	0.6511
Image 15	0.0010274	0.9744	0.093782	0.7594
Image 16	0.061744	0.8038	0.27658	0.599

Image	M	
	rho	%
General	0.8565124	81.25
Males	0.8617647	75
Females	0.8167773	87.50

DISCUSSION

Overall, the values obtained support the validation of the valence dimension of the 16 images from to the International Affective Picture System (IAPS) examined in the study for the evaluation of emotional response.

In the comparison, the obtained rho values of 0.8565124 (overall), 0.8617647 (males), and 0.8167773 (females) attest to the similarity of this validation study in Latin America with the original US study, despite the differences of age and culture. This suggests that the valence dimension of emotional response is associated with neurobiological aspects, more than cultural or learning aspects (Gantiva et al., 2011; Gantiva et al., 2019; Mina et al., 2017; Silva et al., 2011).

CONCLUSION

The study results in the validation of 16 images from the IAPS set for studies of emotional responses in children.

The comparison undertaken suggests that the results of the study test are similar to those of the original test in all three tables: overall, male and female.

The data obtained provide a basis for future evaluations of emotional response using images that have been validated in our environment. As indicated at the beginning, it is intended to carry out these evaluations, in addition to the traditional way, by applying technological tools such as Eye Tracking and Virtual Reality, which are the main objectives of the research group.

It is recommended that more images be validated in order to expand the bank of visual material for research and/or therapeutic work in the area of psychology and neuropsychology.

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