

Normative Data of Emojis for Valence, Arousal, Dominance, Familiarity and Clarity in an Argentinian University Student Sample

Datos normativos de emojis para las dimensiones de valencia, activación, dominancia, familiaridad y claridad en una muestra de estudiantes de Argentina

Dados normativos de emojis para as dimensões de valência, ativação emocional, dominância, familiaridade e clareza em uma amostra de estudantes da Argentina

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Abstract: Emojis have become essential elements of digital communication, serving to convey emotions and reduce ambiguity in written messages. Despite their widespread use, the cognitive and emotional mechanisms underlying their processing remain insufficiently understood. The present study aimed to provide normative data on the affective dimensions of valence, arousal, and dominance, as well as familiarity and clarity, for 60 commonly used emojis in an Argentine sample, and to compare these results with previous studies conducted in other cultures. A total of 198 Argentine university students participated, evaluating each emoji using the Self-Assessment Manikin (SAM) and complementary familiarity and clarity scales. The results showed that affective responses followed the typical boomerang pattern in the two-dimensional valence-arousal space, with valence emerging as the principal organizing dimension. Significant gender differences were observed only in the valence dimension. Compared with data from Spain, Japan, Portugal, and the United States, Argentine participants exhibited lower arousal levels but similar valence evaluations. Overall, the findings indicate that emojis are valid affective stimuli, displaying patterns comparable to those observed for other emotional materials such as images, words, and sounds. Their high familiarity and clarity make them valuable tools for research on cognitive and emotional processes.

Keywords: emoji; valence; arousal; familiarity; clarity

Resumen: Los emojis se han convertido en elementos esenciales de la comunicación digital, utilizados para expresar emociones y reducir la ambigüedad en los mensajes escritos. A pesar de su uso generalizado, los mecanismos cognitivos y emocionales implicados en su procesamiento aún no se comprenden completamente. Este estudio tuvo como objetivo aportar datos normativos sobre las dimensiones afectivas de valencia, activación y dominancia, así como sobre la familiaridad y la claridad, para 60 emojis de uso frecuente en una muestra argentina, y comparar los resultados con estudios previos de otras culturas. Participaron 198 estudiantes universitarios argentinos, quienes evaluaron cada emoji mediante el Self-Assessment Manikin (SAM) y escalas complementarias de familiaridad y claridad. Las respuestas afectivas siguieron el patrón típico en forma de boomerang en el espacio de valencia-activación, con la valencia como eje principal. Se observaron diferencias significativas por género solo en la dimensión valencia. En comparación con España, Japón, Portugal y Estados Unidos, los estudiantes argentinos presentaron niveles más bajos de activación, pero valoraciones de valencia similares. En conjunto, los hallazgos indican que los emojis son estímulos afectivos válidos y comparables a otros materiales emocionales, como imágenes, palabras y sonidos.

Palabras clave: emoji; valencia; activación; familiaridad; claridad

Resumo: Os emojis tornaram-se elementos essenciais da comunicação digital, utilizados para expressar emoções e reduzir a ambiguidade nas mensagens escritas. Apesar do seu uso generalizado, os mecanismos cognitivos e emocionais envolvidos em seu processamento ainda não são completamente compreendidos. Este estudo teve como objetivo fornecer dados normativos sobre as dimensões afetivas de valência, ativação e dominância, bem como sobre a familiaridade e a clareza, para 60 emojis de uso frequente em uma amostra argentina, e comparar os resultados com estudos prévios de outras culturas. Participaram 198 estudantes universitários argentinos, que avaliaram cada emoji por meio do Self-Assessment Manikin (SAM) e de escalas complementares de familiaridade e clareza. As respostas afetivas seguiram o padrão típico em forma de bumerangue no espaço de valência-ativação emocional, com a valência como eixo principal. Foram observadas diferenças significativas por gênero apenas na dimensão valência. Em comparação com Espanha, Japão, Portugal e Estados Unidos, os estudantes argentinos apresentaram níveis mais baixos de ativação emocional, mas avaliações de valência semelhantes. Em conjunto, os achados indicam que os emojis são estímulos afetivos válidos e comparáveis a outros materiais emocionais, como imagens, palavras e sons.

Palavras-chave: emoji; valência; ativação; familiaridade; clareza

Digital technologies, including messaging apps, email, social networks, and others, along with the increased accessibility of smartphones, have transformed written communication by enabling more efficient and expressive exchanges compared to traditional media (Bonini et al., 2024; Herrero et al., 2023). As these forms of communication become ubiquitous, it is essential to understand how individuals process both their verbal components—such as written or spoken words—and their nonverbal components, including emojis, GIFs, images, and videos (Rodrigues et al., 2018). Emojis have gained significant relevance in everyday communication (Daniel & Camp, 2020). Originating in Japan in the late 20th century to facilitate digital interaction, emojis have become a core element of written exchanges across chat apps, social networks, and email (Bai et al., 2019). Their widespread presence is illustrated by findings showing that nearly half of all posts on platforms such as Instagram contain at least one emoji (Was & Hamrick, 2021).

Beyond expressing emotions and abstract ideas, these graphic symbols provide affective cues that clarify meaning and reduce ambiguity in written messages (Kaye & Schweiger, 2023). However, their communicative effectiveness is not absolute. Holtgraves (2024) stated that although emojis can perform specific speech acts (e.g., warning, thanking), both senders and receivers tend to overestimate the clarity of these intentions, with receivers being particularly optimistic about their accuracy. Within this framework, emojis can be conceptualized as emotional stimuli consistent with Lang's (1995) model, which describes emotions as action dispositions elicited by personally relevant stimuli. Accordingly, emojis are suitable for analysis within a cognitive-affective framework defined by the fundamental dimensions of valence, arousal, and dominance.

When encountering an emoji, the initial evaluation often revolves around its perceived pleasantness or unpleasantness, a process that aligns with the valence dimension. Dimensional models of affect consistently identify valence as the most basic and rapidly accessed dimension of stimulus evaluation (Russell, 2003; Yik et al., 2023), and converging evidence from affective neuroscience suggests that valence-based appraisals occur within the first hundreds of milliseconds of stimulus processing (Barrett, 2017). This immediate affective appraisal determines whether the emoji is seen as positive (aligned with appetitive motives such as connection or pleasure) or negative (eliciting defensive or avoidance responses). Building on Lang's (1995) framework, in which valence reflects the activation of two primary motivational systems, this first impression serves as a critical filter guiding subsequent emotional and cognitive processing. Once the valence is assessed, the subsequent evaluation involves determining the level of arousal, or the degree of emotional intensity, that the emoji elicits (Colombetti & Kuppens, 2024; Lang, 1995). Thus, emojis can be mapped onto a cognitive-affective space defined by valence and arousal. Furthermore, when considering additional factors such as dominance (the sense of control or power), researchers can obtain a more nuanced understanding of the emotional impact of emojis (Jerram et al., 2014).

Affective responses to stimuli may also vary across individuals according to personal characteristics such as gender (Bek et al., 2022). Research has shown that women tend to rate aversive stimuli as more unpleasant and arousing than men, whereas for appetitive stimuli, the pattern reverses: men provide ratings characterized by higher pleasantness and arousal (Bradley et al., 2021). Studies using the International Affective Picture System (IAPS) have consistently reported such gender

differences: women generally evaluate unpleasant images as more negative and more activating, while men rate pleasant images as more positive and sometimes more arousing (Branco et al., 2023).

These differences extend to modern forms of expression like emojis. Research has found that women use emojis more frequently and are more familiar with them than men, but women tend to assign slightly less positive meanings to certain emojis (Ferré et al., 2023; Jones et al., 2020). In their study of 70 facial emojis with a U.S. sample, Jones et al. (2020) reported that women gave lower valence ratings (more negative) than men for negative or ambiguous emojis, whereas men provided higher overall positivity in their ratings. In fact, it was observed that men's average valence for the set of emojis was more positive than women's, a difference attributed to women's stronger negativity bias (women likely rated the negative or neutral emojis more negatively, pulling down their average). For example, an emoji depicting a frown or a hesitant face might be seen as somewhat negative by both genders, but women on average rated it as more negative than men did.

Moreover, while these affective properties shape our initial impressions, the cognitive mechanisms underlying the comprehension and use of emojis remain an area of active investigation. Despite their ubiquity and communicative potency, the processes supporting emoji understanding are not yet fully elucidated. According to Weissman and Tanner (2018), preliminary findings indicate that emojis engage semantic processing mechanisms analogous to those utilized in language comprehension. Additionally, Gantiva et al. (2020) revealed comparable neural responses between facial emojis and human faces, suggesting that emojis convey paralinguistic cues typically present in face-to-face interactions but absent in text-based communication. Furthermore, recent findings indicate that emojis can effectively substitute nonverbal emotional expressions, enhancing perceptions of empathy and closeness in digital leader communication, thereby strengthening emotional connections, particularly in remote or distributed teams (Liegl & Furtner, 2024). Similarly, Riordan (2017) found that both facial and non-facial object emojis effectively convey positive affect and contribute to perceived emotional clarity in text messages. This aligns with the sociological concept of emotion work (Hochschild, 1979), which refers to the active management of one's emotional expressions to align them with social, professional, or interpersonal expectations. In computer-mediated communication, where traditional nonverbal cues such as facial expressions and tone of voice are absent, emojis can serve as tools for performing this affective management, allowing individuals to modulate the emotional tone of their messages and to maintain interpersonal closeness in digital exchanges.

Despite the insights gained from previous studies, normative research on emojis still presents gaps that warrant further work. First, although large-scale corpora have been developed (e.g., Ferré et al., 2023, with over 1,000 emojis), normative data for specific Spanish-speaking populations beyond Spain remain scarce, despite documented variability in affective responses across Spanish-speaking communities (Irrazabal & Tonini, 2020, 2023; Tonini et al., 2024). Second, while the selection of stimuli for normative studies necessarily depends on expert criteria, the subjective affective properties of each emoji (such as valence, arousal, dominance, familiarity, and clarity) should be derived from participants' evaluations rather than from researchers' intuition (Gallud et al., 2018; Hsiao & Hsieh, 2014). Several studies have followed this principle (Ferré et al., 2023; Jaeger et al., 2019; Pfeifer et al., 2022; Rodrigues et al., 2018), and the present work adopts the same approach. This study focuses specifically on facial emojis given their central role in conveying affective information in digital communication (Gantiva et al., 2020; Rodrigues et al., 2018; Ferré et al., 2025), and we provide normative data for 60 commonly used facial emojis in an Argentine university student sample.

In addition, this study addresses the influence of cultural factors on emoji interpretation. Previous research has highlighted that cultural norms shape emotional expression and perception, emphasizing the importance of collecting normative data within specific sociocultural contexts. For example, Kralj Novak et al. (2015) used natural-language-processing methods to associate emojis with sentiment values based on Twitter data, although the correspondence between algorithmic and human ratings remains unclear. Rodrigues et al. (2018) cautioned that assuming users' interpretations match developers' intended meanings may be misleading. They provided public normative data from over 500 Portuguese participants, resulting in the Lisbon Emoji and Emoticon Database (LEED), which includes 238 stimuli (153 emojis and 85 emoticons) evaluated across seven dimensions: aesthetic appeal, familiarity, visual complexity, concreteness, valence, arousal, and meaning. Participants also described the perceived meaning of each stimulus, producing both quantitative and qualitative normative data.

In 2019, Jaeger and colleagues explored how consumers interpret facial emojis. In an online survey of 1,084 U.S. adults, participants answered an open-ended question to discover the meanings associated with 33 common facial emojis and used Self-Assessment Manikins (SAM) to assess the emotional valence and arousal of the emojis. The results confirmed that facial emojis encompass broad ranges of emotional valence and arousal, conveying a corresponding range of different emotions and meanings. The level of variability changed depending on the specific emoji considered. This highlights that the interpretation and use of emojis can be flexible, leading Jaeger et al. (2019) to recommend studying the psychosocial factors involved in emoji interpretation.

In 2022, Kutsuzawa et al., aiming to understand how emojis are classified on the axes of valence and arousal and examine the relationship between these and human emotional states, conducted an online survey with 1,082 young Japanese participants. They used a nine-point scale to evaluate the levels of valence and arousal for 74 facial emojis. Cluster analysis revealed that these emojis were classified into six different clusters on the two axes of valence and arousal. The results suggested that each cluster represented (1) a strongly negative feeling, (2) a moderately negative feeling, (3) a neutral feeling with a negative bias, (4) a neutral feeling with a positive bias, (5) a moderately positive feeling, and (6) a strongly positive feeling. They concluded that facial emojis comprehensively express human emotional states.

Finally, in 2023, Ferré et al. presented subjective norms for 1,031 emojis across six dimensions: visual complexity, familiarity, usage frequency, clarity, emotional valence, and emotional arousal. A total of 1,124 Spanish university students participated. This is the largest normative study conducted to date, based on subjective evaluations. Unlike the few existing normative studies, which mainly comprise facial emojis, this study included a wide range of emoji categories. The results showed that, in terms of their affective properties, emojis are analogous to other stimuli, such as words, showing the expected U-shaped relationship between valence and arousal. The relationship between affective properties and other dimensions (e.g., between valence and familiarity) was analogous to that observed in words, in that emojis with positive valence were more familiar than negative ones. In summary, consistent with prior research, emojis are a suitable stimulus for studying affective processing.

However, it is important to note that these findings cannot be generalized a priori, as emoji interpretation is influenced by the implicit conventions of each community (Chen et al., 2024), cultural values regarding emotional expression (Gao & Vanderlaan, 2020), and even the socioeconomic characteristics of the studied population (Kejriwal et al., 2021). Within Spanish-speaking populations specifically, this concern is particularly relevant. Although Ferré et al. (2023) provided extensive normative data for a Spanish sample, the Spanish-speaking world comprises culturally and socioeconomically diverse communities whose communicative practices and emotional expression conventions may differ. Previous studies with other affective stimuli have documented that Argentine and Spanish samples can differ in their affective ratings, particularly in the arousal dimension (Irrazabal & Tonini, 2020, 2023; Tonini et al., 2024). These considerations motivate the present validation of an emoji corpus in an Argentine sample. Consequently, there is a necessity to generate locally adapted normative data. In accordance with these principles, the present study was guided by three primary objectives. First, to provide normative data for 60 commonly used emojis in an Argentine sample across the affective dimensions, valence, arousal, dominance, along with stimuli familiarity, and clarity, thereby expanding the available methodological resources for emotion research. Secondly, examine whether the typical U-shaped relationship between valence and arousal observed in previous studies is replicated in this sample. Finally, the third objective was to explore potential differences in affective evaluations as a function of gender and to compare the obtained norms with those reported in other countries.

Method

Participants

The sample consisted of 198 Argentine university students, selected through convenience sampling. Most participants were women (78.79 %), with an average age of 20.58 years ($SD = 5.91$). Students were exposed to a projection of 60 emojis and evaluated each one using scales measuring valence, arousal, and dominance, as well as familiarity and clarity.

Materials

Emojis. A set of 60 emojis constituted the stimuli for the study. They were exclusively yellow except for the angry emoji (Code U+1F621), which is red. Emojis were presented using their Apple Color Emoji rendering, corresponding to Unicode version 14.0 (The Unicode Consortium, 2021), which was the most recent Unicode release at the time of data collection. This rendering was selected because it is widely used in the Argentine context through iOS devices and is also displayed in WhatsApp, the most popular messaging application in Argentina. The complete list of stimuli with their Unicode codepoints, along with high-resolution PNG images of each emoji as presented to participants, is available in the supplementary materials (Tonini et al., 2026). Emojis from the Smileys category were selected, representing various types of expressions and emotional states. Stimuli were chosen from subcategories that represent smiling and affectionate states, tongues, hands, and accessories, neutrality, illness, and negative emotional states according to Emojipedia's classification (<https://emojipedia.org/smileys>) to cover a wide range of expressions. Other types of emojis (e.g., food, creatures, objects, or people) were not considered. It was decided to select this number of emojis since it is a number frequently employed in validation studies of emotional stimuli, providing a practical balance between comprehensiveness and feasibility in terms of time and resources. The selection procedure followed criteria similar to those proposed by Lang et al. (2005) for standardized emotional stimulus sets. Specifically, emojis were chosen to represent a balanced variety of emotional expressions (positive, negative, neutral) and commonly used gestures. Additionally, to ensure comparability, the emojis selected had a high global frequency of usage and had previously been included in cross-cultural normative studies.

Self-Assessment Manikin (SAM, Bradley & Lang, 1994). The SAM consists of three pictorial scales allowing participants to evaluate the stimuli across three affective dimensions (valence, arousal, and dominance). Each scale is a 9-point Likert scale, with five options represented by manikins and four blank spaces for intermediate scores. For the first two dimensions, the scale starts at 9 (*pleasant; excited*) and ends at 1 (*unpleasant; calm*); for the third, the order is reversed, starting at 1 (*lack of control*) and ending at 9 (*in control*).

Familiarity and Clarity Scale. The Familiarity Scale consisted of a 7-point Likert scale, similar to the one used by Ferré et al. (2023), in which participants indicated how frequently they encountered the emoji in their daily lives. A score of 1 (*very unfamiliar*) indicated that the participant rarely encountered the emoji, while a score of 7 (*very familiar*) indicated frequent encounters with the emoji. The Clarity Scale also used a 7-point Likert scale, with participants rating how clear or ambiguous they found each emoji. Similar to the Familiarity Scale, a low score indicated that the emoji was not clearly understood or was difficult to comprehend, while a high score indicated that the emoji clearly conveyed its meaning without ambiguity.

Procedure

The 198 Argentine students were exposed to a projection of 60 emojis and responded to scales measuring their emotional characteristics (valence, arousal, and dominance), as well as the familiarity and clarity of each emoji. The task was conducted in university classrooms over two sessions, each lasting approximately 20 minutes. The series of 60 emojis was presented using Microsoft Office PowerPoint software, which controlled the timing of each stimulus and projected them onto a screen. During the demonstration phase, three emojis not included in the final corpus were used to illustrate the correct use of the Self-Assessment Manikin (SAM). Once the demonstration was complete, the test phase began. This phase started with a warning slide displayed for 5 seconds, indicating the number of the emoji to be evaluated: "EMOJI X." The target emoji was then projected for 6 seconds, followed by an additional slide shown for 8 seconds, prompting participants: "Please evaluate emoji X on its three dimensions." The set was presented in two different orders to counterbalance the exposure of the emojis contained in them. Before concluding the study, each participant also rated every emoji in terms of familiarity and clarity.

Relevant datasets from previous research were obtained to compare normative data from Spanish (Ferré et al., 2023), Japanese (Kutsuzawa et al., 2022), Portuguese (Rodrigues et al., 2018), and U.S. (Jaeger et al., 2019) populations with the Argentine sample described in the present study. Although these studies share methodological similarities with the current investigation, each differs in the exact number and type of emojis used. Therefore, for cross-cultural comparisons, only the emojis that overlapped between the set employed in this study and each of the previous studies were selected.

Statistical analysis

Data were analyzed using the R programming language and environment (R Core Team, 2022), implemented via the RStudio IDE (RStudio Team, 2020). The psych package (Revelle, 2022) was used to calculate Cronbach's alpha and McDonald's omega for each affective dimension to provide evidence of the reliability of the ratings. The tidyverse package (Wickham et al., 2019) along with gt (Iannone et al., 2023) were used to calculate average values and standard deviations of the 60 emojis for the entire sample and separately for males and females. Correlations were calculated between the dimensions that constitute the two-dimensional affective space (valence and arousal), including the average ratings of the entire sample as well as males and females individually.

Given the crossed structure of the data, where each participant rated multiple emojis and each emoji was rated by multiple participants, linear mixed-effects models were fitted to account for both sources of non-independence. Models were specified as $\text{outcome} \sim \text{predictor} + (1 \mid \text{participant}) + (1 \mid \text{emoji})$ using the *lme4* package (Bates et al., 2015), with *p*-values obtained through the Satterthwaite approximation implemented in *lmerTest* (Kuznetsova et al., 2017). Marginal and conditional R^2 were computed with performance (Lüdtke et al., 2021) and estimated marginal means and contrasts with *emmeans*. For the valence-arousal relationship, both linear and quadratic (orthogonal polynomial) specifications were compared via likelihood ratio tests, and a model with random slopes of valence by participant was additionally fitted to assess individual variability. Differences between males and females in each dimension were examined with mixed-effects models including gender as a fixed predictor, and the modulation of the valence-arousal relationship by gender was tested by comparing models with and without the $\text{poly}(\text{valence}, 2) \times \text{gender}$ interaction.

Finally, to compare the affective evaluations of emojis by participants from different countries, a multivariate analysis of variance (MANOVA) was conducted for each dimension. This analysis was performed on aggregated mean ratings per emoji because individual-level data from the comparison samples (Spanish, Portuguese, Japanese, and U.S.) were not publicly available.

Ethical considerations

All participants were informed about the implications of the study, participating voluntarily and anonymously after signing an informed consent. This study was conducted following the guidelines set forth in the latest revision of the Declaration of Helsinki. The research protocol was approved by the Research Ethics Committee of the Facultad de Ciencias Sociales at Universidad de Palermo, under resolution R 010/2024. Although the project was considered low risk, it involved research with human participants. The study was conducted in accordance with local legislation and institutional requirements, as well as international ethical guidelines (APA and NC3R).

Results

Internal consistency

Both Cronbach's α and McDonald's ω were calculated to examine the internal consistency of the affective dimensions. Reporting both indices provides a more comprehensive assessment of reliability. Cronbach's α assumes tau-equivalence, meaning that all items contribute equally to the latent construct. In contrast, McDonald's ω relies on a factor-analytic approach that relaxes this assumption, offering a more accurate estimate when items vary in their loadings (McNeish, 2018). As shown in Table 1, all dimensions displayed excellent internal consistency, with α values ranging from .82 to .96 and ω values from .88 to .97, indicating high reliability of the ratings across all affective dimensions.

Table 1

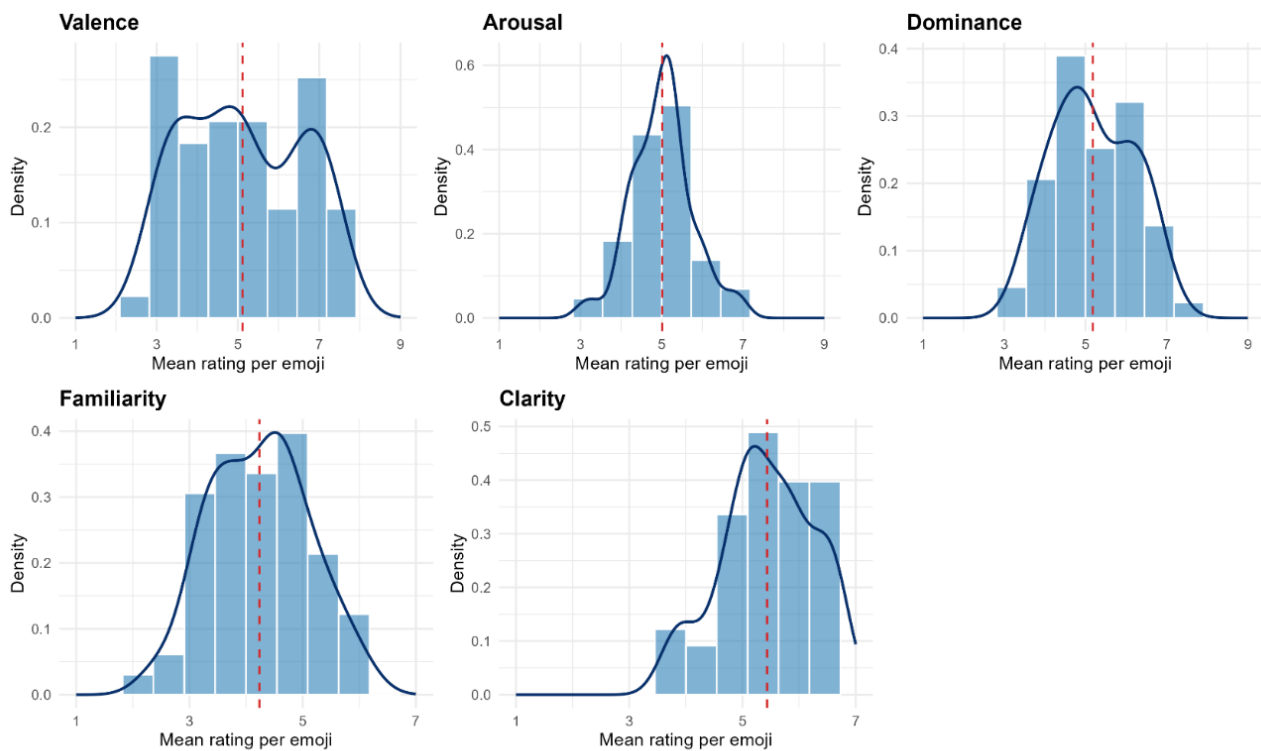
Internal consistency coefficients for each affective dimension, familiarity, and clarity

Dimension	Cronbach's Alpha (α)	McDonald Omega (ω)
Valence	.96	.97
Arousal	.82	.88
Dominance	.91	.93
Familiarity	.96	.96
Clarity	.94	.95

Following the reliability analyses, we examined the distribution of mean ratings across the 60 emojis for each dimension. As shown in Figure 1, valence ratings displayed substantial variability across the scale, whereas arousal and dominance were more concentrated around intermediate values. Familiarity and clarity tended to show higher mean ratings, indicating that the stimuli were generally perceived as recognizable and clearly interpretable. The dashed red line represents the overall mean for each dimension.

Figure 1

Distribution of mean ratings for valence, arousal, dominance, familiarity, and clarity across the emoji set.



Red dashed line: overall mean of the dimension. SAM dimensions on 1-9 scale; familiarity and clarity on 1-7 scale.

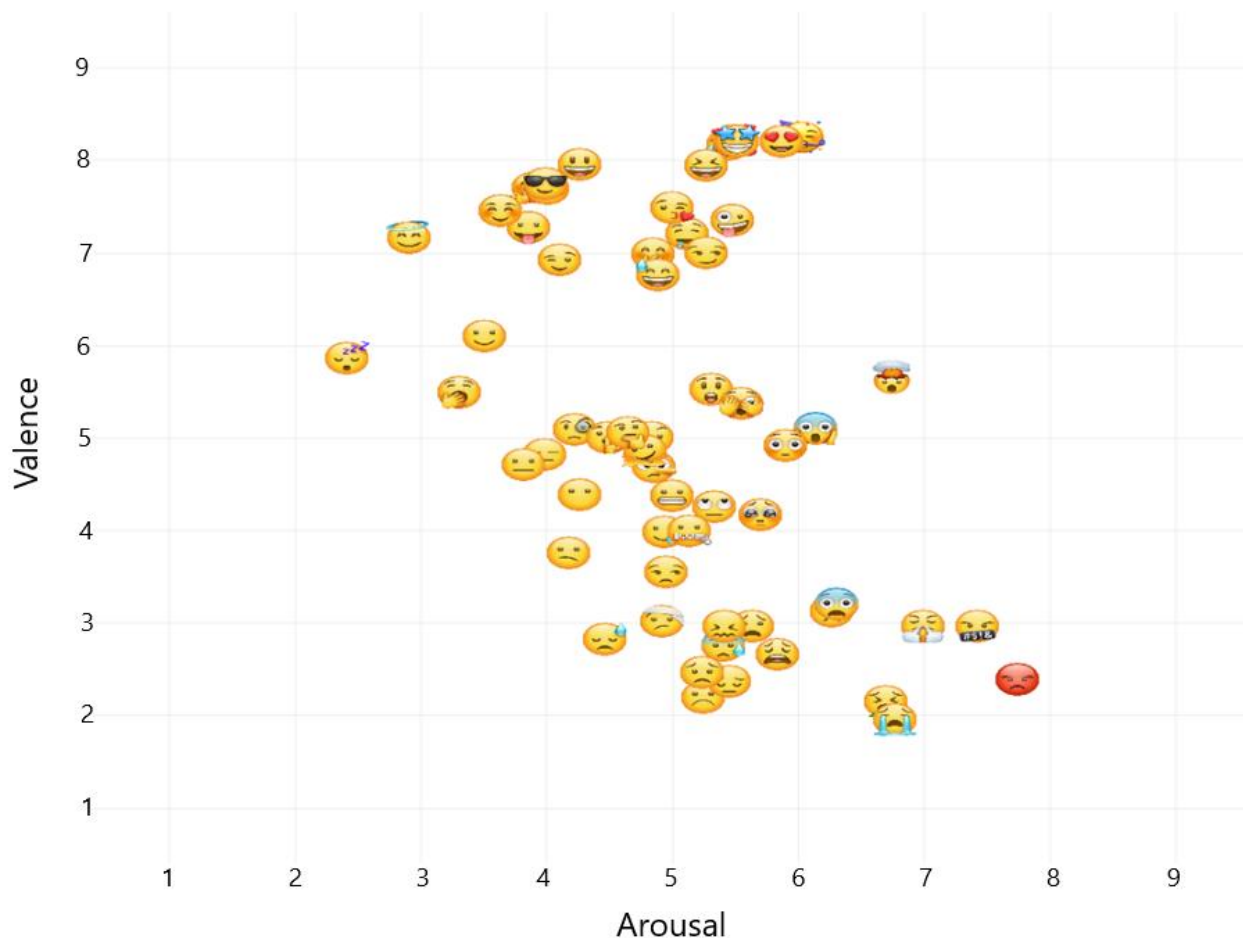
Normative data for the Argentinian sample

Figure 2 illustrates the distribution of the scores for the 60 emojis in the two-dimensional affective space. In this case, the distribution followed the typical boomerang shape observed in previous studies. First, the distribution contains a central cluster of neutral scores and an extreme characterized by high emotional arousal and negative valence. Additionally, a more dispersed group of scores with high arousal and pleasantness can be distinguished. Secondly, it is worth noting that a statistically significant correlation was found between the two variables ($r = -.43$, $p = .04$) CI $[-.72, -.02]$, but only for scores located in the lower quadrant (negative valence and high arousal), where lower valence scores were associated with greater arousal. This correlation was not significant for pleasant emojis ($r = .07$, $p = .69$).

Finally, when considering valence as the main variable in the two-dimensional affective space, a simple linear model showed that valence accounted for 14.6% of the variance in arousal ($R^2 = .15$, $p = .002$). However, visual inspection suggested a non-linear association, which was confirmed when fitting a quadratic model that significantly improved the explained variance ($R^2 = .25$, $p < .001$). To further capture the curvilinear trend, a generalized additive model (GAM) with a smooth spline was tested, yielding a comparable level of explained variance ($R^2 = .26$) and confirming that the relationship between valence and arousal follows a non-linear, U-shaped pattern consistent with previous findings in affective research.

Figure 2

Distribution of the scores for the 60 emojis in the two-dimensional affective space



Within the affective responses to emojis, several significant correlations were found (Table 2). There is a strong positive association between valence and dominance, indicating that emojis with positive valence are perceived as conveying a greater sense of control. Additionally, a negative correlation was observed between arousal and dominance, suggesting that emojis with high arousal scores are associated with low dominance scores. Finally, a strong positive correlation was found between familiarity and clarity, suggesting that emojis perceived as more familiar by participants also tended to be perceived with greater clarity.

Table 2

Correlations between affective dimensions, familiarity, and clarity of emojis

		$r[CI_{low}-CI_{high}]$	p
Valence	Arousal	-.40[-.59; -.16]	.001
Valence	Dominance	.90[.83; .94]	.001
Valence	Familiarity	.33[.08; .54]	.006
Valence	Clarity	-.03[-.28; .22]	1.00
Arousal	Dominance	-.40[-.60; -.17]	.001
Arousal	Familiarity	-.02[-.27; .24]	1.00
Arousal	Clarity	.31[.06; .52]	.008
Dominance	Familiarity	.24[-.02; .46]	.273
Dominance	Clarity	.01[-.25; .25]	1.00
Familiarity	Clarity	.66[.49; .78]	.001

To complement the analyses on aggregated means and to properly account for the nested structure of the data (ratings within participants and within emojis), linear mixed-effects models were fitted on the 11,692 individual ratings, including crossed random intercepts for participants ($n = 196$) and emojis ($n = 60$).

The relationship between valence and arousal was reanalyzed at the level of individual ratings. A model with valence (centered) as a fixed predictor showed a significant negative linear effect ($\beta = -0.17$, $SE = 0.01$, $t(10,910) = -18.45$, $p < .001$; conditional $R^2 = 0.25$, marginal $R^2 = 0.03$). A quadratic model with orthogonal polynomials substantially improved the fit, $\chi^2(1) = 170.41$, $p < .001$ ($\Delta AIC = -183$), confirming the U-shaped pattern. The quadratic coefficient was positive and significant ($\beta = 33.70$, $t(11,107) = 13.12$, $p < .001$), indicating that arousal reaches its minimum at intermediate valence values and increases toward both extremes.

A model with a random slope of valence by participant further improved the fit ($\Delta AIC = -1,400$; conditional $R^2 = 0.35$), revealing substantial individual variability in the valence-arousal relationship (slope $SD = 0.32$ around a mean of -0.17). The variance components confirmed that both random factors contributed meaningfully to the total variability (participant variance = 0.80; emoji variance = 0.45; residual variance = 4.55).

Gender differences

Gender differences were examined using mixed-effects models with gender as a fixed predictor and crossed random intercepts for participants and emojis (Table 3). A statistically significant difference was found in valence, showing that men rated emojis slightly more positively than women (estimated difference = 0.16 points on a 9-point scale, $p = .037$). No significant differences were observed in arousal, dominance, familiarity, or clarity. In all models, the marginal R^2 associated with gender was below 1 %, while conditional R^2 ranged from 0.23 to 0.39, indicating that the variability across participants and emojis explains a substantially larger portion of the total variance than gender does.

Table 3

Gender differences in the affective dimensions, familiarity, and clarity

		<i>M</i>	<i>SD</i>	<i>n</i>	β	95% CI	<i>t</i>	<i>p</i>
Valence	Men	5.24	1.29	42				
	Women	5.08	1.48	156	0.16	[0.01, 0.31]	2.10	.037
	Total	5.11	1.44	198				
Arousal	Men	4.79	.81	42				
	Women	5.07	.75	156	-0.28	[-0.60, 0.05]	-1.66	.098
	Total	5.01	.76	198				
Dominance	Men	5.17	.80	42				
	Women	5.18	1.07	156	-0.01	[-0.33, 0.31]	-0.04	.964
	Total	5.18	.99	198				
Familiarity	Men	4.12	.87	42				
	Women	4.27	.88	156	-0.14	[-0.51, 0.22]	-0.76	.451
	Total	4.24	.87	198				
Clarity	Men	5.39	.79	42				
	Women	5.44	.83	156	-0.05	[-0.31, 0.21]	-0.37	.714
	Total	5.43	.81	198				

Note. β represents the fixed effect of gender from a linear mixed-effects model dimension $\sim$ gender + (1 | participant) + (1 | emoji) with men as the reference category. Negative values indicate higher scores in women. Degrees of freedom estimated via Satterthwaite approximation.

To evaluate whether the U-shaped relationship between valence and arousal differs between men and women, a quadratic model with gender interaction was compared to a model without interaction. The interaction significantly improved the fit, $\chi^2(2) = 14.61$, $p < .001$. Examination of individual interaction terms showed that the modulation operated on the linear component of the curve ($\beta = 19.37$, $p < .001$) but not on the quadratic component ($\beta = 6.95$, $p = .21$), indicating that both groups show the characteristic boomerang-shape with comparable curvature, but women display a steeper slope in the negative valence range.

Differences in the affective dimensions (valence and arousal), familiarity, and clarity by country

To analyze affective response differences by country, normative data from Spanish (Ferré et al., 2023), Japanese (Kutsuzawa et al., 2022), Portuguese (Rodrigues et al., 2018), and U.S. (Jaeger et al., 2019) populations were compared with the Argentine sample. As shown in Figure 3, the scores from each study adopt the typical boomerang shape in the two-dimensional affective space formed by valence and arousal. Due to differences in study design and measurement procedures, the following comparisons should be interpreted as approximate rather than strictly equivalent. The reference studies (Ferré et al., 2023; Jaeger et al., 2019; Kutsuzawa et al., 2022; Rodrigues et al., 2018) were conducted independently and differ in sample size, age range, presentation modality, emoji platform of origin, and period of data collection. To partially mitigate these heterogeneities, we restricted each comparison to the subset of emojis shared between our corpus and the corresponding reference study. The results below should therefore be interpreted as exploratory cross-sample comparisons rather than as definitive inferences about cultural differences in emoji processing.

Figure 3

Distribution of the emojis' scores in the two-dimensional affective space by country

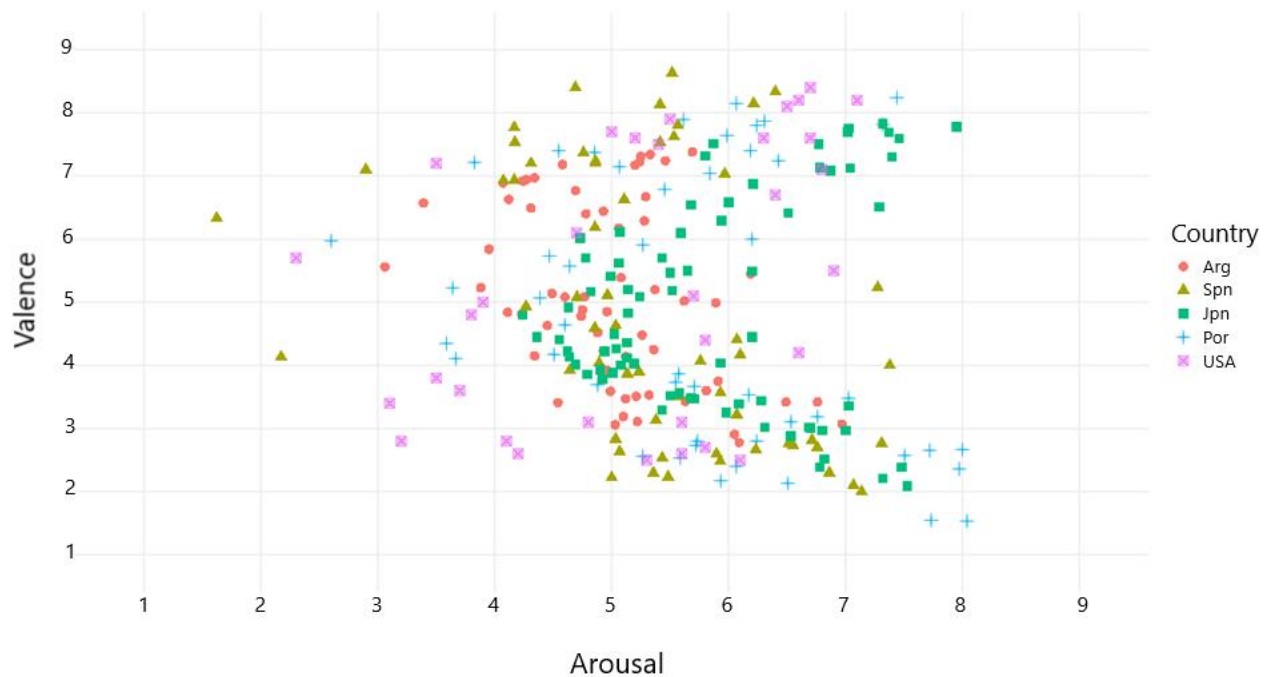


Table 4

Differences in affective dimensions by country

Dimension	Comparison	M_A	M_B	t	gl	p
Valence	Argentina - Spain	5.11	4.88	0.68	97.22	.961
	Argentina - Japan	5.11	4.91	0.74	131.22	.947
	Argentina - Portugal	5.11	4.82	0.80	78.58	.930
	Argentina - USA	5.11	5.34	-0.54	48.19	.983
	Spain - Japan	4.88	4.91	-0.10	102.15	1.000
	Spain - Portugal	4.88	4.82	0.14	99.86	1.000
	Spain - USA	4.88	5.34	-0.97	66.97	.868
	Japan - Portugal	4.91	4.82	0.25	81.79	.999
	Japan - USA	4.91	5.34	-1.00	49.50	.852
Arousal	Argentina - Spain	5.01	5.38	-2.01	95.60	.271
	Argentina - Japan	5.01	5.88	-5.90	131.87	<.001
	Argentina - Portugal	5.01	5.77	-3.64	72.34	.004
	Argentina - USA	5.01	5.22	-0.85	43.79	.912
	Spain - Japan	5.38	5.88	-2.69	108.04	.061
	Spain - Portugal	5.38	5.77	-1.65	95.87	.468
	Spain - USA	5.38	5.22	0.55	60.04	.982
	Japan - Portugal	5.88	5.77	0.53	80.81	.984
	Japan - USA	5.88	5.22	2.59	47.81	.087

To evaluate the differences, a multivariate analysis of variance (MANOVA) was conducted. The model indicated that the country of origin had a significant effect, Wilks' Lambda = 0.90, $F(8, 532) = 3.56$, $p < .001$. Univariate analyses showed that the country of origin had a significant effect on arousal, $F(4, 267) = 6.98$, $p < .001$, but not on valence, $F(4, 267) = 0.52$, $p = .725$. The Games-Howell post-hoc test revealed that Japanese ($M = 5.88$) and Portuguese ($M = 5.77$) participants reported higher arousal levels compared to Argentine participants ($M = 5.01$), as shown in Table 4.

In terms of familiarity and clarity, another MANOVA was conducted to assess the impact of the country of origin. In this case, the results also showed a significant effect of the country of origin on familiarity and clarity, Wilks' Lambda = 0.74, $F(4, 322) = 13.14$, $p < .001$. Univariate analyses revealed significant differences in how participants evaluated familiarity, $F(2, 162) = 23.05$, $p < .001$, and clarity, $F(2, 162) = 7.73$, $p < .001$. Table 5 shows that Spanish participants ($M = 5.27$) reported higher familiarity with the stimuli compared to Argentine ($M = 4.24$) and Portuguese ($M = 4.43$) participants. Similarly, Spanish participants ($M = 5.73$) rated the emojis as clearer compared to Argentine ($M = 5.43$) and Portuguese ($M = 5.12$) participants.

Table 5

Differences in familiarity and clarity dimensions by country

Dimension	Comparison	M_A	M_B	t	gl	p
Familiarity	Argentina - Spain	4.24	5.27	-6.27	114.12	< .001
	Argentina - Portugal	4.24	4.43	-1.22	104.22	.442
	Spain- Portugal	5.27	4.43	5.03	102.81	< .001
Clarity	Argentina - Spain	5.43	5.73	-2.03	114.98	.110
	Argentina - Portugal	5.43	5.12	2.02	101.02	.112
	Spain- Portugal	5.73	5.12	3.95	98.73	<.001

Discussion

This article presents normative values for a corpus of 60 emojis in the dimensions of valence, arousal, dominance, clarity, and familiarity in a sample of Argentine university students. The ratings showed high reliability across raters. When studying the properties of the emotional dimensions of valence, arousal, and dominance, we found that the behavior of these stimuli is similar to the evidence found with other types of emotional stimuli, such as images (Branco et al., 2023; Lang et al., 2005), sounds (Irrazabal et al., in press; Naal-Ruiz et al., 2022), or words (Huerta-Chavez et al., 2025). Valence emerged as the main property that organizes the stimuli response (Yik et al., 2023). Together with arousal, we observed that emojis, like other stimuli, follow the characteristic boomerang pattern, with a stronger relationship in the negative quadrant. This indicates that the more negative the valence of a stimulus, the higher its arousal level. This relationship between valence and arousal becomes weaker in the quadrant of pleasant stimuli. These results lead us to conclude that this set of emojis can be reliably used in emotion research, just like other commonly used emotional stimulus corpora.

Regarding gender differences in the Argentine sample, mixed-effects models revealed a small but statistically significant difference in valence, with women providing less positive ratings than men. Although the effect size is modest, its direction is consistent with a well-documented negativity bias in women's evaluations of affective stimuli. Across studies using diverse emotional materials, women have been shown to rate ambiguous or negative stimuli as more unpleasant than men, while ratings of clearly positive stimuli tend to be more similar across gender (Bradley et al., 2021; Branco et al., 2023; Ferré et al., 2023; Jones et al., 2020). This asymmetry produces a systematic downward shift in women's average valence scores, particularly when the stimulus set includes a substantial proportion of neutral or negatively-valenced items, as is the case in our emoji corpus.

Further support for this interpretation comes from the analysis of the bidimensional affective space defined by valence and arousal across gender groups. Although both women and men showed the expected U-shaped pattern, women exhibited a significantly steeper linear slope in the negative valence range. This pattern is characteristic of a negativity bias operating specifically on the unpleasant side of the affective space, and replicates findings reported with the IAPS (Bradley et al., 2021; Branco et al., 2023) and with affective sounds (Naal-Ruiz et al., 2022), suggesting that the phenomenon generalizes across stimulus modalities and now extends to digital affective stimuli such as emojis. Importantly, no global differences emerged in arousal, dominance, familiarity, or clarity, indicating that the gender difference is not an undifferentiated higher reactivity in women but a specific asymmetry in how negative content is processed.

The absence of an overall difference in arousal is consistent with validation studies in other regions. Reports from Portuguese (Rodrigues et al., 2018), Spanish (Ferré et al., 2023), U.S. (Jaeger et al., 2019), and Japanese (Kutsuzawa et al., 2022) samples indicate that men and women rate arousal levels of emojis similarly when aggregated across stimuli. Our results align with these reports at the aggregate level, while extending them by showing that gender differences do emerge once the asymmetry between positive and negative stimuli is considered. From an applied perspective, this implies that researchers using emoji-based stimuli should consider gender as a potentially relevant moderator when negative or ambiguous items are included in the stimulus set.

Regarding familiarity and clarity, the similar ratings between men and women in our Argentine sample differs from findings in other countries, although these comparisons require methodological caution because the studies involved vary substantially in the composition of their stimulus sets. Rodrigues et al. (2018), using a stimulus set composed predominantly of facial emojis with a Portuguese sample, indicated that women rated emojis as more familiar and clearer than men. Similarly, Jones et al. (2020), who used facial emojis with a U.S. sample, reported that women considered emojis to be clearer than men. Ferré et al. (2023), with a Spanish sample, found comparable patterns, although their stimulus set included a much broader range of emoji categories beyond facial emojis (e.g., objects, animals, gestures, and symbols). Because familiarity and clarity ratings may depend on the specific emoji types sampled, these methodological differences should be considered before attributing the observed divergences exclusively to cultural factors. A more directly comparable resource has recently been provided by Ferré et al. (2025), who developed normative data for 112 exclusively facial emojis in a Spanish sample. Although the variables assessed in that study differ from those in the present work, it reinforces the value of normative resources focused on a homogeneous stimulus category.

These results align with studies suggesting that women tend to use emojis more frequently than men (Jones et al., 2020). However, in our sample, both men and women found emojis to be equally clear and familiar. This suggests that within the young, university-educated demographic from which our sample was drawn, the use of emojis has become widespread and homogenized. Whether this homogenization extends to broader age groups, educational backgrounds, and regions of Argentina remains an empirical question for future research. Overall, these results highlight the importance of considering both cultural factors and methodological comparability when evaluating the use of emojis in online communication across different regions (Park et al., 2014).

When analysing differences across the available samples, regardless of the gender of the participants, no differences in valence scores were found between the Argentine, Spanish, Portuguese, U.S., and Japanese samples. These results align with previous validation studies using other emotional stimuli, such as words, images, or sounds (Irrazabal & Tonini, 2020, 2023; Sarli & Justel, 2022; Tonini et al., 2024), indicating that valence consistently emerges as the central dimension organizing affective responses (Branco et al., 2023; Lang, 1995).

On the other hand, differences were observed in arousal ratings. Argentine participants rated arousal similarly to participants from the U.S. and Spain, but reported lower levels compared to Portuguese and Japanese participants. However, caution is needed when interpreting these differences. It is unclear whether these variations reflect genuine cultural differences in emotion perception, methodological factors such as differences in emoji sets, the duration of tasks, participant characteristics (e.g., age, educational background), or other potential confounding variables. Nevertheless, this pattern aligns with findings from studies employing different emotional stimuli. For instance, Tonini et al. (2024) found that Argentine participants reported lower arousal compared to Japanese participants when assessing emotional sounds (IADS-E). Such findings are consistent with Lang's (1995, 2010) proposal that affective valence serves as the fundamental, evolutionarily shaped dimension of emotional processing (Sadeghi et al., 2024), while arousal may be more susceptible to influences from learning, culture, and contextual factors. Therefore, although valence appears robust across cultural contexts, researchers should remain cautious and ideally conduct local validations, particularly for other emotional dimensions, when selecting stimuli for cross-cultural experimental research.

Finally, there is a general tendency for users to consider emojis to be both familiar and clear. As facial emojis represent facial expressions, they are processed similarly to real faces (Rodrigues et al., 2018), a characteristic that contributes to their frequent use in online communication. Comparing the overlapping subset of emojis between studies, the Argentine sample rated them as less familiar than the Spanish sample, which in turn rated them as more familiar than the Portuguese sample. In terms of the

clarity of the emojis' semantic content, the Argentine sample found them to be as clear as those in the Spanish and Portuguese samples, although differences were found between these two latter populations. These differences should be interpreted with caution, given that the Spanish reference dataset (Ferré et al., 2023) included a broader range of emoji categories than the Portuguese (Rodrigues et al., 2018) and Argentine datasets, both of which focused on facial emojis. Part of the observed variation in familiarity and clarity ratings may therefore reflect differences in stimulus composition rather than purely cultural factors. This underscores the importance of considering both local cultural factors and methodological comparability when selecting stimuli for cross-cultural research.

One limitation of the study concerns the gender distribution of the sample, which was predominantly female (79 %). This is related to the sampling strategy. The sample consists of a relatively small group of undergraduate students, primarily representing Gen Z, which may not capture the full spectrum of Argentine cultural interpretations of emojis. While these data provide valuable initial normative insights, they predominantly reflect the affective responses of a younger, university-educated demographic. We view this work as a first step in constructing a more comprehensive normative framework for Argentina. Future studies should aim for more balanced samples of men and women to analyze whether gender differences in participants' ratings emerge.

Secondly, the characteristics of the emojis used may limit the interpretation of the results when analysing differences between countries. While we aimed to use identical or similar emojis (e.g., all emojis were facial), variations in emoji design depending on the platform (WhatsApp, Twitter, iOS) were not considered. Whether design differences significantly affect the evaluation of their emotional characteristics was not addressed in this study but could be considered in future research.

A methodological limitation relates to the order in which emojis were presented. Although the data collection was carried out across two sessions, with the emoji set presented first in one order and subsequently in the reverse order, a fully randomized order of presentation would have been preferable. Randomization would have minimized potential order and fatigue effects, ensuring more robust and unbiased responses from participants.

A further limitation concerns the cross-cultural comparisons reported in this study. Although we restricted comparisons to overlapping emojis between our corpus and each reference study, the heterogeneity in sample composition, presentation modality, emoji platforms of origin, and data collection periods prevents firm conclusions about the cultural origin of the observed differences. Methodologically robust cross-cultural research on emoji norms would require coordinated multi-site studies employing identical stimulus sets, identical presentation procedures, and demographically comparable samples. By making the present normative data publicly available, we aim to contribute to future collaborative initiatives of this kind.

It should also be noted that the cross-cultural analyses were conducted under a methodological constraint. Although the Argentine dataset allowed the use of mixed-effects models to account for the crossed structure of the observations, the comparison datasets from Spain, Portugal, Japan, and the United States were available only in aggregated form. As a result, cross-cultural comparisons relied on mean ratings per emoji rather than individual-level observations. Future studies that make participant-level data publicly available would allow more comparable modelling across samples and more precise estimation of cultural differences, including their moderation by individual characteristics.

Conclusions

In sum, the present study provides initial normative data for a corpus of 60 emojis evaluated by young Argentine university students. Within this sample, emojis behaved as valid affective stimuli, showing the characteristic boomerang distribution in the two-dimensional affective space and high levels of familiarity and clarity, in line with other commonly used emotional materials (images, words, and sounds). These properties support their use as accessible stimuli for research on cognitive and emotional processes within comparable demographic groups. Extending these normative data to more diverse Argentine populations, particularly in terms of age, educational background, and gender balance, remains a priority for future research.

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