

Influence of gender in the recognition of basic facial expressions: A critical literature review

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Abstract

AIM: To conduct a systematic literature review about the influence of gender on the recognition of facial expressions of six basic emotions.

METHODS: We made a systematic search with the search terms (face OR facial) AND (processing OR recognition OR perception) AND (emotional OR emotion) AND (gender or sex) in PubMed, PsycINFO, LILACS, and SciELO electronic databases for articles assessing outcomes related to response accuracy and latency and emotional intensity. The articles selection was performed according to parameters set by COCHRANE. The reference lists of the articles found through the database search were checked for additional references of interest.

RESULTS: In respect to accuracy, women tend to perform better than men when all emotions are considered as a set. Regarding specific emotions, there seems to be no gender-related differences in the recognition of happiness, whereas results are quite heterogeneous in respect to the remaining emotions, especially sadness, anger, and disgust. Fewer articles dealt with the parameters of response latency and emotional intensity, which hinders the generalization of their findings, especially in the face of their methodological differences.

CONCLUSION: The analysis of the studies conducted to date do not allow for definite conclusions concerning the role of the observer's gender in the recognition of facial emotion, mostly because of the absence of standardized methods of investigation.

Key words: Facial; Face; Perception; Recognition; Sex; Expression

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Core tip: In this systematic review we found that results on the influence of the observers' gender on the recognition of basic facial expressions of emotion as examined in respect to accuracy, latency, and emotional intensity are inconclusive, despite a small tendency for women to perform better than men in general emotion recognition. This can be partly explained by the wide variation in the methods used in the studies. We highlight the need for standardized procedures to be used in facial emotion recognition tasks. Otherwise, inconsistencies in the final results of these studies will continue to exist.

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INTRODUCTION

The recognition of facial expressions has been a focus of research since the 19th century when, in 1872, Darwin^[1] published his book "The Expression of Emotions in Man and Animals".

Emotion recognition is central for successful social interactions, since it is fundamental for one to be able to correctly identify signs related to the emotional states of his counterparts. Such signs consist mostly of non-verbal behavior including gestures and facial expressions^[2], the latter regarded as the main form of emotional communication^[3].

In 1971, Ekman *et al*^[4] proposed that facial displays of happiness, sadness, disgust, anger, surprise, and fear are universal as they appear in many cultural backgrounds, and they were thus named "basic expressions".

Facial emotion recognition is a complex task because it involves several elaborate processes from a neurobiological point of view. Most brain regions that play a role in facial emotion recognition are required to execute a perception process, identifying the geometric configuration and features of the observed face so as to be able to discriminate between different stimuli based on their appearance^[5].

In addition, the emotional meaning of a given face must be attributed through the identification of the specific signs of each emotion. The occipital temporal cortex, the amygdala, and the orbitofrontal cortex are regions that take part in this process^[5].

It has also been established that the ability to distinguish and interpret facial displays is dependent on individual experiences and learning, although there is no consensus in regard to the mechanisms implicated in

the perception and categorization of facial stimuli; that is, about whether these two processes are biologically determined or acquired through experience^[6].

The expansion of research assessing facial recognition abilities has provided evidence suggesting that the observer's characteristics affect the final results of facial emotion recognition tasks. Among these characteristics, gender stands out, with relevance in clinical settings and especially in research, as it is used as a reference variable.

A number of studies investigated the influence of gender on the accuracy and response latency in facial emotion recognition tasks, as well as differences in the neurobiological functioning of men and women during the performance of such tasks^[7]. Results have been inconsistent to date, however, given the diversity of findings. Furthermore, there are no systematic reviews available dealing with evidence produced in this field.

Our objective was to make a systematic review of indexed literature on the influence of the variable gender on the recognition of facial expressions of the six basic emotions based on the outcome variables accuracy, response latency, and emotional intensity, in addition to making a critical exam of the methodology used in the studies.

MATERIALS AND METHODS

We made a systematic search with the search terms (face or facial) and (processing or recognition OR perception) and (emotional or emotion) and (gender or sex) in PubMed, PsycINFO, LILACS, and SciELO electronic databases for articles assessing outcomes related to response accuracy and latency and emotional intensity. The articles selection was performed according to parameters set by COCHRANE. The reference lists of the articles found through the database search were checked for additional references of interest. The number of articles found through the database and hand searches, the inclusion and exclusion criteria, and the total number of references included in the review are shown in Figure 1.

RESULTS

Sampling and methodological aspects

As seen in Figure 1, 32 articles were included in the review following a thorough analysis by two psychologists with research experience in the field. The decade with most articles published was the 2000s (31.25%, $n = 10$). Around 37% of the studies ($n = 12$) were performed in the United States. The main characteristics of the samples and methodologies used in the studies are described in Table 1.

As one of the inclusion criteria for this review was the enrollment of non-clinical samples, around 75% ($n = 24$) of the studies involved samples of university students. Samples included a variable number of subjects (mean: 331, median: 93) with a mean age of 24

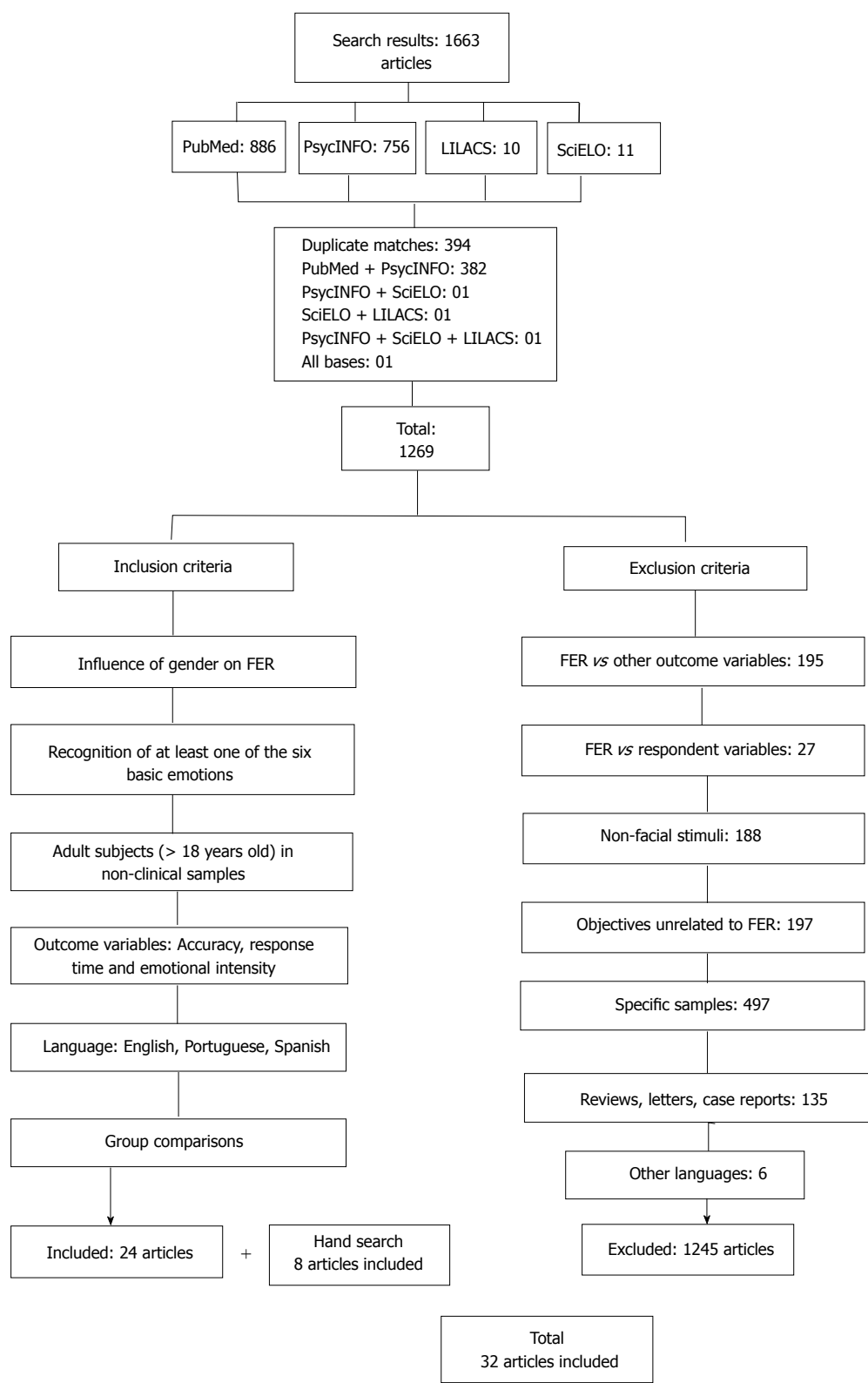


Figure 1 Flowchart describing the inclusion and exclusion of references found. FER: Facial emotion recognition.

years. The homogeneity of sociodemographic variables between groups of men and women was ensured in 56.25% of the studies ($n = 18$)^[12,13,19-24,26-28,30-33,35,36,39].

Most articles (56.25%; $n = 18$) provided no information concerning inclusion and exclusion criteria^[8-11,14-18,20,21,23,25,27,33,34,36,37]. Among the inclusion/

exclusion criteria described in the articles, the most common were presence/absence of psychiatric (24%) and neurological (21%) disorders, and use of psychotropic and/or illicit drugs (17%).

In respect to methodological aspects, Table 1 shows that 24 of the 32 studies included in the review

Table 1 Main sampling and methodological aspects of studies included in this review

Ref.	Country	Year	Sample type	N (♂/♀)	Age (mean)	Stimuli/color/presentation	Emotions	Stimuli presentation time	Outcome variable
Gitter <i>et al</i> ^[8]	United States	1972	U	160 (NA/NA)	NA	DS/ BW/static	H, F, D, A, S, SD	NA	Ac
Zuckerman <i>et al</i> ^[9]	United States	1975	U	101 (64/37)	NA	DS/ color/static	H, F, D, A, S, SD	2 s	Ac
Fujita <i>et al</i> ^[10]	United States	1980	U	24 (12/12)	NA	DS/ BW/static	H, D, S, SD	10 s	Ac
Kirouac <i>et al</i> ^[11]	Canada	1983	U	34 (16/18)	NA	Ekman-Friesen/ BW/static	H, F, D, A, S, SD	10 s	Ac
Babchuk <i>et al</i> ^[12]	United States	1985	U	40 (20/20)	25.65	Dr Carroll Izard/ BW/static	H, F, D, A, SD	No limit	Ac, L
Kirouac <i>et al</i> ^[13]	Canada	1985	GP	300 (150/150)	26.20	Ekman-Friesen/ BW/static	H, F, D, A, S, SD	10 s	Ac
Mandal <i>et al</i> ^[14]	India	1985	U	150 (75/75)	26.50	Ekman-Friesen/ BW/static	H, F, D, A, S, SD	0.25 s, 0.5 s, 1 s	Ac
Wagner <i>et al</i> ^[15]	England	1986	U	53 (15/38)	21.50	DS/ BW/static	H, F, D, A, S, SD	5 s	Ac
Nowicki <i>et al</i> ^[16]	United States	1987	U	107 (49/58)	NA	Ekman-Friesen/ BW/static	H, F, D, A, S, SD	0.06 s	Ac
Rotter <i>et al</i> ^[17]	United States	1988	U	(1) 679 (241/438) (2) 399 (162/237)	(1) 20.00 (2) NA	DS/ Color/static	F, D, A, SD	NA	Ac
Mufson <i>et al</i> ^[18]	United States	1991	U	275 (105/170)	NA	Ekman-Friesen/ BW/Static	H, F, D, A, S, SD	0.05 s	Ac
Erwin <i>et al</i> ^[19]	United States	1992	GP	(1) 39 (24/15) (2) 20 (10/10)	31.80	DS/ BW/static	H, SD	7 s	Ac
Duhaney <i>et al</i> ^[20]	United States	1993	U	30 (15/15)	NA	Ekman-Friesen/ BW/static	H, F, D, A, S, SD	10 s	Ac, I
Hess <i>et al</i> ^[21]	Canada	1997	U	24 (12/12)	18.97	Matsumoto- Ekman/ BW/dynamic	H, D, A, SD	5 s	Ac
Thayer <i>et al</i> ^[22]	Norway	2000	U	44 (16/28)	23	Ekman-Friesen/ BW/static	H, D, F, A, S, SD	6 s	Ac
Oyuela-Vargas <i>et al</i> ^[23]	Colombia	2003	U	60 (30/30)	21.5	Ekman-Friesen/ BW/static	H, A, SD	2 s	Ac, L
Grimshaw <i>et al</i> ^[24]	United States and Canada	2004	U	73 (36/37)	NA	Ekman-Friesen/ BW/static	H, F, A, SD	0.05 s	Ac, L
Hall <i>et al</i> ^[25]	United States	2004	U	(1) 96 (69/27) (2) 363 (126/237)	NA	Matsumoto- Ekman/BW/ static and dynamic	H, F, D, A, S, SD	10 s/0.20 s (maximum)	Ac
Rahman <i>et al</i> ^[26]	England	2004	GP	240 (120/120)	29	Ekman-Friesen/ BW/static	H, SD	No limit	Ac, L
Palermo <i>et al</i> ^[27]	Australia	2004	GP	24 (12/12)	24.5	Ekman-Friesen; Gur <i>et al</i> ^[51] NimStim; Watson; Mazurski-bond/ BW/static	H, F, D, A, S, SD	No limit	Ac, L
Montagne <i>et al</i> ^[28]	The Netherlands	2005	U	68 (28/40)	22.45	DS/ BW/dynamic	H, F, D, A, S, SD	NA	Ac, I
Biele <i>et al</i> ^[29]	Poland	2006	U	38 (14/24)	22	MSFDE/ BW/dynamic and static	H, A	1.5 s (static and dynamic)	I
Hampson <i>et al</i> ^[30]	Canada	2006	U	62 (31/31)	20.77	Ekman-Friesen/ BW/dynamic	H, F, D, A, SD	No limit	Ac, L
Williams <i>et al</i> ^[31]	Australia	2009	GP	728 (329/399)	20-91	Gur <i>et al</i> ^[51] / Color/static	H, F, D, A, S, SD	2 s	Ac, L
Collignon <i>et al</i> ^[32]	Canada	2010	U	46 (23/23)	24.8	DS Color/dynamic	F, D	0.5 s	Ac
Hoffmann <i>et al</i> ^[33]	Germany	2010	U	(1) 133 (58/75) (2) 186 (70/116)	22	Matsumoto- Ekman/ color/static	H, F, D, A, S, SD,	0.3 s	Ac, I
Scherer <i>et al</i> ^[34]	Switzerland	2011	(1) GP/ (2) U	(1) 7158 (5358/1800) (2) 72 (9/63)	NA	(1) Ekman-Friesen, BW static (2) DS/BW/ dynamic	(1): H, F, D, A, SD/(2): H, D, SD	(1) 3 s/(2): NA	Ac

Donges <i>et al.</i> ^[35]	Germany	2012	GP	81 (28/53)	25.25	Facial Emotion Discrimination Test/ BW/static	H, SD	0.033 s	Ac, L
Weisenbach <i>et al.</i> ^[36]	United States	2012	GP	138 (75/63)	32.91	Ekman-Friesen/ BW/static	H, F, A, SD	0.3 s	Ac
Pinto <i>et al.</i> ^[37]	Brazil	2013	U	120 (60/60)	NA	Ekman-Friesen/ BW/dynamic	H, F, D, A, S, SD	0.5 s	Ac
Wang ^[38]	China	2013	U	93 (48/45)	18.81	Ekman-Friesen/ BW/static	H, A	2 s	Ac
Kessels <i>et al.</i> ^[39]	Norway, Australia, Ireland and Germany	2013	GP	210 (85/125)	18-75	ERT/ BW/dynamic	H, F, D, A, S, SD	NA	Ac

NA: Not available; U: University students; GP: General population; DS: Developed for the study; BW: Black and white; MSFDE: Montreal Set of Facial Expression of Emotion; H: Happiness; F: Fear; D: Disgust; A: Anger; S: Surprise; SD: Sadness; ♀: Women; ♂: Men; Ac: Accuracy; L: Latency; I: Intensity of emotion.

used standardized stimuli sets, the most frequent of which was the series by Ekman *et al.*^[40] (66%, $n = 16$). Another eight studies (25%) used their own sets of stimuli. Black and white stimuli ($n = 27$) were more common than colored stimuli ($n = 5$). Only one study^[31] used a standardized procedure; the remaining investigations adapted procedures according to their objectives resulting in large diversity, with methodological details not always available in the articles, which hampered comprehension.

The study by Williams *et al.*^[31] was also the only investigation that used the Internet for data collection, whereas the remaining studies used face-to-face stimuli presentations.

The number of stimuli displayed in the several tasks used in the studies ranged from six to 336 (mean: 171, median: 58), which were mostly presented at random order (59.37%, $n = 19$)^[8,9,12,17,20-23,25-30,32,33,35,38] and statically (81.25%, $n = 26$).

Only eight studies (25%) used morphing techniques in the composition of their stimuli^[10,20,28,29,32,33,37,39], which allows the manipulation of pictures in order to achieve the display of facial emotions at different intensities.

The number of actors photographed to compose the stimuli sets varied from two to 10 and all sets included male and female models. Most actors were Caucasian (71.87%, $n = 23$)^[8,11,13,14,16-27,30,33,34,37-39] and adults (78.12%, $n = 25$)^[9-11,13-27,29,30,33,34,36-38].

In respect to the emotions studied, the most frequent were happiness, assessed in 93.75% of the articles reviewed ($n = 30$), and sadness, assessed in 90.62% of the studies ($n = 29$). Surprise was the least frequently assessed emotion (56.25%, $n = 18$) and on average studies included displays of five facial emotions.

As also shown in Table 1, the time of stimuli presentation was measured in 28 studies (87.50%), whereas response latency was measured in only 11 (34.37%). In most studies, the presentation time was previously established and was not under the subjects' control.

Summarizing the outcome variables analyzed in this review in accordance with our inclusion criteria,

response accuracy was assessed in 31 studies, response latency in eight studies, and gender differences in relation to the intensity of displayed emotions in four studies.

Accuracy

The accuracy of emotional judgments has been studied in terms of general emotional recognition and of the recognition of specific emotions. Table 2 presents the main findings related to the accuracy of emotional judgments.

As seen in Table 2, 26 studies assessed accuracy in respect to the full set of emotions displayed, and stimuli sets varied across studies (Table 1). From these, around two-thirds ($n = 16$) reported that women performed better than men in respect to the correct identification of emotions, with a minimum significance level of $P \leq 0.01$. In the remaining studies, no such differences were found.

These studies did not share common methodological designs, whether we consider this group as a whole ($n = 26$) or the groups of articles that found or failed to find gender-related differences. Thus, there seems to be no direct influence of methodological variables on the final results obtained.

In respect to specific emotions, results are rather heterogeneous. The only emotion for which a marked pattern was found was happiness, regardless of the methodology used: in 79.16% of the studies ($n = 19$), men and women did not have significant differences in their accuracy to recognize happiness.

In regard to the recognition of sadness, women tended to be more accurate than men, as approximately half of the articles reviewed described a significant difference in favor of women (46.15%, $n = 12$). Men and women tended to perform similarly in the recognition of surprise, anger, and disgust (surprise: 62.50%, $n = 10$; anger: 57.14%, $n = 12$; disgust: 63.15%, $n = 12$). As for fear, half of the studies found significant differences in favor of women (50%, $n = 10$), whereas accuracy was the same for both genders in the other half (50%, $n = 10$).

Table 2 Main results related to the variables accuracy, response latency, and emotional intensity

Variable investigated	Emotion	Results		
		F > M	F = M	F < M
Accuracy (<i>n</i> = 31)	Total score (<i>n</i> = 26)	<i>n</i> = 16 ^[8-11,14,16-18,22,25,28,32-34,38,39]	<i>n</i> = 10 ^[10,15,20,23-27,31,33]	-
	Happiness (<i>n</i> = 24)	<i>n</i> = 4 ^[21,25,33,35]	<i>n</i> = 19 ^[8,12,14-16,18-20,23-28,30,31,33,36,39]	<i>n</i> = 1 ^[37]
	Sadness (<i>n</i> = 26)	<i>n</i> = 12 ^[8,14,16,17,25,28,31-34,37,39]	<i>n</i> = 11 ^[12,15,18,20,23,24,26,27,30,33,36]	<i>n</i> = 3 ^[19,21,33]
	Anger (<i>n</i> = 21)	<i>n</i> = 6 ^[8,12,25,30,33,29]	<i>n</i> = 12 ^[16,18,20,21,23,24,27,28,31,33,36-38]	<i>n</i> = 3 ^[14,15,17]
	Disgust (<i>n</i> = 19)	<i>n</i> = 6 ^[17,18,25,30,33,34]	<i>n</i> = 12 ^[8,12,14-16,20,27,28,31,33,37,39]	<i>n</i> = 1 ^[21]
	Fear (<i>n</i> = 20)	<i>n</i> = 10 ^[8,12,17,18,25,31-33,36,39]	<i>n</i> = 10 ^[14-16,20,24,27,28,30,33,37]	-
	Surprise (<i>n</i> = 16)	<i>n</i> = N = 6 ^[8,12,16,25,33]	<i>n</i> = 10 ^[14-16,18,20,27,31,33,37,39]	-
Response latency (<i>n</i> = 8)	Total score (<i>n</i> = 8)	-	<i>n</i> = 5 ^[14,23,24,27,35]	<i>n</i> = 3 ^[12,26,31]
	Happiness (<i>n</i> = 1)	-	<i>n</i> = 1 ^[23]	<i>n</i> = 1 ^[26]
	Sadness (<i>n</i> = 2)	-	-	<i>n</i> = 2 ^[26,30]
	Anger (<i>n</i> = 2)	-	<i>n</i> = 1 ^[23]	<i>n</i> = 1 ^[30]
	Disgust (<i>n</i> = 1)	-	-	<i>n</i> = 1 ^[30]
	Fear (<i>n</i> = 1)	-	-	<i>n</i> = 1 ^[30]
Emotional intensity (<i>n</i> = 4)	Total score (<i>n</i> = 2)	-	<i>n</i> = 2 ^[20,33]	-
	Anger (<i>n</i> = 2)	<i>n</i> = 2 ^[28,29]	-	-
	Disgust (<i>n</i> = 1)	<i>n</i> = 1 ^[28]	-	-

F: Female; M: Male.

It should be noted that some studies, although few, described greater accuracy for men in the recognition of happiness (4.34%, *n* = 1), anger (14.28%, *n* = 3), sadness (11.53%, *n* = 3), and disgust (4.34%, *n* = 1).

Considering the findings and the methodological aspects of the studies, we can infer that, when specific emotions are examined, the studies that found no statistically significant differences between men and women had some similar characteristics in the methods used. Common aspects were: (1) use of Ekman and Friesen^[40]'s stimuli series, with black and white pictures presented statically; (2) sample matching procedures for the number of subjects included in each group; (3) organization of samples so as to ensure the homogeneity of sociodemographic characteristics across groups of men and women; and (4) strict selection criteria.

Response latency

Only eight studies investigated the subjects' response time for the recognition of facial emotions. Their results are presented in Table 2.

All eight studies assessed their full sets of stimuli, with heterogeneous results regardless of the emotions represented in each set. It is of note that this group of studies was more methodologically homogeneous than the studies that assessed accuracy, regardless of their results.

Specific emotions were assessed in a very limited number of studies (*n* = 3), which makes it impossible to draw even partial conclusions.

Emotional intensity

A small number of studies (*n* = 4) investigated the effects of emotional intensity on the recognition of facial expressions by men and women and, as Table 2 shows, their results are still speculative, especially in the face of the variety in study designs.

DISCUSSION

Several investigations have been carried out in an attempt to elucidate whether there are differences between genders in what concerns the recognition of facial emotion and the reasons for this. Although hypotheses have been raised, there is no consensus about the definitive answer for this question.

One major line of thought refers to evolutionary differences, starting from the cultural aspects that involve the attribution of roles to men and women according to gender^[41]. For instance, men would be more prone to recognize anger because boys are encouraged to manifest aggressive behavior^[42].

Technological advance has enabled the investigation of differences in neurobiological processing during the recognition of facial expressions. In a literature review, Fusar-Poli *et al.*^[7] concluded that men and women tend to present activation in distinct brain areas during emotion recognition, with men displaying greater activation in the right medial frontal and hippocampal gyri, left fusiform gyrus, and amygdala; whereas women would have greater activation in the right subcallosal gyrus.

In accordance with the objective of this review, we included studies with the specific aim of assessing gender differences in respect to the accuracy, response latency, and intensity of emotion in the recognition of facial expressions of at least one of the six basic emotions in adult, non-clinical samples. Therefore, we did not include articles focusing on other sociodemographic or cultural aspects, neurobiological components, hormonal issues, influence of psychoactive substances or studies involving clinical samples and/or children and adolescents, even when they provided indirect data on the influence of gender in emotion recognition.

In respect to accuracy, the studies reviewed show that women tend to be more accurate than men in the recognition of emotions in general. However, we

observed that the studies that failed to find differences between men and women were more rigorous and homogeneous in terms of the methodology adopted and sample selection.

For specific emotions, in turn, no common pattern was observed, except for facial displays of happiness, as most studies found no difference between groups regardless of their design. One possible explanation for this refers to the peculiarities of the recognition of happiness, considered to be the most easily recognized emotion and for which accuracy levels often present a ceiling effect for both men and women^[19].

Based on the data described above, it can be inferred that the results found in this review do not allow for conclusive statements, since findings were quite heterogeneous concerning all the outcome variables examined, with the additional problem of the small number of articles that assessed response latency and emotional intensity. It should be noted, however, that there is a small tendency for women to be more accurate in the general recognition of facial emotions, but no conclusions can be reached in respect to specific emotions.

Theoretically, hypotheses to explain possible differences between genders in terms of accuracy in emotional recognition are based on cultural and evolutionary aspects. Historically, women have been in charge of child care, especially during the pre-verbal stage of development, and would thus be required to develop abilities to recognize emotional displays and potential threat to their offspring. Accordingly, women would be more stimulated to recognize different emotions, assigning increased importance to the recognition of mental states in others with the purpose of facilitating communication, strengthening affective bonds, and protecting their social group^[41].

As for men, greater importance would be attributed to the recognition of aggressive stimuli, as these could be indicative of threat posed by competitors in the same social environment and therefore have great adaptive value, ensuring the maintenance of leadership within the group^[41]. This could explain the results of studies in which men showed an increased capacity to recognize anger.

With the development of research techniques that involve the recognition of facial emotion, additional hypotheses were raised to explain differences between genders based on the particularities of brain functioning. The results of a literature review^[7] suggest that maturation processes play a significant role in the way men and women recognize emotion, mostly because of the action of masculine and feminine hormones, affecting even the activation of certain brain regions during research procedures.

As described above, the existing literature indicates the possibility that there are differences in facial emotion recognition by men and women; however, this result was not evident in our review. One hypothesis to explain this divergence is the variety of methodologies used in

the studies, and while a common method is not used, it will be difficult to conclude in favor or against this difference. Below is a description of the main methodological aspects that can interfere with the results of studies in the field.

As mentioned earlier, the literature informs that certain characteristics of the observer, which are outlined next, can influence the performance of facial emotion recognition tasks. Thus, the selection and composition of samples may have an impact on the final results of studies if they are not taken into account.

From the 32 articles reviewed here, around half provided no information concerning their inclusion/exclusion criteria, which would be important to lend greater reliability to their findings since it is known, for example, that the presence of mental^[43] and neurological disorders^[44] and cognitive deficits^[45] can directly affect facial recognition.

Another factor that should be considered is the ethnicity of viewers and actors, since the recognition of facial emotion is facilitated when subjects belong to the same ethnic group, as specificities exist within ethnic groups despite emotions being universal^[46].

In the studies reviewed here, there was a predominance of Caucasians among both observers and actors. However, ideal tasks should include stimuli with actors of different ethnicities, which would confer greater ecological validity to the studies. The composition of the sample should also be carefully considered, with the inclusion of subjects from different ethnic groups or the establishment of bias control measures.

The same applies to the age of respondents, which is known to affect the recognition of facial expressions^[47]. In many of the studies included in this review, this information was absent in sample descriptions. Among the articles that brought this information, most samples were formed by young adults. As happens with ethnicity, the inclusion of subjects at different age ranges strengthens results as the experimental situation gets closer to real life. When age variation is impossible, this variable must be controlled for.

The predominance of Caucasian ethnicity and adult age in the pictures used as stimuli is due to the fact that the most commonly used stimuli series was that of Ekman and Friesen^[40], renowned and validated throughout the world despite its limitations, such as the sole inclusion of Caucasian, adult actors in black and white pictures.

Although most of the tasks in the studies used static stimuli, the remaining characteristics of the procedures employed were quite heterogeneous, including the stimuli presentation time, number of images used, and emotions represented in the stimuli sets.

A relevant example of methodological variation refers to the time of stimuli presentation, since the longer a subject can take to make his judgment, the greater the accuracy tends to be^[14]. The use of standardized procedures would avoid this bias across studies, allowing more reliable comparisons of findings.

In an attempt to increase the ecological validity of facial emotion recognition tasks, recent investigations have used colored images and dynamic stimuli presentation. This trend is mostly a result of technological developments that allow the manipulation of photographs in order to make them look closer to real-life social situations^[48].

Another possibility that starts to be explored is the administration of tasks over the Internet, which allows the enrollment of larger samples with greater sociocultural diversity. It should be noted that these procedures must be validated so that the results obtained through these means are indeed reliable and contribute to the research on facial emotion recognition.

We conclude that findings related to the influence of the observers' gender on the recognition of basic facial expressions of emotion as examined in respect to accuracy, latency, and emotional intensity are inconclusive, despite a small tendency for women to perform better than men in general emotion recognition.

This can be partly explained by the wide variation in the methods used in the studies, especially in a field where a number of variables are known to affect performance in the tasks, including age, gender, and ethnicity of respondents and actors depicted in stimuli sets; time of exposure to the stimuli; presentation mode (static or dynamic); and stimuli colors^[49,50].

This general look highlights the need for standardized procedures to be used in facial emotion recognition tasks that take into account the influence of variables whose effect has already been described in the literature. For many researchers in this area, the proposition of an ideal procedure is illusory. But we believe that variables like form, apresentation time and intensity of the stimulus can be standardized, as well sociodemographic and clinical characteristics of the sample (like age, intellectual capacity) must be controlled. Otherwise, inconsistencies in the final results of studies will continue to exist.

COMMENTS

Background

Emotion recognition is central for successful social interactions, since it is fundamental for one to be able to correctly identify signs related to the emotional states of his counterparts. It has also been established that the ability to distinguish and interpret facial displays is dependent on individual experiences and learning, although there is no consensus in regard to the mechanisms implicated in the perception and categorization of facial stimuli; that is, about whether these two processes are biologically determined or acquired through experience.

Research frontiers

The expansion of research assessing facial recognition abilities has provided evidence suggesting that the observer's characteristics affect the final results of facial emotion recognition tasks. Among these characteristics, gender stands out, with relevance in clinical settings and especially in research, as it is used as a reference variable.

Innovations and breakthroughs

A number of studies investigated the influence of gender on the accuracy

and response latency in facial emotion recognition tasks. Results have been inconsistent to date, however, given the diversity of findings. Furthermore, there are no systematic reviews available dealing with evidence produced in this field. The authors made a systematic review of indexed literature on the influence of the variable gender on the recognition of facial expressions of the six basic emotions based on the outcome variables accuracy, response latency, and emotional intensity, in addition to making a critical exam of the methodology used in the studies.

Applications

The findings related to the influence of the observers' gender on the recognition of basic facial expressions of emotion as examined in respect to accuracy, latency, and emotional intensity are inconclusive, despite a small tendency for women to perform better than men in general emotion recognition. This can be partly explained by the wide variation in the methods used in the studies. It is need for standardized procedures to be used in facial emotion recognition tasks. Otherwise, inconsistencies in the final results of studies will continue to exist.

Terminology

Stimulus recognition of facial expressions: the way in which the subjects have access to facial recognition tasks, which are photographs of actors expressing various emotion; Task recognition of facial expressions: how these stimuli are presented to subjects.

Peer-review

This systematic review deals with a relevant issue such as the influence of gender in the recognition of facial expressions. Authors' main findings are the lack of homogeneity among the studies and their serious methodological flaws. Data are therefore inconclusive and this fact strongly suggests the need for further studies with improved and standardized procedures. The manuscript is easy to read, and results and comments are well exposed throughout the paper.

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