# How do emotion-colour associations vary according to the gender of the participant?

## Gender variation in emotion-colour associations

In our book, we have explored the ways in which emotions and colours, and the associations that are formed between them, vary across languages and cultures. There is however another potentially important source of variation which may provide us with more information about how the associations are formed: that of gender. Differences have been observed between men and women in the emotions that they report to experience, the emotions that they are ‘expected’ to experience, the ways in which they experience colour, and the types of colours that are associated with them.

During the course of our investigations on emotion-colour associations we explored this aspect. The scope of the book did not include a thorough report and interpretation of the data we collected on the participants’ gender and the ways in which it affected their emotion-colour associations. However, for the sake of open science, transparency and potential interests in replicability, we are happy to share our analyses on how emotion-colour associations vary according to the gender of the participant. All the data, scripts and analyses are stored in the online repository on OSF, as extra analyses, which are theoretically motivated and discussed in the present document.

In this section we therefore discuss these differences and develop and test hypotheses about how they may impact on the sorts of emotion-colour associations that men and women form. Before embarking upon our discussion of gender, it is important to note that ‘gender’ is a somewhat complex term as it involves issues relating to identity, and to the internalisation or rejection of certain behavioural norms. As such, gender does not always map easily onto biological sex. In this section we focus on work that has been conducted with respect to gender. In the next two sections we discuss studies that have looked at the way gender relates to emotion and the ways in which gender relates to colour. In both cases we look at differences that have been found in the ways in which men and women actually experience these phenomena (or at least differences in the ways in which they report their experiences) and differences in the ways in which society believes them to be related. The two do not always correlate.

### Real and perceived gender differences in the experience of emotion

There is evidence to suggest that men and women do not necessarily experience emotions in the same way. Women have been found to report stronger emotional responses than men when presented with identical stimuli (Grossman & Wood, 1993). They have also been found to be better at identifying and discriminating between emotions (Collignon et al., 2010) and to be better than men at remembering emotional experiences (Canli, Desmond, Zhao, & Gabrieli, 2002). Women are also more likely than men to externalise their emotions (Kring & Gordon, 1998) and are more likely to rate negative stimuli as being more negative in comparison to men (Brebner, 2003). It has also been suggested that emotions that have the same ‘label’ are experienced in different ways by men and women. For example, the type of anger experienced by women is thought to be different from the type of anger that is experienced by men, with women experiencing anger that is more drawn out and ‘calculated’, and men experiencing anger that is more impulsive and ‘uncontrollable’ (Barrett, 2019).

The differences between men’s and women’s reported levels of emotional intensity are, to a large extent, socially constructed and reflect societal expectations of gendered behaviour. According to social role theory, beliefs about gender are based on perceptions of the communal and agentic attributes of men and women (Eagly, 1987). Communal attributes, such as affection, sensitivity, and sympathy are more strongly ascribed to women, while agentic attributes, such as dominance, ambition, and aggression are more strongly ascribed to men. Women are expected to display emotions such as happiness, calmness and shyness, whilst men are expected to exhibit ‘stronger’ emotions, such as anger, fury and confidence. In many societies, women have a much narrower behavioural range within which it is socially acceptable for them to operate, especially, when it comes to strong negative emotions, such as anger (Eagly & Wood, 1991). It is deemed more acceptable for men to display strong negative emotions than it is for women to do so. Perceived and actual gender differences in the types of emotions that are experienced by men and women may also affect the colours that men and women associate with emotions. One might expect to find, for example, that men will choose more saturated colours for strong negative emotions than women.

Differences in the ways in which the emotional lives of men and women are perceived may also affect the colour choices that people make when the emotional adjectives are used to describe men and women respectively. In some languages, the adjectival description of the emotion alters according to whether it is referring to a man or a woman. For example, in Italian, the word for ‘joyful’ is ‘allegro’ or ‘allegra’, depending on whether it refers to a man or a woman. One might predict that more saturated colours will be selected for negative emotions when they are presented in the masculine grammatical form than when they are represented in the feminine grammatical form. Conversely, if it is the case that women are meant to be more joyful than men, then participants may associate the emotion with a lighter shade of yellow when it is applied to a woman (‘allegra’) than when it is used to refer to a man (‘allegro’). In other words, when an emotional descriptor is presented in the feminine form, participants may form a set of associations that is different from those that they will form when it is presented in the masculine form, and this may affect the colours that people associate with emotion words when they appear in different genders.

Indirect support for this hypothesis comes from the finding that grammatical gender affects people’s perception of concrete objects. Findings from research employing a range of different paradigms (voice attribution, trait attribution and inference generation tasks) have shown that grammatical gender affects the content of conceptual representations of objects that do not have an actual gender (Sato & Athanasopoulos, 2018). In Spanish the word for ‘bridge’, ‘el puente’ is masculine, whereas the word in German, ‘die Brücke’, is feminine. Boroditsky and Schmidt (2000) found that Spanish and German speakers’ memory for object-name pairs (e.g., ‘bridge-Antonio’) was better for pairs where the gender of the proper name was congruent with the grammatical gender of the object name (in their native language), than when the two genders were incongruent. This was true even though both groups performed the task in English. These findings suggest that grammatical gender can shape thinking. Indeed, grammatical gender has been frequently employed to fuel the long-lasting debate on linguistic relativity (see Cubelli, Paolieri, Lotto, & Job, 2011 for a review).

To sum up, findings from the research literature suggest that, to some extent, men and women are perceived to have, and in some cases do actually have, different internal emotional lives. Women report experiencing stronger emotions than men, but in society, women, unlike men, are not expected to display strong negative emotions. These differences may lead to differences in the colours that men and women associate with certain emotions, or to differences in the colours that people associate with adjectives relating to emotions, depending on whether they are presented in the masculine or the feminine form. By comparing the different associations that men and women report, we may gain insights into how the emotions are experienced by men and women. For example, if men really do experience anger in a more active and vivid way than women, they may associate anger with a darker, or more saturated shade of red. Perceived gender differences in emotional experience may lead participants to select different colours for emotions when they are present in masculine or feminine gender. By comparing the responses that reflect the actual gender of the participants with those that reflect the gender of the prompt, we may gain insights into the extent to which gender variation in emotional experience are actual felt experiences, as opposed to being simply perceived by outsiders.

### Real and perceived gender differences in relation to colour

In addition to gender-based variation in the experience of emotion, the types of associations that men and women form between emotions and colours may also be shaped by the fact that men and women perceive colour itself in different ways. Women are better than men at perceiving similarities and differences between colours (Abramov, Gordon, Feldman, & Chavarga, 2012), they employ more words for colour than men (Arthur, Johnson, & Young, 2007) and the names that they employ tend to be more elaborate (Greene & Gynther, 1995). Also, when dividing up the colour spectrum, women divide it into a larger, more nuanced and elaborated set of colour descriptors (Mylonas, Paramei, & MacDonald, 2014). Mylonas et al. also found that women divide up the colour spectrum into a higher number of descriptors when talking about warm colours whereas men tend to do so for cool colours. It is also worth noting that men have a higher propensity towards colour-blindness than women, although colourblind individuals have been found to behave in broadly similar ways to non-colourblind individuals in terms of the associations that people form between emotions and colours (Jonauskaite et al., 2021).

Gender differences in colour perception have their origin in both nature and nurture. There is evidence to suggest that women find it easier than men to discriminate between red and green hues, but not between blue and yellow hues and this has been linked to differences in male and female chromosomes (Rodríguez-Carmona, Sharpe, Harlow, & Barbur, 2008). However, the findings from most studies point to the role of nurture in shaping men’s and women’s responses to colour. There are also differences in the types of colours that are associated with men and women. It has been shown that people associate lighter colours with women rather than with men (Semin, Palma, Acartürk, & Dziuba, 2018). People are faster to recognise male names when they are written in dark colours and female names when they are written in light colours (Semin & Palma, 2014). In sum, as with emotion, there is evidence to suggest that women behave differently in their response to colour (e.g., by displaying more sensitivity to a range of different colours) and that women tend to be associated with different colours than men (particularly light colours).

### Gender variation in relation to the bodily basis of language

There is some research suggesting that, in some cases, sensory-motor experience plays a more significant role in the acquisition and use of language in men than it does in women. Women appear to acquire metaphorical language through a more ‘usage-based’ approach that involves the ability to subconsciously detect and imitate patterns in the surrounding linguistic input. For example, in English there is a metaphorical association between importance and physical weight, which, underlies expressions such as ‘heavy subject matter’ or ‘light entertainment’. Ackerman et al. (2010) found this association to be more closely related to bodily experience in men than in women. In their study, which is however not free from controversy and failed replication attempts, they asked male and female participants to hold either a light or heavy clipboard, featuring an imaginary ‘social action survey’. They then asked participants whether particular public issues should receive more or less government funding. The issues included some that could be considered socially important and serious (such as air pollution standards) and some that could be considered more idiosyncratic and less important (such as the regulation of public toilets). They found that male participants allocated significantly more money to social issues when holding the ‘heavy’ clipboards than when holding the ‘light’ clipboards. In contrast, female participants chose to fund nearly all the social issues regardless of the kind of clipboard that they were holding. This suggests that for the men in the study, the association between linguistic expressions involving weight and the actual experience of holding heavy weights was much more direct.

Similar findings have been made with regard to metaphorical associations between physical strength or power and abstract strength or power (e.g., “she built a strong argument”, “that’s a really weak case”) and between verticality and prestige (e.g., “she’s very high up in the organisation”, “what will upstairs say?”). Schubert and Koole (2009) found that performing actions associated with power (such as making a fist) leads male participants (but not female ones) to perceive themselves as being more assertive, esteemed, and powerful. In a similar vein, Stepper and Strack (1993) found that when men are in an upright position, they are more likely to feel pride in response to positive feedback than when they were in a slumped position. They did not find this effect in their female participants. Although not all of these studies have been successfully replicated (e.g. Beek et al., 2018), the bulk of the evidence from this area of research suggests that the bodily basis of some metaphorical expressions may be experienced in a more visceral way by men than by women.

In contrast, there is evidence to suggest that the use of metaphorical expressions by women is more likely to be shaped by their sensitivity to frequencies in linguistic data. Hutchinson and Louwerse (2013) compared the ways in which male and female participants responded to associations between verticality and valence (e.g., good-bad), verticality and authority (e.g., doctor-patient), verticality and temperature (e.g., hot-cold), and verticality and gender (e.g., male-female). They showed their participants pairs of words displayed one above the other and asked them to say whether the words were from the same semantic domain. Their hypothesis was that when the words were displayed in the ‘congruent’ direction (e.g., with ‘good’ at the top and ‘bad’ at the bottom), participants would respond more quickly than when the words were displayed in the non-congruent direction. In addition to this, they obtained frequency data on the most likely levels of linguistic exposure that participants might have had to these orderings. For each pair of items, they identified the linguistic frequencies with which these words occur in their canonical and non-canonical orderings in the Web 1T 5-gram corpus (Brants and Franz, 2006). They then compared the log frequency of a-b (e.g., happy-sad) and the b-a (e.g., sad-happy) order of the word pairs. They correlated these distributions with the results obtained in their study for both male and female participants. They found that participants in the study responded significantly more quickly to the canonical condition. More importantly, they found that the responses of female participants were significantly more closely aligned with the frequency distributions identified in the corpus data, for all four tests that involved the vertical axis. Therefore, it appears to be the case that women are more attuned than men to statistical distributions in the linguistic environment when internalizing bodily-based associations in language. In other words, it may be the case that women have a more context-sensitive, usage-based approach to concept acquisition. Women have been shown to have more developed reading and writing skills than men, which may be partly due to the fact that they engage more deeply in language related activities within and outside educational settings (Roivainen, 2011). As such, they may have more usage-based linguistic knowledge at their disposal. In contrast, men, who have less usage-based linguistic knowledge at their disposal, may have to draw on more bodily-based knowledge sources. For men, the bodily-based origin of the expression may be more psychologically ‘present’.

These findings suggest that when providing explanations for the emotion-colour associations that they report, men may be more likely to provide explanations that have a bodily-basis, whereas women may make more references to linguistic factors, such as the presence of idioms. This would be an interesting finding as it would show that men and women are to some extent aware of the different ways in which they acquire linguistic knowledge. This hypothesis is also tested in our study.

*Research Question: How do emotion-colour associations vary according to the gender of the participant?*

## Findings

We report our findings concerning gender variation in the types of associations that our participants made between emotions and colours. We begin by looking at how the emotion-colour correspondences varied according to the gender of the participants. We then explore how the relationships between valence and lightness and between saturation and intensity varied according to gender. Next, we consider the grammatical gender of the words themselves. For this we work with a subset of our data and focus only on the Spanish and Italian prompts as those are the only two languages in our study where adjectives are marked for masculine or feminine (and not neutral) gender. Our aim here is to establish whether the relationships between valence and lightness and between saturation and intensity vary according to whether the emotion adjectives are presented in the masculine or feminine form. Finally, we look at the reasons offered by participants for their choices of word colour associations, and investigate whether, and if so how, they varied according to the gender of the participants.

### How do emotion-colour correspondences vary according to the gender of the participant?

In order to provide a broad overview of the similarities and differences in the colours that men and women associated with the different emotions, we begin by presenting the three most common colours chosen by women for each emotion and three most common colours chosen by men. These are shown in Table 1:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Most common colour chosen by women | | | Most common colour chosen by men | | |
|  | *Colour* | *%* | *Colour* | | *%* |
| Angry | Red | *13* | Red | | *10* |
| Black | *6* | Black | | *5* |
| No.association[[1]](#footnote-1) | *2* | Purple | | *2* |
| Bored | Brown | *18* | Grey | | *16* |
| Grey | *18* | Brown | | *11* |
| White | *8* | White | | *6* |
| Calm | Turquoise | *25* | White | | *18* |
| White | *16* | Turquoise | | *12* |
| Blue | *13* | Blue | | *10* |
| Cheerful | Yellow | *15* | Yellow | | *11* |
| Orange | *12* | Orange | | *8* |
| Pink | *10* | Green | | *6* |
| Confident | No.association | *8* | No.association | | *6* |
| Blue | *7* | Black | | *5* |
| Pink | *5* | Blue | | *5* |
| Depressed | Black | *19* | Black | | *15* |
| Grey | *13* | Grey | | *8* |
| Blue | *7* | Brown | | *7* |
| Excited | Orange | *14* | Orange | | *9* |
| Yellow | *7* | Colour.not.listed | | *5* |
| No.association | *6* | Green | | *5* |
| Fearful | No.association | *9* | Black | | *9* |
| Brown | *8* | No.association | | *7* |
| Turquoise | *6* | Colour.not.listed | | *5* |
| Furious | Red | *15* | Red | | *11* |
| Colour.not.listed | *5* | Black | | *4* |
| Black | *4* | Colour.not.listed | | *4* |
| Happy | Yellow | *14* | Yellow | | *11* |
| Orange | *11* | Green | | *8* |
| Pink | *8* | Blue | | *3* |
| Jealous | Green | *17* | Green | | *10* |
| Purple | *10* | Purple | | *9* |
| No.association | *6* | No.association | | *6* |
| Joyful | Pink | *13* | Yellow | | *9* |
| Yellow | *12* | Orange | | *7* |
| Orange | *11* | Green | | *5* |
| Passionate | Red | *14* | Red | | *10* |
| Pink | *5* | Purple | | *4* |
| Purple | *5* | Orange | | *3* |
| Sad | Blue | *13* | Grey | | *11* |
| Grey | *11* | Black | | *8* |
| Black | *7* | Blue | | *8* |
| Shy | Turquoise | *16* | Pink | | *9* |
| Pink | *10* | Turquoise | | *8* |
| White | *9* | Brown | | *7* |

Table 1 The three most common colours provided for each emotion by women and men

Although these are descriptive data and the differences shown in Table 1 are not necessarily statistically significant, we can see some potentially interesting differences, especially in relation to the colour pink. It is well established that women and girls are socialized to favour the colour pink whereas men and boys are socialized into avoiding this colour due to its ‘female’ associations (Jonauskaite, Dael, et al., 2019; LoBue & DeLoache, 2011). In our data, the colour pink occurs in the top three choices for women’s responses to five positive emotions cheerful, confident, happy, joyful and passionate, whereas both genders refer to the colour pink in response to the more neutral emotion ‘shy’. The relationship between shyness and the colour pink is likely to be largely bodily-related as it originates from the idea that one’s cheeks turn pink when one is shy (as many of our respondents reported), or motivated by cultural environment as indicated by some Italian participants, who pointed out that young girls, who usually wear pink, are also (and somewhat stereotypically) quite shy.

These findings point to differential roles played by language, culture, the body and the environment, at least in relation to these emotions. However, as we will see below, these differences appear to be emotion and colour-specific and did not extend to the whole dataset. The emotion colour choices disaggregated by gender are shown in Figure 1.

Gráfico, Gráfico de barras

Descripción generada automáticamente

Figure 1 Percentages of colours selected by male and female participants

Despite the fact that the response patterns of male and female participants look very similar on the surface, they were in fact significantly different from one another (𝝌 2(1)= 43.119, p<.001) although the association was weak (Cramer’s V = 0.06) given the small size of the dataset used for this test. We still find this an interesting finding from a qualitative point of view, and therefore, in order to identify specific colours where men and women showed significantly different preferences, it is useful to examine the residuals from the chi-square test. These are shown in Figure 2. Residuals of 2 and above are considered to be relatively over-represented (in green) and residuals of -2 or less (in red) are considered to be under-represented.

Interfaz de usuario gráfica, Gráfico, Aplicación

Descripción generada automáticamente

Figure 2 Residuals showing colour choices that were disproportionately more (shown in green) or less (shown in red) likely to be favoured by men and women

We can see from Figure 2, that men were relatively more likely to choose black and less likely to choose orange than women. There may a cultural explanation for men’s preference for the colour black as in many cultures, black is considered to be a more ‘manly’ colour. It is interesting to see that these stereotypes also extend into the ways in which men and women represent emotions. It is unclear why women were more likely to choose orange.

### Do associations between valence & lightness vary according to the gender of the participant?

We saw in Chapter 4 of our book that there was a significant association between the valence of the emotion and the lightness of the colour with which it was associated (p<.001, AdjR2=0.20), with some evidence for cross-cultural variation. Here we look at whether this relationship varied according to the gender of the participants. Before answering this research question, it is necessary to establish whether women or men were more likely to choose lighter colours by default. No significant difference was found: men and women responded in a similar way to one another in terms of the lightness of the colours selected (mean lightness value for colours chosen by women: 69%; in the case of men: 68%). The mean scores and distributions for male and female participants in terms of the overall lightness of the colours that they selected are shown in Figure 3.

Imagen que contiene Gráfico

Descripción generada automáticamente

Figure 3 Mean scores and distributions of the overall lightness ratings of colours chosen by male and female participants

Our mixed linear model (predictors: *Valence* \* *Gender of the Participant*; outcome: *Lightness*; random effects: *Participant, Item*) returned no significant difference between male and female participants in terms of their sensitivity to valence when selecting light or dark colours (p=.47). In other words, the two genders responded in a similar way to one another in terms of the extent to which the lightness of the colour selected was affected by the valence of the emotion. The responses are shown in Figure 4.

Gráfico, Gráfico de líneas

Descripción generada automáticamente

Figure 4 Associations between valence of the emotion and the lightness of the colours with which it was associated in male and female participants

### Do associations between emotional intensity & colour saturation vary according to the gender of the participant?

We also saw in Chapter 4 of our book that there was a significant association between the degree of intensity of the emotion and the level of saturation of the colour with which it was associated (p<.001, AdjR2=0.22), with some evidence for cross-cultural variation. Here we look at whether this relationship varied according to the gender of the participant. The data showed that women chose slightly more saturated colours than men (mean saturation value for colours chosen by women: 59%; by men: 57%). Even though our mixed model (predictor: *Gender of the Participant*; outcome: *Saturation*, random effects: *Participant, Item*) showed that this difference was statistically significant in the data collected (estimate of male responses: -1.58, SE=0.6, p<.001), caution should be exercised as the model was very weak (AdjR2=0.0006). See mean saturation values for the colours chosen by female and male participants in Figure 5.

Gráfico

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Figure 5 Mean scores and distributions of the overall saturation ratings of colours chosen by male and female participants

There was, however, no significant difference between male and female participants in terms of their sensitivity to intensity when selecting saturated or unsaturated colours (p=.24). In other words, the two genders responded in a similar way to one another in terms of the extent to which the saturation of the colour selected was affected by the intensity of the emotion. The responses are shown in Figure 6.

Gráfico

Descripción generada automáticamente con confianza media

Figure 6 Associations between the intensity of the emotion and the saturation of the colours with which it was associated in male and female participants

### Differences in the reasons for the associations that were offered by male and female participants

We saw in Chapter 1 of our book that when acquiring some aspects of linguistic behaviour, women are more sensitive to the linguistic environment than men. We might therefore expect women to cite more lingustically-motivated reasons for their emotion-colour associations, with men citing more bodily-motivated reasons. In order to test this hypothesis, we identified the distributions of the motivation types across the two genders. These are shown Figure 7.

Gráfico, Gráfico de barras

Descripción generada automáticamente

Figure 7 Distributions of motivation types produced by male and female participants

As we can see in Figure 7, male and female participants responded in similar ways. However, despite the broad similarities shown in Figure 6.12, the distributions of the motivation types across the two genders were significantly different from one another (𝝌2 = 42.95, p<.001; Cramer’s V=0.06). In order to explore the differences between the genders in more depth, it is useful to look at the residuals from the chi-square test and to identify motivation types that were significantly more likely to be used by female and male participants respectively. These are shown in Figure 8.

Gráfico, Gráfico en cascada

Descripción generada automáticamente

Figure 8 Motivation types that were disproportionately more (shown in green) or less (shown in red) likely to be chosen by men than by women and vice versa

We can see in Figure 8 that male participants were more likely to provide unspecified interpretations, and were less likely to choose environment-related responses. In contrast, women very rarely provided unclear answers. Although these findings do not provide support for our hypothesis that the men’s motivations are more bodily based across the board, they do provide some potentially interesting insights into male and female mindsets. When we look closely at the sorts of emotion-colour combinations that received a response where no motivation was specified, and where it was simply unclear what the motivation was, we see that the majority were produced in response to the association between anger and red. When participants did produce a reason for this particular association it was nearly always bodily based:

e.g., I associate this with a strong emotion, heat and blood flushing my face.

It may be the case that this motivation was so strong and so ‘obvious’ that the participants did not feel the need to state the reason for their choice. This response pattern may also reflect a wider gender difference in society whereby men’s world views are seen as ‘objective truths’ and do not need to be justified (see Code, 2018). The finding that men made more cross-modal associations than women is interesting as these associations tended to involve metaphor, and there is some evidence to suggest that men have a greater tendency to use of metaphor than women (Hussey & Katz, 2006) and, in comparison with women, are perceived as being better communicators when they do so (Hussey & Katz, 2009).

## Conclusion

Our findings show that, there were some differences between men and women in terms of the colours that they associated with particular items, and that this appeared to be the case for the colour ‘pink’, which has strong gender associations. Men were also more likely to favour the colour ‘black’ overall, whereas women were more likely to favour the colour ‘orange’. The first of these findings (men’s preference for the colour black) appears to conform to gender stereotypes but women’s preference for the colour orange is more difficult to explain. In overall terms, there were no significant differences between the two genders in terms of the hue and lightness of the colours chosen. Female participants did tend to select more saturated colours than male participants, but this finding was only weakly significant. There were no differences between the genders in terms of the strength of association between valence and lightness and between intensity and saturation.

Interestingly, when we compare these findings to our findings regarding the gender of the prompt (reported in Chapter 4 of our book) we see something of a disconnect between the ways in which male and female participants behaved and the responses that were provided for feminine and masculine adjectives, thereby showing a disalignment between intrinsic and acquired associations. There were relatively fewer differences in terms of actual gendered behaviour than there were in terms of people’s expectations of how people should behave according to the gender of the prompt. This finding aligns with much of the literature on gendered behaviour showing that it is a product of social and cultural conditioning. Men and women do not differ that much in terms of the emotions that they experience but cliched ideas about how women and men experience emotions can be accessed indirectly via emotion-colour association tasks.

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1. The answer no.association refers to cases where participants reported that they did not associate any colour with this emotion. [↑](#footnote-ref-1)