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Recognition of facial expressions is moderated by Islamic cues

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ABSTRACT

Recognising emotions from faces that are partly covered is more difficult than from fully visible faces. The focus of the present study is on the role of an Islamic versus non-Islamic context, i.e. Islamic versus non-Islamic headdress in perceiving emotions. We report an experiment that investigates whether briefly presented (40 ms) facial expressions of anger, fear, happiness and sadness are perceived differently when covered by a niqāb or turban, compared to a cap and shawl. In addition, we examined whether oxytocin, a neuropeptide regulating affection, bonding and cooperation between ingroup members and fostering outgroup vigilance and derogation, would differentially impact on emotion recognition from wearers of Islamic versus non-Islamic headdresses. The results first of all show that the recognition of happiness was more accurate when the face was covered by a Western compared to Islamic headdress. Second, participants more often incorrectly assigned sadness to a face covered by an Islamic headdress compared to a cap and shawl. Third, when correctly recognising sadness, they did so faster when the face was covered by an Islamic compared to Western headdress. Fourth, oxytocin did not modulate any of these effects. Implications for theorising about the role of group membership on emotion perception are discussed.

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Recognising emotions in covered faces

History has shown that especially in times of economic uncertainty or instability, people seek support by their kin and kith (henceforth ingroup), and avoid, fear, or even violently ward off the outgroup (Fiske, Cuddy, Glick, & Xu, 2002; Hatemi, McDermott, Eaves, Kendler, & Neale, 2013). Populist politicians use this public fear in their favour, fuelling anxiety and distrust with heated discussions targeting the outgroup, like the ever recurring propositions to ban the Islamic headscarf or more recently, the burkini. One of the arguments against these dresses is that they are thought to block communication and that someone's emotions and intentions cannot be clearly read anymore. We previously showed that this viewpoint is not entirely correct: emotions *can* be recognised from a face partly covered by a veil, even when the emotion is only partly visible (Fischer, Gillebaart, Rotteveel, Becker, & Vliek, 2012), or only in a flash (Kret & De Gelder, 2012).

Yet, the fact that emotions can be recognised from veiled faces does not mean that there is no interference whatsoever and that no mistakes are made. When a face is partly covered with some headdress, recognition of emotions evidently becomes more difficult, and more mistakes can be expected. But apart from the fact that veils hide parts of the face, they also provide a certain context that might modulate the processing of the emotions expressed in the wearer. Islamic garments for instance, may serve as social cues that might immediately evoke anxiety in some observers, because these garments signal a religious identity that is different from their own (Moors & Salih, 2009). Other research has shown that negative feelings that are triggered when people are

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confronted with someone from another group, reduces recognition of positive feelings such as happiness in a member from "the outgroup". For instance, in the USA, African-Americans are more negatively evaluated compared to European-Americans (e.g. Nosek, Banaji, & Greenwald, 2002). This is also found in implicit tasks, where African-Americans are more associated with negative events or emotions (Greenwald, McGhee, & Schwarz, 1998; Hugenberg & Bodenhausen, 2003, 2004), and evoke physiological threat responses (Mendes, Blascovich, Lickel, & Hunter, 2002). In an emotion recognition paradigm, Hugenberg (2005) showed that participants recognised happiness faster from own-race faces and negative emotions faster from other-race faces. This outgroup-negativity bias may even be stronger when confronted with people wearing an Islamic headscarf, because interpretation biases may be further increased as this garment covers parts of the face.

Fischer et al. (2012) investigated whether the emotions expressed in short film clips by female targets were perceived differently when their faces were either fully visible, covered by a niqāb or by a plain black bar. They observed that happiness was perceived less intensely from covered faces and that negative emotions were perceived more intensely when the faces were covered. However, no systematic differences were observed between the niqāb and black bar condition, suggesting that the niqāb does not play a role in the perception of emotions on the face. In this research, however, the black bar was a rather artificial control condition. A better test of the role of the niqāb would have been to compare the effect of the niqāb to a condition where the face is covered with a similar headdress, but with another cultural association. This was aimed for in a study by Kret and De Gelder (2012). In their emotion recognition study, they showed that covering the face by a niqāb, hiding the lower part of the face, resulted in better fear recognition, but worse happiness recognition, compared to when the exact same parts of the face were hidden under a cap and a shawl. In their experiment, the stimuli were very briefly presented to observers who were in turn stimulated to react as fast as they could, which they did, especially when being confronted with a threat (Kret & De Gelder, 2012; see also De Valk, Wijnen, & Kret, 2015; Van Rooijen, Ploeger, & Kret, 2017).

Cues of group membership, whether from characteristics within a face or whether derived from clothing, form a type of context in which expressions are interpreted. Although other research has already shown that contextual integration can take place at a very early processing stage (Meeren, van Heijnsbergen, & De Gelder, 2005; Righart & De Gelder, 2006, 2008a), the mechanisms that link outgroup cues to negative biases in emotion perception remain poorly understood. One possibility is that the linkage is conditioned by oxytocin, an evolutionary ancient neuropeptide that acts as hormone and neurotransmitter (Bos, Panksepp, Bluthe, & Van Honk, 2012; Carter, 2014; Donaldson & Young, 2008; De Dreu & Kret, 2016; Kret & De Dreu, 2013, in press; Ludwig & Leng, 2006; Meyer-Lindenberg, Domes, Kirsch, & Heinrichs, 2011). This possibility follows from two lines of evidence.

First, oxytocin is released and elevated during intimate social interactions such as birth and lactation, pair-bond formation, and interpersonal contact between parents and offspring, close friends, and sharing among group members (e.g. Carter, 2014; Seltzer, Ziegler, & Pollak, 2010; Wittig et al., 2014). Accumulating evidence suggests that oxytocin acts on the mesocorticolimbic circuitry promoting (affiliative) approach, especially when (social) stimuli have positive valence, and on the cortico-amygdala circuitry reducing withdrawal from (social) threat (De Dreu & Kret, 2016; Harari-Dahan & Bernstein, 2014; Kemp & Guastella, 2011). Whereas oxytocin is intimately involved in the formation and maintenance of social bonds (e.g. Rilling & Young, 2014) and enables positive parent–offspring interactions such as play and caring (Feldman, 2010), at the same time, oxytocin promotes aggressive responding to danger, especially threat to offspring (so-called maternal defence; Bosch, Meddle, Beiderbeck, Douglas, & Neumann, 2005; De Dreu et al., 2010; De Dreu, Greer, Handgraaf, Shalvi, & Van Kleef, 2012; Kret & de Dreu, 2013; Ten Velden, Baas, Shalvi, Kret, & De Dreu, 2014). Oxytocin can thus up-regulate defensive shielding and vigilance vis-à-vis outsiders and unfamiliar others (De Dreu & Kret, 2016).

Second, oxytocin increases sensitivity to one's partner's emotion expressions (Leknes et al., 2013; Shahrestani, Kemp, & Guastella, 2013; De Dreu, Kret, & Sauter, 2016). The results are however not always consistent: it sometimes facilitates and sometimes impedes emotion recognition and empathic responding to facial displays of emotion (i.e. Bos et al., 2012; Ebitz, Watson, & Platt, 2013; Shahrestani et al., 2013; Van IJzendoorn & Bakermans-Kranenburg, 2012). We recently showed effects of oxytocin in an emotion recognition

study in Dutch students who had to categorise a wide range of vocalisations from Western and African people. Oxytocin reduced the accuracy of decoding outgroup pleasure, yet enhanced the accurate decoding of outgroup amusement, triumph, anger and sadness (De Dreu et al., 2016). In the context of the current study, the finding that participants under oxytocin were less likely to assign the label "pleasure" to an outgroup member expressing that emotion is of particular interest. Because oxytocin has the effect of strengthening ingroup ties and fostering outgroup vigilance and derogation, we may expect oxytocin to have group-specific effects on the recognition of certain emotions. Possibly, our previous finding showing that women wearing a niqāb are perceived as expressing less positive emotions, will be even stronger under oxytocin compared to placebo.

Taken together, there is reason to assume that the "outgroup-negative" linkage is conditioned by oxytocin. We tested this possibility here, with healthy males and females.

The current study

In the current study, we compare the recognition of fear, anger, sadness and happiness in faces that are either covered by a niqāb or turban or by a cap and shawl (Headdress condition). This headwear covers a similar amount of the face, and therefore any differences in perception can only be due to the cue signalled by either a niqāb or turban or a cap and shawl. In addition, we aim to examine immediate reactions. Most previous studies presented stimuli during several seconds, giving participants time to reflect and think, and use certain strategies to perform well on the task. An immediate and instant reaction, however, better reflects outgroup biases and manifests itself, before controlling mechanisms can take over and correct initial responses.

Our predictions were threefold. First, we predict that happiness would be associated more with the ingroup than the outgroup and that therefore the recognition of happiness would be worse from faces covered by an Islamic compared to a non-Islamic headdress). Second, we expected that the recognition of fear would be better from faces covered by an Islamic compared to a non-Islamic headdress. Third, we predicted that oxytocin would strengthen both effects.

Method

Participants

One hundred thirty-four students (66 male, 68 female) of the University of Amsterdam took part in our study. Sixty-five of these students received oxytocin treatment, 69 were treated with placebo. Exclusion criteria were medical or psychiatric illness, medication, smoking and drug or alcohol abuse. The study was performed in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the University of Amsterdam (#2013-WOP-2757). All participants provided informed consent prior to the study. The data of eight participants was excluded and the data of one participant from the second block, because they performed at chance level and had abnormally fast reaction times or pressed other buttons than the allowed four for more than 25% of the trials. We conjectured they did not take the task seriously.

Procedure

Participants were seated individually in soundproof cubicles. Distance to the computer screen was 60 cm. They were randomly assigned to the oxytocin or placebo group (double-blind, placebo controlled study design). Participants self-administered, under experimenter supervision, a single intranasal dose of 24 IU placebo or oxytocin (Syntocinon-Spray Novartis; three puffs per nostril, with 1 min in between puffs). The placebo contained all the active ingredients except for the neuropeptide, and was manufactured by Stichting Apothekers Haarlemse Ziekenhuizen in coordination with the pharmacy at the Amsterdam Medical Center, adhering to the European Union guidelines on Good Manufacturing Practice and Good Clinical Practice. Placebos were delivered in the same bottles as Syntocinon.

Following treatment, the experimenter left the cubicle and participants watched a nature documentary for thirty minutes. Because effects of oxytocin peak at approximately 35 min after administration (Baumgartner, Heinrichs, Vonlanthen, Fischbacher, & Fehr, 2008), the computer switched to the instructions for the main task after 30 min. Participants were instructed to categorise emotional facial expressions. They were informed about the task and told that only part of the face would be visible and that the pictures would appear as a flash on the screen. Participants were requested to make their choices as fast and

accurate as possible, and to guess in case they were not sure. No reference was made to culture or the Islam.

A trial started with a fixation cross (800 ms), followed by the stimulus (40 ms), and a screen with the response alternatives (anger, fear, happy and sad). The order of the response alternatives was counterbalanced. The text was presented for maximally 3000 ms, but disappeared when the participants made a choice (as in Kret & De Gelder, 2012). There were two blocks of 192 randomly presented trials (384 in total) and participants took a 1-min break in between the two blocks. In total, the experiment took ~30 min.

Materials

We used six male and six female models showing happy, angry, sad and fearful expressions, taken from a well-validated face set (www.macbrain.org/resources.htm). In the validation of that face set, these specific pictures were recognised above 80% correct. Different types of headwear were combined with the facial expressions, using Adobe Photoshop CS5. The female faces were covered with either Islamic headwear or caps and shawls (same as in Kret & De Gelder, 2012), the male faces with either turbans or caps and shawls. Importantly, these four types of headwear left exactly the same face area uncovered (see Figure 1).

We are aware of the fact that blocking certain parts of the face might have stronger consequences for the recognition of some emotions than of others. From previous research, it is for example well known that the mouth is important for recognising happiness and sadness and that blocking this with whatever type of headdress hampers recognition (i.e. Fischer et al., 2012;

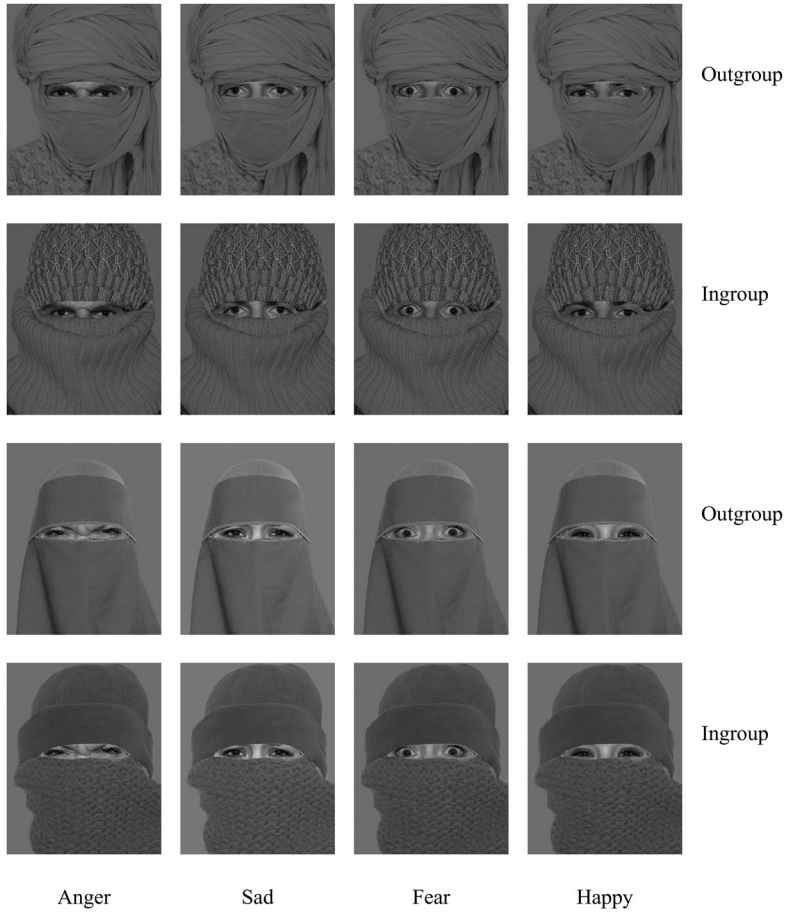

Figure 1. Four types of headdress occluded the same face regions. The turban and niqāb represent the outgroup, the cap/shawl the ingroup. Stimuli were presented for 40 ms.

Morris, deBonis, & Dolan, 2002). For the recognition of fear and anger the eyes and eyebrows play an important role and covering the eyebrows dampens recognition. When creating the stimulus material, we piloted with a version that left the forehead and mouth visible and a version that covered these parts. As most of the societal discussion is about the niqāb, we decided to use this type of headdress. Importantly, our control condition covers exactly the same parts.

The headdress templates used in this study have previously been validated in 28 participants (5 male; mean age: 20 years, range 18–25 years), all Caucasian and of Dutch origin. Nine of them were Christian and 19 indicated to be nonreligious. The results of the validation study showed that the cap and scarf templates were more often associated with happiness than the niqāb templates [$t(27) = 2.57$, $p < .05$]. An opposite, non-significant tendency was observed for fear (Kret & De Gelder, 2012).

Statistical analysis

Participant's performance was analysed from their unbiased hit rates (*Hu*), using Wagner's (1993) formula. These values range from 0 to 1 (perfect score). A simplified example just to explain the formula: if a participant correctly decodes six of eight outgroup anger stimuli (a raw hit rate of 75%), but labels a total of 10 outgroup stimuli as "anger", her *Hu* score for outgroup anger is: $6^2/(8 \times 10) = .45$. For exploratory purposes we also analysed *response biases* where we divided the number of correct classifications, in this example six for outgroup anger, by the total number of times this label was used in an outgroup context, here 10, and subtracted that from one: $1-(6/10) = .40$. In addition to Hu scores and response biases we also analysed *reaction times*. Following standard procedures, reaction times were filtered to only include the correct trials and trials where participants' response was faster than 2500 ms. All measures were analysed in Repeated Measures ANOVAs that included the factors headwear, emotion, treatment and their interactions. The means and standard errors can be found in Table 1 and the full statistics in the supplementing material.

Results

Hu scores

Results showed a main effect of Emotion, $F_{3,\ 372} = 319{,}915$, $p < .001$, with highest emotion recognition scores for anger and fear, being significantly higher than for happiness and sadness ($ps < .001$). Interestingly, despite the fact that exactly the same faces were shown in the different headdress conditions, a main effect of headdress demonstrated that emotion recognition was more accurate for faces with cap and shawl (ingroup) compared to faces with Islamic headdress (outgroup), $F_{1,\ 124} = 6115$, $p = .015$. Furthermore, in line with our previous work, there was an interaction between Headdress and Emotion $F_{3,\ 372} = 4380$, $p = .005$. Follow-up simple Bonferroni-corrected *t*-tests showed that this ingroup advantage was driven by happy expressions (ingroup versus outgroup) $t_{125} = 3.528$, $p = .004$ (Bonferroni-corrected for four tests).

Table 1. Means and standard errors (SEs) of percentage accurate responses (Hu scores, response bias and reaction times), split by emotion, headdress and treatment condition.

			Hu scores		Response bias		Reaction times	
Treatment	Emotion	Headdress	Mean	SE	Mean	SE	Mean	SE
Placebo	Anger	Outgroup	0.486	0.020	0.486	0.020	789.412	15.931
		Ingroup	0.484	0.020	0.484	0.020	777.695	15.878
	Fear	Outgroup	0.505	0.025	0.505	0.025	906.813	17.745
		Ingroup	0.528	0.026	0.528	0.026	894.761	17.854
	Happy	Outgroup	0.267	0.017	0.267	0.017	946.612	21.453
		Ingroup	0.294	0.019	0.294	0.019	922.550	22.936
	Sad	Outgroup	0.203	0.013	0.203	0.013	1027.110	27.333
		Ingroup	0.211	0.015	0.211	0.015	1088.807	25.988
Oxytocin	Anger	Outgroup	0.491	0.020	0.491	0.020	779.177	16.186
		Ingroup	0.477	0.020	0.477	0.020	777.723	16.132
	Fear	Outgroup	0.475	0.025	0.475	0.025	909.023	18.029
		Ingroup	0.486	0.026	0.486	0.026	910.732	18.140
	Happy	Outgroup	0.258	0.017	0.258	0.017	897.134	21.797
		Ingroup	0.284	0.019	0.284	0.019	904.253	23.302
	Sad	Outgroup	0.179	0.014	0.179	0.014	991.520	27.771
		Ingroup	0.189	0.015	0.189	0.015	1048.919	26.404

Response bias

Results showed a main effect of Emotion, with most mistakes occurring in the two conditions that were most difficult to decode (i.e. sadness and happiness) $F_{3,\ 372} = 81{,}838$, $p < .001$ ($ps < .001$). Another main effect for Headdress showed there were more mistakes in the outgroup compared to ingroup condition $F_{1,\ 124} = 7308$, $p = .008$. Most interestingly, the interaction between Emotion × Headdress $F_{3,\ 372} = 4577$, $p = .004$ showed that participants relatively often incorrectly assigned the label sadness to an outgroup versus ingroup face $t_{125} = 2.911$, $p = .016$ (Bonferroni-corrected for four tests).

Reaction times

Results showed a main effect of Emotion, with reaction times being fastest in the anger condition and slowest in the sadness condition, $F_{3,\ 372} = 111.200$, $p < .001$ ($ps < .001$). An interaction between Emotion × headdress $F_{3,\ 372} = 7456$, $p < .001$ showed that the recognition of sadness was faster following outgroup compared to ingroup headdresses $t_{125} = 3.435$, $p = .003$ (Bonferroni-corrected for four tests).

Discussion

In the current study we found that briefly presented emotional expressions on the face were interpreted differently, depending on the type of headdress that partly covered the face. Whereas for the negative emotions no difference between headdress conditions was found, happiness was less accurately recognised from faces that are covered by an Islamic veil compared to the same faces covered by a cap and a scarf. Moreover, the mistake to categorise another's expression as sad was relatively more often made when the face was covered by an Islamic versus a non-Islamic headdress. Oxytocin treatment did not modulate these effects of headdress nor had any other effect.

When being confronted with another person's expression of emotion, the emotion on the face is not all we perceive. The facial expression is perceived in a certain context, revealing for example the expresser's age, gender, familiarity and group membership. In addition, previous research showed that contextual information in the form of the body posture (Kret, 2011; Kret & De Gelder, 2012a, 2013; Kret, Roelofs, Stekelenburg, & De Gelder, 2013; Kret, Stekelenburg, Roelofs, & De Gelder, 2013; Sinke, Kret, & De Gelder, 2010), other emotional people (Clarke, Bradshaw, Field, Hampson, & Rose, 2005; Kret & De Gelder, 2010), the surrounding scene depicting emotion-provoking situations (Righart & De Gelder, 2006; Righart & De Gelder 2008b), all impact on emotion processing at a very early stage (Meeren et al., 2005; Righart & De Gelder, 2008a). Here we focused on a contextual cue that has received much attention in public debates, i.e. the niqāb, and its male counterpart, turbans.

Whereas previous research (Fischer et al., 2012; Kret & De Gelder, 2012) already showed that happiness is less likely to be perceived in covered faces, the present results further show that the nature of the face covering makes a difference, as the Islamic scarf specifically hampered the recognition of happiness. From our earlier study, it is already known that mere niqābs (just the clothing without a face) are less often associated with happiness than caps and shawls (Kret & De Gelder, 2012). The most likely explanation is that niqābs and turbans are not associated with happiness but with negative stereotypes about the Islam, and therefore happy faces are less likely to be recognised as such, especially when the clearest facial cue of happiness, the smile, is not visible. We would like to add that we expect that the effects observed in this study may generalise to other group contexts as well. Indeed, similar findings have been reported in earlier work. For example, Hugenberg (2005) showed that the race of a target face provides an evaluative context for emotion recognition. Specifically, he showed that European American participants displayed a recognition advantage for happy faces, specifically for White target faces, but displayed a response latency advantage for angry and especially sad Black target faces. Other research has also shown that in the USA, African-Americans are negatively evaluated (e.g. Nosek et al., 2002), associated with anger (Hugenberg & Bodenhausen, 2003, 2004), and even evoke physiological threat responses in White Americans (Mendes et al., 2002). Using a minimal group paradigm Dunham, Baron, and Carey (2011) showed that, the link between "negative" and "outgroup" is not a link learned through experiences between for example affect and race, but is attributable to more general intergroup processes. It should also be noted that such negative, implicit attitudes are considerably stronger for racial outgroups or for outgroups with strong Islamic associations than for minimal outgroups, suggesting a central role for social learning in the implicit association between Islamic culture and negative affect (Dunham et al., 2011).

We also found some results that did not support our hypotheses. The recognition of negative emotions, especially fear, was not systematically affected by the nature of the headwear. The only negative emotion effect was found for sadness, which was more often inaccurately perceived in outgroup faces. We do not have an explanation for these inconsistent findings. Possibly, our current sample consisting of students from the University of Amsterdam, were more exposed to the Islam than the students from the more rural Tilburg who took part in our previous study (Kret & De Gelder, 2012).

Interestingly and unexpectedly, we did not find any effects of oxytocin on the differential recognition of happiness from ingroup or outgroup faces. We had expected that oxytocin would further polarise the enhanced recognition of ingroup versus outgroup happiness but found no difference with the placebo group. A possible interpretation is that insufficient information about the different target group members was available for oxytocin to have an effect. Compared to the current study, previous studies on the effects of oxytocin used a clearer ingroup where similarity to participants was stressed more than in our study. Here, we cannot rule out the possibility that participants had stronger reactions following the outgroup compared to ingroup stimuli, as the latter did not have strong ingroup characteristics. Future research should therefore aim to further disentangle the contextual effects of ingroup and outgroup, for example by making participants feel more positive about the ingroup dress and by adding a third, neutral group. In addition, our previous study already showed that the effects of oxytocin are fine-tuned. That is, we observed that oxytocin reduced recognition accuracy for decoding outgroup vocalisations of pleasure yet, enhanced the accurate decoding of outgroup amusement and triumph (and anger and sadness) (De Dreu et al., 2016). It is possible that participants in the current study, who perceived emotions in a flash from the eye region did not have sufficient nuance for oxytocin to have an effect. A previous fMRI study showed that oxytocin administration reduced amygdala reactivity to masked emotions when attending to salient facial features, i.e. the eyes (not mouth) of angry faces and the mouth (not eyes) of happy faces. As in the current study, there were no effects of oxytocin on detection in the study by Kanat, Heinrichs, Schwarzwald, and Domes (2015). We think an interesting venue of future research would be to investigate whether oxytocin dampens the putative subcortical route for processing emotions.

The results of the current study may be informative for current debates as they show that it is the Islamic headwear and not just the covering of the face that may influence the misperception of happiness. Whether in the media or in real life, people nowadays are increasingly confronted with individuals from different religions and cultures. In most cases, however, true interactions hardly take place, due to segregated living circumstances, but also to feelings of anxiety or discomfort about proper codes of conduct for interacting (Amir, 1969). These latter feelings are further increased by religious cues. The niqāb, and other religious symbols, have become a strong expression of one's religious identity, which resulted in strong debates and the prohibition of wearing such headdresses in public places in many Western countries. As we have again shown in this study, it is not the coverage as such, but rather the symbolic contextual cues that bias our perception of emotions and thus may affect social interactions.

Data repository

The data can be downloaded from the Harvard Dataverse following this link https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/K2Y1J9.

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Disclosure statement

No potential conflict of interest was reported by the authors.
We declare no conflict of interest.

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