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RESEARCH ARTICLE

The Caucasian and North African French Faces (CaNAFF): A Face Database

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In France, when studying intergroup relations between ethnicities, one usually contrasts Caucasian and North African individuals. Despite the presence of a large number of face databases in the literature, none of them contains Caucasian and North African faces similar to faces we can find in a usual French environment. To overcome this problem, we propose a new database: the Caucasian and North African French Faces (CaNAFF). One hundred and forty-seven individuals, scattered on prototypicality across the Caucasian/North African continuum, have been photographed. These individuals displayed a neutral emotional expression and photos were taken under three eye gaze directions (right, frontal, and left), resulting in a total of 441 photos. Subsequently, in order to validate our database, 25 participants evaluated the photos on emotional neutrality and 30 participants evaluated faces on ethnic prototypicality, attractiveness, and willingness to approach/avoid faces. We make available to researchers this database as well as the result of the validation as a support for studying relations between Caucasian and North African individuals in France. The procedure for requesting access to the CaNAFF database as well as the validation file are available on this following link: https://osf.io/274ry/.

Keywords: face database; intergroup relations; North African; Caucasian; prototypicality

Categorising other people is one of the core functions of social cognition and one of the most prevalent pieces of information we use in this endeavour is the face. Relying on faces is particularly likely when to-be-categorised groups have distinctive facial features, as is the case with some ethnic groups, like Black and White individuals in many countries or Caucasian and North African individuals in Europe. Accordingly, when possible, studies designed to capture early categorisation processes rely on facial prototypes of some ethnic groups. This is often the case, for instance, with the most popular indirect measure, the implicit association test (IAT; Greenwald, McGhee & Schwartz, 1998), which can be found on the Project Implicit website (Nosek, Banaji & Greenwald, 2002). However, using faces for social categorisation purposes is only possible when a relevant face database is available. For instance, in France and the US, the Black/White IAT relies on faces, but the Arab-Muslim IAT relies on first names, which obviously precludes face-related categorisation processes for this latter group. The goal of the current contribution is therefore to provide a face database, the Caucasian and North African French Faces (CaNAFF), designed to be used when scholars are interested in using Caucasian and North African faces corresponding to faces that can be encountered in France.

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Faces in Intergroup Relations

It is now well established that faces provide a lot of information for making assumptions about people and their characteristics (e.g. Oosterhof & Todorov, 2008; Willis & Todorov, 2006). In the domain of intergroup relations, extracting visual features from faces is essential to categorise others in specific groups (e.g. gender, ethnicity, age) and to combine these features with other (face-related or contextual) features (e.g. Black faces perceived as more threatening when they display a direct eye-gaze direction, but less so when displaying averted eye-gaze direction; Trawalter, Todd, Baird & Richeson, 2008). Given the importance of faces to studying categorisation and social perception in a given cultural context, various face databases have been developed. Many of these databases focus on one or several dimensions, like faces of different ages or displaying various emotions (e.g. FACES; Ebner, Riediger & Lindenberger, 2010; Radboud Faces Database; Langner et al., 2010), but also on subjective perceptions about these faces, like attractiveness (e.g. Chicago Face Database; Ma, Correll & Wittenbrink, 2015). It is also noteworthy that some of them provide videos of

dynamic faces (e.g. Video Database of Moving Faces and People; O'Toole et al., 2005; DynEmo; Tcherkassof et al., 2013; Amsterdam Dynamic Facial Expression Set; van der Schalk, Hawk, Fischer & Doosje, 2011) or natural environments (e.g. Labeled Faces in the Wild; Huang, Mattar, Berg & Learned-Miller, 2008). Finally, and more important for our purpose, some of them contain faces of different ethnicities (e.g. Langner et al., 2010; Ma et al., 2015).

This last kind of database can be especially useful for scholars interested in intergroup relations between ethnicities. Among others, a part of this field is devoted to the study of stereotypes, prejudice, or discrimination against members of an outgroup (e.g. Devine, 1989). Although faces can be used in explicit/direct tasks (i.e. when individuals explicitly report their evaluation towards a person), faces are often used in implicit/indirect tasks (i.e. when participants' evaluations are inferred from their performance in a task; see Gawronski & De Houwer, 2014). Examples of this latter kind of task are approach/avoidance tasks (e.g. Paladino & Castelli, 2008), dot probe (e.g. Richeson & Trawalter, 2008), memory of faces (e.g. Meissner & Brigham, 2001), the implicit association test (e.g. Greenwald et al., 1998), evaluative priming (Wittenbrink, Judd & Park, 2001), and the shooter task (Correll, Park, Judd & Wittenbrink, 2002; Mange, Chun, Sharvit & Belanger, 2012). Moreover, in this field, faces can be used either as targets, like in approach/avoidance tasks (Paladino & Castelli, 2008), or as primes, like in the stereotype misperception task (Krieglmeyer & Sherman, 2012). Since the introduction of these implicit tasks, faces are now commonly used in the study of intergroup relations. These variations in terms of paradigms, however, should not let us overlook that, depending on the country where the study is conducted, relevant ethnicities and facial prototypes may differ.

Intergroup Relations in France: Ethnic Prototypicality

Because a host of studies in this area has been conducted in North America, many of these studies contrast White and Black people (e.g. Fazio, Jackson, Dunton & Williams, 1995; Wittenbrink, Judd & Park, 1997). Nevertheless, in Western Europe, for historical and immigration reasons, scholars study less the prejudice or discrimination towards Black people and more that shown towards Arabs[1] or Muslim people (e.g. Das, Bushman, Bezemer, Kerkhof & Vermeulen, 2009; Dotsch & Wigboldus, 2008; Dotsch, Wigboldus, Langner & van Knippenberg, 2008; Fischer, Greitemeyer & Kastenmüller, 2007). In addition to this difference between North America and Western Europe, it is noteworthy that these ethnic minorities in European countries are rather different (e.g. mostly Turkish people in Germany, Turkish and Moroccan people in the Netherlands, Pakistani people in the United Kingdom, and North African people in France). Moreover, even when countries share a minority group coming from the same country (e.g. Moroccan people in France and in the Netherlands), this group can come from different ethnic subgroups (the real ethnic origin; Fondation Hassan II pour les Marocains Résidants à l'Etranger, 2003). It follows that a North African prototypical face (i.e. the most representative face) in one country can be different from a prototypical face in another country because these groups possess, on average, different physical features. In France in particular, to the best of our knowledge, scholars interested in using faces from these two groups (people originating from France versus people originating from North Africa) do not have access to a database gathering prototypical faces of people that one can meet in France. Until now, when scholars working in France wanted to use faces, they were left with pictures either from foreign databases (Langner et al., 2010), with the drawback of having faces not necessarily prototypical of people living in France, or through search engines, with the drawback of not having standardised faces or not knowing where these faces came from.

The Caucasian and North African French Faces (CaNAFF)

The goal of this contribution is to provide a new database, the CaNAFF, gathering faces that scholars could use in a French environment by selecting faces of Caucasian individuals (i.e. French White people) and North African individuals (i.e. French Arab people). By being closer to prototypical faces one would encounter in France, we think that this new database will be useful for social cognition research relying on faces. It is important to mention that, although our faces will be more similar to faces one can encounter in a French environment (in contrast with databases from the Netherlands or from the US), these faces will obviously also differ in terms of prototypicality *within* the two respective groups. In fact, although we selected participants we categorised *a priori* as members of one of these two groups, what we will provide are prototypicality scores, namely to what extent each of these faces fits with the prototype of the two target groups (e.g. this face is more or less prototypical of a North African face). In other words, our database will provide different faces scattered across the Caucasian/North African continuum.

Although it could have been valuable to cross this continuum with gender, in the CaNAFF we decided to focus on male faces. Indeed, many of the studies in the social cognition literature focused on male first names or faces (e.g. Ackerman et al., 2006; Correll et al., 2002; Krieglmeyer & Sherman, 2012; Park & Banaji, 2000; Zerhouni, Rougier & Muller, 2016). This might be explained by the fact that the perception of the threat stereotype is higher in male targets than in female targets (e.g. Maner et al., 2005; Plant, Goplen & Kunstman, 2011). We also focused on males between 18 and 30 years old, once again because that is the most frequent in this field. Finally, because studies showed that eye gaze direction could play a role in outgroup perception (e.g. Richeson & Trawalter, 2008), we also manipulated gaze direction. Accordingly, in addition to having faces looking at the camera (i.e. gaze direction in front), we will also provide each face with the gaze direction on the left and on the right.

In addition to collecting face pictures and prototypicality ratings, we also gathered ratings on two subjective dimensions: attractiveness and willingness to approach/avoid the faces. We chose these two dimensions because researchers could be interested in controlling them and because it will

enable us to test whether the faces composing our database are perceived as we predict they should be. First, we could expect that the more faces are prototypical of Caucasian faces (as compared with North African faces), the more they will be perceived as attractive by Caucasian individuals (Kniffin, Wansink, Griskevicius & Wilson, 2014; Ratner, Dotsch, Wigboldus, van Knippenberg & Amodio, 2014). Second, we could expect that the more faces are prototypical of Caucasian faces (as compared with North African faces), the more Caucasian participants should have the willingness to approach them (Paladino & Castelli, 2008).

In the first section, we describe how we collected the pictures from a first set of participants. Then, we present how a second set of participants evaluated these pictures on several dimensions (i.e. emotional neutrality of faces, prototypicality, attractiveness, and willingness to approach/avoid faces).

Method

CaNAFF Creation

Participants. One hundred and forty-seven participants were recruited in a French shopping centre in a large French city (i.e. Grenoble). We selected participants to be as prototypical as possible of Caucasians or North Africans. Participants were paid ten euros for the session. After being photographed, each participant signed a consent form authorising researchers to use these photos as material for scientific research projects.

Apparatus. Photos were taken with a Canon EOS 750D camera (24.2 Mpx) with a SP AF 90 mm macro lens and a sigma EM-140 DG flash. The camera was set up on a tripod, 1.60 metres above the floor.

Procedure. When they arrived, participants had to put on a black t-shirt, take off all distinctive signs (e.g. glasses, earrings, and piercings), and stand in front of a cross drawn on the wall so their head was precisely on the cross. Each photo was taken with a white uniform background and participants were standing three meters from the camera. We took three pictures of each participant, with three different gaze directions (i.e. right, frontal, and left). To standardise the direction of their eye gaze and in order for them to change their eye gaze direction while keeping their head facing the camera, participants were asked to look at crosses drawn on a wall on the left or on the right of the camera. Participants were also asked to display a neutral emotion.

Image processing. The database contains 441 portrait images of 147 male faces with three different gaze directions. Images are stored in a JPEG format and have been post treated for harmonisation. Accordingly, we removed all the remaining distinctive signs or imperfections with Photoshop. Then, across images, luminance distribution of the whole picture was harmonised. Finally, each image was cropped and resized to reach a final size of 4000 × 3600 pixels.

CaNAFF Database Validation

Participants. Sixty-eight participants took part in the validation study (M_{age} = 22.09, SD_{age} = 3.04, 62 females). Participants were students in a psychology master's degree and came in exchange for course credits. Because many studies on intergroup relations between different ethnicities include a large majority of Caucasian participants (see Rudman, Feinberg & Fairchild, 2002, for a similar observation), we decided to keep only participants who categorised themselves as Caucasians; otherwise, non-Caucasian participants could have a different judgement and bias the database validation. Accordingly, data from 13 participants were removed from the analysis.

Procedure. For this validation, we collected four measures: emotional neutrality, prototypicality, attractiveness, and willingness to approach or avoid the face. These ratings were collected by creating two groups of participants.

Because subtle emotional expressions could change from picture to picture, a first group of 25 participants evaluated the emotional neutrality of the 441 pictures. Each photo was seen independently (i.e. each participant saw all the photos separately, with the three different gaze directions), and participants had to assess the emotional expression of the face (from −50 = positive to +50 = negative, the middle of the scale representing neutrality; here and everywhere below, participants did not see these numbers only the anchors; these numbers only reflect how responses were coded). Photo order was randomised across participants.

Because the other dimensions should have little reason to change drastically from picture to picture, a second group of 30 participants evaluated these dimensions for each of the 147 individuals composing our database. Accordingly, this second group of participants saw the three photos of the same individual at the same time (**Figure 1**). These participants had to evaluate ethnic prototypicality (from −50 = Caucasian to +50 = North African), attractiveness (from −50 = non-attractive to +50 = attractive), and natural willingness to approach or avoid this person (from −50 = avoid to +50 = approach). Scale order was counterbalanced across participants and the photo triplets order was randomised.

Results

For all our data analysis, we used R (version 3.4.2, 2017; R Core Team, 2012) and the lme4 package (version 1.1, 2016; Bates, Maechler & Bolker, 2015). P-values were obtained by Kenward-Rogers approximation (car package, version 2.1.6, 2017; Fox & Weisberg, 2011). When possible, we applied mixed model analyses (Judd, Westfall & Kenny, 2012), which allows for analysing continuous within-participants variables.

First, we tested whether levels of emotional expression, attractiveness, and willingness to approach/avoid differed from neutrality. To do so, we ran three separate mixed model analyses to test whether the mean across faces differed from zero. Second, we tested the relationship between prototypicality and the previous variables (i.e. emotional neutrality, attractiveness, and approach/avoidance willingness). Concerning emotional neutrality, because it was not possible to run a mixed model analysis (i.e., the faces' prototypicality and emotional neutrality, respectively, were judged by different participants), we carried out a linear regression between prototypicality and emotional neutrality by aggregating our data by stimuli (i.e. each target

Figure 1: Photos of a Caucasian individual (top panel) and a North African individual (bottom panel), with three gaze directions (i.e. right, frontal, and left).

Table 1: Intraclass correlations with participants as random factor, computed as single rater (ICC 2.1) and as mean of multiple raters (ICC 2.k).

Dimensions	ICC (2.1)	ICC(2.k)
Emotional neutrality	.17	.83
Attractiveness	.15	.85
Approach/avoidance tendencies	.11	.78
Prototypicality	.66	.98

person). This means that, for these analyses, the target person became the unit of observation. Concerning attractiveness and approach/avoidance willingness, we carried out two separate mixed model analyses by having prototypicality (mean centred around each participant's mean; Brauer & Curtin, 2017) as a fixed effect. Because we wanted to generalise our results to the population of individuals (i.e. other individuals than those who participated), we used participants as a random factor in all our mixed model analyses. Conversely, because our aim was not to generalise our results to other stimuli (i.e. other photos of faces than those composing our database), we did not use stimuli as a random factor. Finally, for all the rating dimensions, we calculated the intraclass correlations (ICC 2.1 and ICC 2.k; Shrout & Fleiss, 1979) as indices for interrater reliability (**Table 1**).[2] It should be noted that ICC 2.k can generally be interpreted as Cronbach's alpha.

Global Features

As a reminder, in our database we aimed for faces displaying a neutral emotional expression. All faces taken together (i.e. 147 faces with three different gaze directions), the overall emotion was not significantly different from neutrality (M = –0.49, SD = 4.75), $t(24.00) = 0.61$, $p = .55$.[3] Similarly, if we split faces by gaze directions, we can see that faces with eye-gaze directed towards the camera (M = 0.98, SD = 5.11), $t(23.99) = 0.93$, $p = .36$, as well as faces with gaze directions respectively on the right (M = –0.96, SD = 5.18), $t(23.99) = 1.04$, $p = .31$ and on the left (M = –1.50, SD = 4.92), $t(23.99) = 1.47$, $p = .15$, all displayed an emotion not different from neutrality.

Regarding attractiveness, overall our faces were categorised as relatively unattractive (M = –15.18, SD = 8.09), $t(29.00) = 7.17$, $p < .001$. These faces, however, did not differ significantly from neutral in terms of approach/avoidance willingness, (M = 0.43, SD = 6.00), $t(29.00) = 0.27$, $p = .79$.

Prototypicality and Its Relationship to Perception of the Faces

Our goal was to create a database of Caucasian and North African faces, prototypical of faces encountered in a French environment. Having preselected these faces in relation to their presupposed Caucasian and North African category memberships, as predicted, two different groups of faces emerged from the prototypicality scale (**Figure 2**). Overall, preselected Caucasian faces (N = 75) were perceived as more prototypical of their category (M = –26.86, SD = 8.28) than preselected North African faces (N = 72; M = 18.24, SD = 9.21), $t(145) = 5.97$, $p < .001$, $\eta_p^2 = .20$.

There was no relation between face prototypicality and emotional neutrality perception, $b = 0.02$, $t(145) = 1.24$, $p = .22$, $\eta_p^2 = .01$ (**Figure 3**, top panel). Regarding attractiveness, we found that the more a face was categorised as North African (in contrast with Caucasian), the less it was perceived as attractive, b = –0.06, $t(28.54) = 2.68$, $p = .01$ (**Figure 3**, middle panel). In the same fashion, the more a face was categorised as North African (in contrast with Caucasian), the more participants reported a willingness to avoid it, b = –0.09, $t(28.84) = 13.22$, $p = .001$ (**Figure 3**, bottom panel).

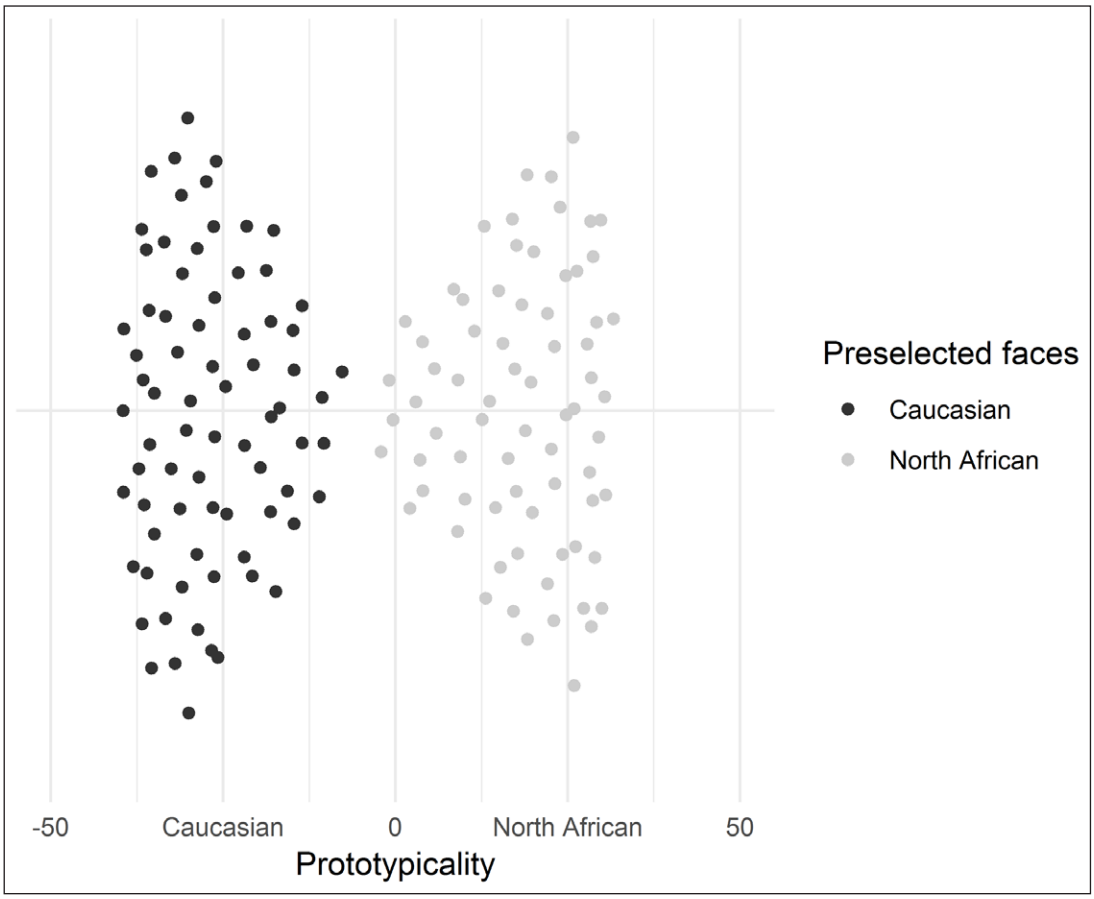

Figure 2: Distribution of faces according to the Caucasian/North African (–50 = *Caucasian*, 50 = *North African*) continuum and the preselected faces (Caucasian vs. North African).

Discussion

The goal of this contribution was to introduce a new database of Caucasian and North African faces, the CaNAFF, a database of faces of people living in France. To do so, we photographed 147 faces of French individuals under three different eye gaze directions for a total of 441 photos. Subsequently, to validate our database, we submitted these photos to a sample of Caucasian students to assess these faces on emotional neutrality, prototypicality, attractiveness, and approach/avoidance willingness.

Similarity with the Pre-existing Literature

Our results are coherent with the intergroup literature. First, previous work has shown that people find members of their ingroup more attractive than people from an outgroup (e.g. Kniffin et al., 2014; Ratner et al., 2014). Therefore, given that North Africans can constitute an outgroup for participants who took part in the validation of the database, it is coherent to find that our North African origin faces were evaluated as being less attractive than the faces of Caucasian origin. Second, previous work using approach/avoidance paradigms has also shown that participants more easily approached members from their ingroup than people from an outgroup, while the reverse is true for avoidance (e.g. Paladino & Castelli, 2008). Therefore, it is also coherent to find that our participants reported a higher willingness to avoid faces of North African origin compared to faces of Caucasian origin.

In addition, it is also noteworthy that we already used the faces from this database in the context of an indirect measure involving these two groups. In three recent replications of the stereotype misperception task (Krieglmeyer & Sherman, 2012) with Caucasian participants, we systematically found priming effects coherent with an indirect ingroup bias in favour of (our) Caucasian faces over (our) North African faces. This result is in line with previous work demonstrating an indirect ingroup bias when relying on these groups (e.g. Mange, Sharvit, Margas & Sénémeaud, 2016) and therefore contributes in suggesting that our database can be used to study implicit cognition. It is worth mentioning that we did not rely on a full ingroup-outgroup design (i.e. with members of both groups as participants and targets; Judd & Park, 1993), so strictly speaking, our results do not demonstrate that these effects can really be interpreted as ingroup versus outgroup effects. Our goal here was simply to underline that our database produces results coherent with the pre-existing literature.

Contribution to Scientific Research

To the best of our knowledge, this is the first database of French and North African faces from a French environment. By having easy (and free) access to this database (all the information are available on this link: https://osf.io/274ry/), researchers will have an alternative to the use of foreign databases (e.g. the Radboud Faces Database;

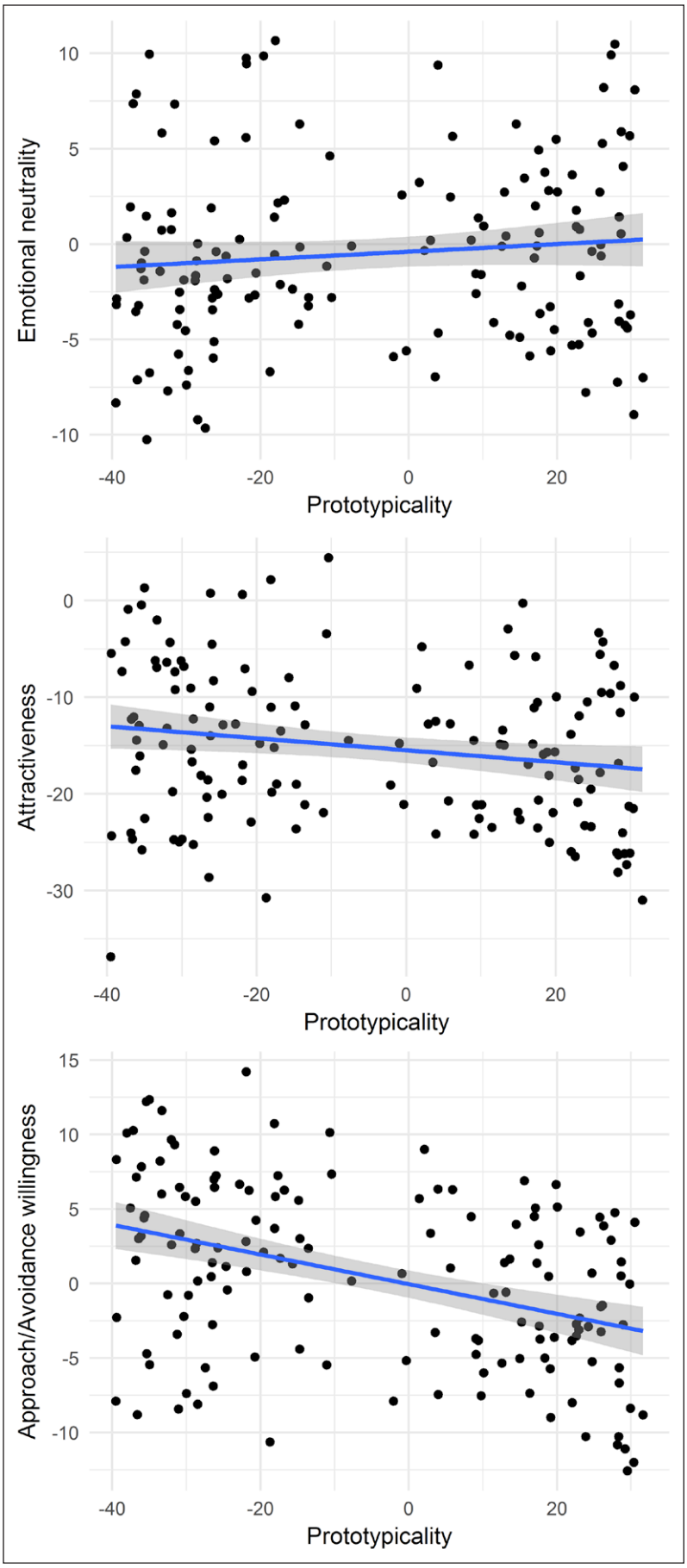

Figure 3: Emotional neutrality (top panel), perceived attractiveness (middle panel), and willingness to approach or avoid faces (bottom panel), as a function of prototypicality (i.e. –50 = *Caucasian*, 50 = *North African*) Shaded areas represent the 95% confidence intervals.

Langner et al., 2010) or unstandardised stimuli (e.g. stimuli found on search engines) when they want to study (quick and spontaneous) reactions towards Caucasian versus North African groups. In addition, researchers will have the opportunity to study these reactions while being able to select features related to the level of emotional neutrality, prototypicality, attractiveness, or approach/avoidance willingness. Such controls could be necessary, as demonstrated for instance by studies showing the role of attractiveness in memory of faces (e.g. Brigham, 1990; Shepherd & Ellis, 1973). It is also well known that people are better at recognising people from their ingroup than from outgroups (i.e. the Own Race Bias; Meissner & Brigham, 2001). We can thus imagine a study investigating how attractiveness contributes to this own race bias.

Regarding the approach/avoidance dimension, having these ratings could be useful in testing the correlation between self-report approach/avoidance willingness and approach/avoidance tendencies measured by an approach/avoidance task (e.g., Degner, Essien & Reichardt, 2016). In France, the study of intergroup relations, especially relations with North African individuals, is crucial. Like in other countries in Europe, North African/Arab individuals are sometimes perceived as highly threatening (e.g., Mange et al., 2016). At a time of multiple terrorist attacks and the resurgence of extremist groups, such a database could be useful for studies on stereotypes or prejudices against North African people.

Having preselected these faces in relation to their presupposed Caucasian and North African category memberships, it is interesting to see that, within these categories, faces can be perceived as more or less close to the vision of what a Caucasian or a North African individual should be (see also Blair, Judd, Sadler & Jenkins, 2002). Focusing on intergroup relations between Black and White people, studies have already tried to modify the degree of face prototypicality by using, for example, morphs (e.g., Freeman, Penner, Saperstein, Scheutz & Ambady, 2011). Dealing with real faces, other studies showed that people who had more Afrocentric features were more likely to be associated with stereotypical traits of Black people rather than counter-stereotypical traits (Blair et al., 2002). Using again real faces, our database could be useful to test whether this kind of result can be reproduced with the two groups we used here. Therefore, this new database will be useful not only for studying the relations between Caucasian and North African populations in France, but also for studying the influence of facial prototypicality (i.e. facial likeness with the group prototype) in intergroup relations.

No previous study has examined the role of skin tone alone (i.e. controlling for other perceptual features) in the perception of North African prototypicality and the associated stereotype of threat. However, this can be interesting because we know that a light skin colour is strongly preferred compared to a dark skin colour (Nosek et al., 2007). Accordingly, we will thus also provide another set of photos that are the same photos of Caucasian and North African faces, but where the faces are normalised in terms of luminance. For this second set of photos, we applied a mask on every picture and extracted the face pixels. Then, we computed and equalised the mean standard deviation of the faces. Doing so allowed us to provide pictures of Caucasian and North African faces with similar skin tone. This could be useful when researchers want to control this dimension.

Limitations

Despite the fact that we tried to standardise our database as much as possible, some limits can be mentioned. First of all, although our database includes two clusters of faces (i.e. North African and Caucasian faces), the degree of average prototypicality between the two groups is different. On average, the Caucasian faces were perceived as more prototypical than the North African faces. We can suggest two explanations for this difference. First, maybe the Caucasian faces were indeed objectively more prototypical of their group than North African faces. Second, it may have been more difficult for our (self-categorised French origin) participants to categorise a face as North African because the category itself is less well defined or because it could be socially more difficult to categorise someone as a member of a minority.

A second limitation is that, compared to some other databases (e.g. Chicago Face Database; Ma et al., 2015), the CaNAFF only contains young male faces. In the future, it would be desirable to complete this database with female faces or older faces. Finally, the male/female ratio of our validation sample was unbalanced (62 females, 6 males). This ratio was not something we aimed for, but it reflects the usual ratio found in psychology universities in France; therefore, it fits the kind of sample many research rely on. That being said, and although it is unclear whether ratings of faces would differ according to participants gender, this was impossible to test with the current sample, considering the small number of male participants.

Conclusion

The goal of this contribution was to introduce a new database of Caucasian and North African faces from French individuals. Researchers will be able to select and use available photos for free in their future research. This selection of Caucasian and North African faces can concern their level of emotional neutrality, prototypicality, attractiveness, and approach/avoidance willingness. We expect that this database will be a useful tool for scholars interested in implicit social cognition related to these two groups.

Notes

[1] We use the term "Arab" to refer to people originated from the Arab world (i.e. North Africa or Middle East). Later, we will focus on North African people; that is only on individuals from the North African part of the Arab world.

[2] Those intraclass correlations are weak but in a similar range as those observed with other databases (e.g., Langner et al., 2010).

[3] Because there is currently no consensus on the calculation of effect sizes in mixed model analyses, we do not report effects sizes.

Competing Interests

The authors have no competing interests to declare.

Author Information

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