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Dissertação orientada pelo Doutor Tomás Palma e pela Doutora Diana Orghian

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Durante seis anos esta Faculdade foi a minha segunda casa. Tal como em qualquer casa, nem tudo foi perfeito, nem do meu agrado (e.g., serviços académicos), contudo, a um nível académico, providenciou-me a oportunidade de aprender e ter contacto com pessoas cujo trabalho eu admiro, especialmente na minha área de estudo. Mesmo com a incerteza de ter ou não escolhido o curso certo, ter tido contacto com professores apaixonados e interessados pelo seu trabalho e pelo que ensinam, fez com que o meu carinho por Psicologia crescesse. Devido a tal, gostaria de endereçar um agradecimento aos meus orientadores, Tomás e Diana, e a todos os professores que me marcaram de uma forma positiva ao longo deste meu trajeto.

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Posto isto, chegando ao fim deste percurso, é hora de procurar formar novas casas, sabendo que as anteriores criaram e deixaram as estruturas que o permitem fazer. Obrigada

Abstract

Facial attractiveness pertains a crucial role in social interaction, with attractive people being, generally, preferred and highly perceived comparatively to unattractive individuals. Contradicting the maxim *beauty is in the eyes of the beholder*, literature has enlightened an apparent cross-cultural and cross-ethnicity agreement regarding attractiveness, suggesting a possible inherited universal beauty standard. Even though the exact features affecting attractiveness remain in debate, race and information shortage appear to have an influence, with White individuals perceived as more attractive than Black individuals, and Incomplete faces having higher attractiveness. In this thesis, the main goal was to further investigate the role of both variables. Therefore, we conducted a study in which people were divided in two conditions, Original (complete faces) and Mosaic (faces missing 1/3 of the information), and had to rate the attractiveness of White and Black faces of both genders. Our results replicated previous findings, with participants preferring White faces and Incomplete faces. Besides cultural and historical influences on racial bias, we propose a prototypicality account as the underlying mechanism for our results, suggesting that a more developed facial prototype leads to a higher attractiveness of White faces, and the holistic representation of incomplete faces using a facial prototype, more attractive than the original face, as the reason of the shortage information preference. We also found an unexpected gender effect, with women perceived as more attractive than men, that needs further study. Limitations and ideas for future studies are also disclosed.

Keywords: attractiveness, racial bias, averageness, prototypicality, information shortage, cross-cultural agreement

Resumo Alargado

A maneira como interpretamos o mundo depende muito das nossas percepções, nomeadamente a maneira como percepcionamos os que nos rodeiam, as pessoas com quem nos cruzamos no nosso dia a dia, sejam estas estranhas ou conhecidas. Em relação à percepção, uma das principais fontes de estímulos e de informação são as faces (Leopold & Rhodes, 2010; Todorov & Oosterhof, 2011), e, em particular, a sua atratividade. A atratividade possui um papel crucial nas interações humanas, influenciando inferências, julgamentos e opiniões formados pelos indivíduos (Lewis, 2012). Na verdade, desde pequenas, as pessoas são capazes de discriminar faces atrativas de faces não atrativas, demonstrando uma preferência pelas primeiras (e.g., Langlois et al., 1987).

A preferência por faces atrativas é demonstrada pela emergência de um *beauty-is-good* effect: pessoas atraentes são percepcionadas de forma mais positiva (e.g., qualidades sociais, sucesso na vida) e possuem vantagens em diversas áreas (e.g., mercado de trabalho) (Dermer & Thiel, 1975; Dion et al., 1972, Hamermesh & Biddle, 1994). É portanto importante, de forma a estarmos mais conscientes dos vieses que podem influenciar os nossos comportamentos e julgamentos, procurar um melhor entendimento relativamente às características que fazem uma pessoa ser percepcionada como atrativa ou não atrativa.

Atualmente, existe ainda algum debate sobre quais as características que influenciam a atratividade de uma pessoa e/ou a magnitude da sua influência. Contudo, a literatura indica uma concordância entre diferentes culturas e etnias em relação à atratividade facial (Langlois et al., 2000), sugerindo a existência de visões semelhantes e partilhadas dentro e entre cultura relativamente a atributos atrativos. Estes resultados parecem indicar a existência de um padrão de beleza universal com um caráter mais inato, não adquirido somente por meio da cultura e da

socialização (Langlois et al., 1987). Em particular, dois factores que aparentam influenciar a atratividade são a raça e falta de informação facial. Indivíduos Brancos tendem a ser percepcionados como mais atrativos do que indivíduos Negros (Bernstein et al., 1982; Cross & Cross, 1971), e faces incompletas consideradas mais atraentes do que as faces originais completas (Orghian & Hidalgo, 2020; Sadr & Krowicki, 2019; Sevilla & Meyer, 2020).

A presente dissertação tem como objetivo estudar com mais detalhe o impacto da raça e da falta de informação na atratividade facial. De forma a atingir os objetivos mencionados, conduzimos uma experiência na qual os participantes tiveram de avaliar a atratividade das faces exibidas numa escala de 1 (“Nada atrativo) a 100 (“Muito atrativo). Os participantes foram divididos em duas condições: a Original, na qual as fotos exibidas apresentavam a informação completa, e a Mosaico, na qual um terço da informação facial tinha sido aleatoriamente retirada (de forma a minimizar potenciais influências do tipo de informação retirado na atratividade). Exceto as diferenças no tipo de informação exibido (Original ou Mosaic), todos os participantes observaram as mesmas fotos correspondentes a faces Brancas e Negras de ambos os géneros (masculino e feminino).

Os resultados obtidos demonstram que os participantes atribuem uma maior atratividade a faces Brancas comparativamente a faces Negras, replicando resultados observados noutros estudos e fornecendo evidências de um possível viés racial. Uma possível explicação para este efeito é a prototipicidade facial, que representa a configuração média de uma população de faces, e depende da experiência perceptiva e do contexto cultural (Rhodes et al., 2003). Uma vez que Portugal é um país cuja população é maioritariamente Branca, os indivíduos podem possuir um maior *expertise* para caras Brancas, devido a uma maior experiência perceptiva relativamente às mesmas, resultando na formação de um protótipo mais desenvolvido para este tipo de faces.

Consequentemente, isto permitiria que compreendessem melhor quais as pistas faciais importantes, mesmo que inconscientemente, para a realização dos julgamentos de atratividade, levando a uma maior atratividade das faces Brancas comparativamente às faces Negras, para as quais os indivíduos não teriam um protótipo tão desenvolvido (Coetzee et al., 2014).

Adicionalmente, a interação entre a condição e raça fornece mais evidências relativamente a um possível papel da prototipicidade. Nas faces que não continham toda a informação (condição Mosaico), a preferência por caras Caucasianas possuiu uma magnitude maior. Quando a informação facial não está completa, o processamento holístico não é interrompido (Sadr & Krowicki, 2019), ocorrendo, possivelmente, o uso das representações faciais prototípicas dessa categoria para as completar (Orghian & Hidalgo, 2020). Uma vez que caras prototípicas são atrativas, o recurso às mesmas para completar as faces incompletas, faria estas novas versões mais atrativas do que as originais. Os indivíduos, ao possuírem um protótipo mais desenvolvido para caras Caucasianas, levaria a um aumento da magnitude do efeito do enviesamento racial na condição Mosaico. De facto, não houve diferenças significativas na atratividade das caras Africanas nas duas condições, possivelmente pelos participantes não possuírem um protótipo tão desenvolvido para estas faces.

Um outro factor que pode influenciar o viés racial tem a sua origem no colonialismo (de Casanova, 2004; Miller, 1969), na escravatura e na opressão racial (Hill, 2002). O nosso estudo foi realizado com uma amostra portuguesa e, historicamente, Portugal foi um país colonizador, possuindo colónias no continente africano durante um largo período de tempo. Mais concretamente, a independência dessas colónias só foi obtida em 1975, depois de uma Guerra Colonial que durou de 1961 a 1974 (Infopédia, n.d.). Devido a tal, pode existir ainda alguma influência deste período colonial nos julgamentos e estereótipos da população portuguesa. De

facto, um estudo de Araújo et al. (2016) demonstrou que Portugal é um país no qual as mulheres Negras são associadas a estereótipos negativos, enquanto as mulheres Brancas são alvo de um enviesamento positivo. Adicionalmente, crianças portuguesas, entre os cinco e os oito anos, aparentam possuir enviesamentos pro-white/anti-black e pro-light-skinned (Neto & Williams, 1997).

Relativamente às inferências realizadas quando existe falta de informação facial, replicaram-se os resultados de estudos anteriores, com as caras incompletas a serem percepcionadas como mais atrativas. Novamente, propomos a hipótese da prototipicidade como um possível mecanismo para os efeitos observados: uma vez que a prototipicidade está associado à atratividade, a representação holística das faces incompletas com recurso ao protótipo da categoria facial, levaria a um aumento da atratividade das faces incompletas relativamente às faces originais completas.

Adicionalmente, obtivemos um efeito inesperado do género da face na atratividade, com as mulheres a serem percepcionadas como significativamente mais atrativas. Devido a limitações da amostra, não foi possível explorar possíveis explicações para este efeito (e.g., own gender bias, in-group bias, medo de associações homossexuais).

Concluindo, neste estudo observámos uma preferência por caras Brancas a nível da atratividade facial. Este efeito foi mais significativo quando a informação facial era incompleta. Adicionalmente, replicámos os resultados de Orghian e Hidalgo (2020) e fornecemos mais evidências para um possível papel da prototipicidade como mecanismo subjacente à maior atratividade de faces que não possuem toda a informação.

Relativamente à presente dissertação, também é importante denotar que a mesma possui limitações, nomeadamente a nível da amostra e da generalização de resultados, que podem ser mitigadas em estudos futuros. Por exemplo, uma amostra com números significativos de homens

e mulheres e a recolha de informação relativamente à etnia dos participantes, permitiria explorar o efeito do género da face na atratividade. Adicionalmente, recorrer a faces de diferentes etnias ou que variem na sua tipicidade a nível categorial também permitiria uma melhor compreensão de possíveis influências da prototipicidade e da falta de informação na atratividade.

Keywords: atratividade, viés racial, averageness, prototipicidade, falta de informação, concordância intercultural

Índice

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Introduction

The way that we interpret the world depends a lot on our perceptions. Namely, at the level of how we perceive the ones that surround us or the people we encounter on our daily life, whether the person is a stranger or an acquaintance. Regarding perception, humans are likely the main and most intricate object we perceive (Slaughter et al., 2004) and our faces one of the most important sources of visual stimuli and information (Leopold & Rhodes, 2010; Todorov & Oosterhof, 2011). The importance of face stimuli can be already observed in the early stages of human development (Slaughter et al., 2004): infants tend to focus more on faces compared to other non-facial complex objects (Little et al., 2011), indicating that they already have "*some information about the structural characteristics of faces from birth*" (Morton & Johnson, 1991, p.164).

Altogether, humans possess a wide face perception expertise (Sadr & Krowicki, 2019), which allows the ability of processing, recognizing, drawing information, (Little, 2014) and consequently forming impressions from faces. Therefore, this inherited and trained expertise (Sadr & Krowicki, 2019) has an important role in our social inferences and interactions, providing information about peoples' mental and emotional state (Todorov & Oosterhof, 2011), and enabling processes of social categorization (Johnson et al., 2015) and recognition.

One characteristic of faces that has a crucial role in social interaction is facial attractiveness (Holzleitner et al., 2019). In fact, the first judgement we usually make from other person pertains to their facial attractiveness (Lewis, 2012) and it can be assessed in a rapidly way and "*from small silvers of visual information*" (Olson & Marshuetz, 2005, p.502). This importance of attractiveness in the human species has led to it being largely studied, with researchers trying to define this concept and the exact dimensions influencing and composing it (Langlois & Roggman, 1990).

However, researchers have not come to an agreement regarding the definition of this concept or the exact dimensions that compose it.

Nevertheless, there has been a robust, consistent, and reproducible effect of facial attractiveness on stereotypes and behavioral expectations: a more positive response and preference to attractive than unattractive people by children and adults (Langlois et al., 1987). Infants (6 months old) can distinguish between attractive and unattractive faces, demonstrating a preference for the former by spending more time looking at them. This occurs with different types of faces (White adult males and females, Black adult females, and infants), suggesting that this preference can be generalized across age, race, and gender domains (Langlois et al., 1991). Even infants between 2 and 3 months old allocate more time looking to pretty faces when presented with a pretty/not pretty pair of White female facial pictures (Langlois et al., 1987). When evaluating faces varying in gender (male, female), race (Black, White), and age, there seems to be an agreement regarding facial attractiveness between children (7 and 12 years old), adolescents (17 years old), and adults (30-50 years old): Cross and Cross (1971) found that judge's age had no effect on perceived attractiveness, with the different age groups producing similar beauty ratings across multiple age-sex-race groups. Dion (1973) also found an agreement between judgements of attractiveness between children (3-$6^{1/2}$ years) and that they possess competences to distinguish different levels of facial attractiveness.

The capacity to discriminate between attractive and unattractive faces since a young age (Jones & Hill, 1993) and the preference demonstrated for the former, even by young infants, seems to contradict a common belief that beauty standards are an evolving social construct, i.e., a product of culture and acquired through experience (Rubenstein et al., 1999). However, these results can be interpreted using fitness-related evolutionary theories. According to them, attractiveness has an important role in human interactions. There exists inside the same species a variability in the

characteristics of its members, which can be called individual differences. The more favorable variations, the ones that confer advantage and better adaptation, tend to be preserved within a species in a process denominated natural selection (Darwin, 2019). Attractiveness functions as an indicator of characteristics that possess a significant weight regarding the potential of a partner, such as fitness, health, quality, and reproductive value (Langlois et al., 2000; Little, 2014). Therefore, applying the natural selection principle to attractiveness leads to attractive individuals being preferred.

"*Beauty-is-good*" effect

The impact of attractiveness extends beyond a preference for attractive faces: attraction conveys advantages concerning a lot of areas of judgments, treatment, and behavior. For example, physical attractiveness influences social acceptance, popularity, mate selection, and careers (Cross & Cross, 1971). The existence of these positive beliefs and stereotypes towards attractive people is denominated the "*beauty-is-good*" effect (Dion et al., 1972).

The mere observation of photographs of others elicits this effect, with the inference of judgements and attributions having a robust relation with the perceived attractiveness of the people depicted (e.g., Eagly et al., 1991; Langlois et al., 2000). Walster et al. (1966) observed that only the date's attractiveness appeared to influence his likability and likelihood of being asked by the participant to go on a further date. This is not affected by of other traits such as personality and intelligence, and how attractive the date thought the participant was. Physical attractiveness also enables stereotyping, with attractive people being viewed as having more socially desirable personalities (e.g., sensitive, kind, interesting, strong, sociable), presupposed to have better and

more successful lives (e.g., marital happiness, parental happiness, social and professional happiness, total happiness, occupational success), and be better spouses and sexual partners (Dermer & Thiel, 1975; Dion et al., 1972).

This advantage can even be observed in other contexts. Attractiveness can exert an impact in labor market, having influence on people's earnings (mostly independent of occupation) and on hiring decisions. In some cases, pretty people earn more than an average good-looking person, who in turn earn more than an unattractive person (Hamermesh & Biddle, 1994), and attractive job candidates are preferred to unattractive applicants (Dipboye et al., 1977). Evaluation of performance on a task can also be affected: the perceived quality of an essay depends on the writer's attractiveness, with the work of less attractive girls being rated lower than those from attractive girls or people whose physical appearance was not disclosed (Landy & Sigall, 1974). Moreover, facial beauty stereotypes can even implicitly affect our behavior, even when this trait is irrelevant to the task (van Leeuwen & Macrae, 2004) or is only used as a priming (Olson & Marshuetz, 2005).

The positive impact of attractiveness on judgements is not exclusive to adults. Dion and Berscheid (1974) highlighted the existence of an association between children's physical attractiveness and popularity: young children (4-6 years old) perceived physically attractive peers as being more popular than their unattractive classmates. The popularity was measured in terms of likeability: each child had to pick 3 classmates he really liked and 3 he really disliked, and the total popularity of each kid was calculated by subtracting the dislikes to the likes. Even though children's perceived attractiveness was obtained from adult raters, there is no reason to assume that children's attractiveness ratings would differ significantly (Cross & Cross, 1971). There were also effects on perceived social behavior: 1) unattractive males were perceived as exhibiting more

antisocial aggressive behavior than attractive males; 2) attractive children were more likely to be seen as having higher behavioral independence; 3) unattractive females perceived as being more fearful than attractive females (and unattractive males); 4) unattractive children named as scarier comparatively to attractive children. Therefore, unattractive children, especially males, were more associated with antisocial and negative behaviors.

Dion (1973) also found that children (3-$6^{1/2}$ years) prefer to be friends with attractive children, tend to dislike unattractive kids more, attribute more positive social behaviors to attractive children, and a more negative social conduct to unattractive children. Lawson (2001) conducted a study where children (7-12 years old) had to evaluate children's photographs regarding their attractiveness, negative characteristics, intellect, social status, and personal achievement. They observed that unattractive children were more associated with bad characteristics (e.g., being dirty, having lice, exhibiting behavioral problems) and attractive children were perceived as having more positive traits than unattractive kids (e.g., more intelligent, higher social status, more successful). Hence, physical attractiveness seems to be a relevant personal trait since a young age.

Although this *"beauty-is-good"* effect has been widely studied and spread, its actual strength may depend on the type of the characteristics considered. Eagly et al. (1991) conducted a meta-analysis that showed a stronger impact of attractiveness in social skills, suggesting that characteristics such as sociability and popularity might be the basis of this attractiveness bias. Nevertheless, it is important to note that even though in some attributes there was little to moderate impact (e.g., concern for others class), attractive people were never evaluated in a worse manner than unattractive people in categories of evaluative meaning. There have also been questions regarding the direction of the attractiveness stereotype: is beauty good or is unattractiveness bad? Griffin and Langlois (2006) observed that children (7-9 years old) and adults had more prejudiced

judgements of unattractive women comparatively to both average and attractive women. The "unattractiveness-is-bad" effect was expressed in judgments of altruism (e.g., helpful) and intelligence (e.g., smart), and regarding judgments of sociability (e.g., friendly) the effect was bi-directional, i.e., this trait was affected negatively by unattractiveness and positively by beauty. The more extreme appraisals in social traits, evidenced by the bi-directional effect, might be due to a higher salience of attractiveness when evaluating them (Griffin & Langlois, 2006). However, other studies failed to find a bi-directional effect, with only attractiveness being associated with positive traits or associations (Olson & Marshuetz, 2005; van Leeuwen & Macrae, 2004).

Regarding a possible dark side of attractiveness, Cash and Duncan (1984) demonstrated an existence of a "*what is good is self-centered*" bias, with Black males considering attractive Black faces as more vain, egotistic, and bourgeois compared to unattractive and average Black faces. These findings were also observed in other studies, with attractive people being seen as more conceited/less modest, bourgeois, vain, and prone to adultery (Dermer & Thiel, 1975; Eagly et al., 1991). Contrary to Dion et al. (1972), female perceivers considered that unattractive people would be more competent parents and attractive people would have less marital stability (e.g., marital discord, extramarital affairs, divorce) (Cash & Duncan, 1984). Dermer and Thiel (1975) found an attenuation and inversion of the "*beauty is good*" stereotype only when unattractive female perceivers evaluated female faces with different beauty levels: 1) regarding personality traits, they did not consider attractive women to possess more positive traits than unattractive women; 2) they judged attractive women as the least competent parents. Therefore, the "*beauty is good*" bias might depend on the perceiver's attractiveness, or the content judged. It is important to note that in natural settings, attractiveness stereotypes could have less impact if individuals have more information information than physical cues (Eagly et al., 1991).

Cultural and racial/ethnic background influence on attractiveness

In the study of attractiveness prevailed, for quite some time, the maxim that *beauty is in the eyes of the beholder*, meaning that the beauty concept was subjective, variable, and different to every individual (Langlois et al., 2000). This maxim was considered to be more appropriate between different cultures, since there was a higher chance of them having dissimilar standards of attractiveness (Langlois et al., 2000).

Therefore, there should not exist an expectancy of a cross-cultural universal standard for facial attractiveness (Cunningham, 1986). This belief is aligned with a view of attractiveness through socialization/social expectancy theories. According to these theories, people's cultural norms and life experiences affect their behavior (both perceiver and target) (Langlois et al., 2000), and stereotypes (generally the first type of information perceived) can create their own social reality (Snyder et al., 1977). Consequently, attractiveness would be a cultural product, acquired through experience (Rubenstein et al., 1999), and while people from different cultures ought to diverge in their beauty standards, within the same culture no significant discrepancies should emerge.

However, a meta-analysis regarding attractiveness demonstrated a within and cross-cultural agreement (Langlois et al., 2000) suggesting that, even if there are some contrasts within and between cultures, exists shared views and considerations across cultures about attractive attributes. This may imply an existence of a "*species-typical psychological adaptations*" (Thornhill & Gangestad, 1999, p.452). In fact, cross-cultural research has shown an inter-rater reliability in judgments of attractiveness and an agreement regarding the attractiveness of some facial characteristics, independently of the perceiver's racial and/or cultural background (Langlois & Roggman, 1990; Miller, 1969). This suggests that this concept transcends human cultures (Zhang et al., 2019). Additionally, the preference for attractive faces already exhibited by infants also adds

evidence to a possible universal (biological) inherited beauty standard, and not an acquired one (Langlois et al., 1987).

In a study from Zebrowitz et al. (1993), White, Black, and Korean participants had to rate faces of one racial group (White, Black, Korean) in a variety of domains, one of them being facial attractiveness. Although there was higher within-race agreement regarding attractiveness, there was a higher level of interrater (between-race) agreement. According to the authors, those findings suggest that *"attractiveness does have racially universal objective referents in certain facial features"* (Zebrowitz et al., 1993, p.97).

Similar findings were observed with other cultures and races: 1) Black Cruzans (residents of St. Croix, U.S. Virgin Island) and White Americans (Maret & Harling, 1985) agreed on attractiveness judgments of White faces; 2) English and Eastern (Chinese and Indians) females had a similar opinion on the attractiveness of Greek males (Thakerar & Iwawaki, 1979); 3) there was a consistent cross-cultural agreement on attractiveness judgments made by White Americans, Asians (Japan, China, Thailand, Taiwan, Korea), and Hispanics (Guatemala, Panama, El Salvador, Columbia, Cuba, Spain, Mexico) of females faces varying in ethnicity (Asian, Hispanic, Black, White) (Cunningham et al. 1995), 4) Chinese and White and Black Americans exhibited an agreement regarding perceived attractiveness, with judges from different ethnic groups perceiving the same degree of variation, even if they resort to different criteria throughout the rating process (Bernstein et al., 1982); 5) U.S. and Tsiname' (Bolivian ethnic group whose culture is isolated from Western influences) citizens demonstrated a cross-cultural and a within-culture agreement when evaluating faces of both cultures (Zebrowitz et al., 2012). Regarding this last study, it is important to note that the within-culture agreement was stronger when people were making judgments of faces of their own culture.

Coetzee et al. (2014) tried to comprehend the effects of own-race and other-race in attractiveness ratings, using participants from Scotland (Caucasian) and South Africa (Black). Both groups of participants were further split in 4 subgroups: 1) only rated African female faces; 2) only rated African male faces; 3) only rated Scottish female faces; 4) only rated Scottish male faces. The study found a significant cross-cultural agreement regarding attractiveness preference. Although it is important to note that this agreement was stronger concerning faces with European features than with African features, suggesting a role of familiarity experience in attractiveness ratings. The author concluded that higher perceptual experience with other races may lead to: 1) a reduction of an own race bias in judgments, 2) the development of a more complete prototype to those races, 3) a higher knowledge relatively to the utility of the facial features and the information they convey, leading to an increase in attractiveness ratings of other races and a higher cross-cultural agreement.

Even though cross-cultural judgements of attractiveness tend to be similar, subtle differences can emerge. This might be due to variations in the *"perceptual experience or the utility of the information"* between cultures (Zebrowitz et al., 2012, p.121), different adaptive values of some traits across cultures (Zebrowitz et al., 2012), and pathogenic or disease factors (Little, 2014). For example, literature involving the attractiveness of a female body has depicted some of these cultural differences. Research performed with people from places of different socio-economic development levels demonstrates that in less industrialized societies usually exists a positive association between socio-economic status and body weight. This leads for example to women with a higher body mass index (BMI) being preferred (e.g., Swami and Tovée, 2005). This preference is possible due to food having a higher value in more disadvantaged communities, with obesity possibly being seen as a sign of wealth and health (Mvo, 1999; Sobal & Stunkard, 1989).

In fact, Swami and Tovée (2005) observed that differences regarding body attractiveness judgements are not due to ethnic diversity, but rather due to different environmental contexts and pressures: there was no difference in the judgements made in industrialized samples, with a clear preference for lower BMI, even if the culture (Britain or Malaysian) or ethnicity (Malay, Chinese, Indian) varied.

The important role of the environment was also observed in a study of Tovée et al. (2006) with United Kingdom (Caucasian and African) and Zulu (Zulu migrants to the UK and South African Zulus) participants. There was no difference regarding attractiveness within the UK group, however they differed significantly from the SA Zulus which considered bodies with higher BMI more attractive. Interestingly, Zulu migrants tended to prefer bodies with BMI values in the middle of the range defined by the preferred values chosen by the UK (lower BMI) and SA Zulus groups (higher BMI). This indicates a flexibility in attractiveness preferences produced by adaptations to different environmental pressures. (Tovée et al., 2006).

Therefore, attractiveness preferences may not be independent of social learning. However, these cultural divergences are not incompatible with evolutionary theories since they usually emerge in rural or non-industrialized cultures among which different traits might indicate better adaptation (Swami & Tovée, 2005). Additionally, the fact that White and Black men can evaluate facial beauty in the same manner, but do not agree on the physical body standard, implies that the diffusion of Western beauty standards cannot account for all the cross-cultural attractiveness agreement (Cunningham et al., 1995). These differences may emerge because a body conveys more information regarding fitness, capacity to adaptation, and resilience to environmental pressures than a face (Cunningham et al., 1995).

Racial bias on facial attractiveness

In regard to an effect of ethnicity or race on attractiveness, literature has shown an apparent preference for White faces comparatively to Black faces. For example, Cross & Cross (1971) observed a race effect on attractiveness judgments, with White and Black participants of various ages (7-50 years old) perceiving White faces as more attractive. Similar findings were observed by Bernstein et al. (1982), with White facial pictures being judged more favorably by all ethnic groups (Black, Chinese, White).

In certain areas, this possible preference can be partially due to a remaining effect of colonialism: Miller (1969) conducted a study in Jamaica, where skin-color had always been *"an important determinant of social niche, economic status, and personal worth (...) Whiteness has become associated with the desirable and Blackness with the undesirable"* (Miller, 1969, p.72), and observed that Jamaican adolescents with different races had a preference for straight hair, lighter skin, and typical Caucasian features, when construing the ideal boy and girl, demonstrating a contrast to their conception of an average Jamaican. This effect of colonialism can also be seen in Ecuador, a Latin American country with only 5% of White population, where the feminine ideal possesses typical Caucasian features which correspond to the beauty model disseminated by the media (de Casanova, 2004).

Another important fact is that a lot of research is conducted using individuals from the United States of America, a country which had intricate roots on slavery and racial oppression. Therefore, whiteness and blackness were perceived as possessing different qualities, with the former considered beautiful and the latter ugly (Hill, 2002). Even with the existence of movements celebrating and extolling Black culture, there was still a prevailing prejudice within African Americans, regarding skin color and facial features. Once again, lighter skin and Caucasian

features were considered more attractive and over more darker colorations and African features (Bond & Cash, 1992; Hall, 1998; Neal & Wilson, 1989). Rudman and McLean (2016) observed that Black Americans either demonstrated an implicit automatic association between Whites and attractiveness or did not exhibit any in-group preference, contrary to White Americans implicit in-group bias. According to Neal and Wilson (1989) "*pride in the race is taught and stressed, … [but] admiration and success seems to be accorded to those, who have adapted their lives and looks to the majority standard"* (p. 328). However, this preference for White faces appears to be more consensual in the evaluation of women faces, with the existence of divergent findings concerning men (e.g., Lewis, 2011; Wade et al., 2004).

With respect to women's attractiveness, people tend to prefer Whiter faces (Lewis, 2011). Belletti and Wade (2008) observed that when evaluating women faces with different races (Asian, Black, and White) and different racial features (within the same race), White faces were considered more attractive and one of the Whitest faces was usually perceived as the most attractive. This finding appears to be independent of the perceiver's own ethnicity: Lewis (2012) reported that, regardless of perceiver's ethnicity, White women's attractiveness was higher than Black women's, and Martin (1964) observed that White and Black Americans had the same standard regarding women beauty, preferring Caucasian facial features.

Araújo et al. (2016) conducted a study about stereotypes for female physical attractiveness and observed the existence of a negative stereotype towards Black women and a positive bias regarding White women. This prejudice was observed in a lot of countries, including Portugal in which children with five and eight years old, independently of their gender, already appear to possess a pro-white/anti-black and pro-light-skinned biases (Neto & Williams, 1997). It was also found that the context can influence White and Black women's attractiveness: White women's attractiveness

can be enhanced when presented in a predominantly Black context (i.e., alongside more Black women faces than White women faces), while the opposite occurs for Black women in a predominantly White context (Moss et al, 1975). Lighter skin is an attractive trait in women (Vera Cruz, 2018) even within Black faces: the lighter the face, the more attractive it was perceived to be (Cunningham et al., 1995; Hill, 2002).

On the contrary, the effect of race on men's attractiveness is not so clear as it is in women's, with multiple studies presenting contradictory conclusions. Using faces representative of populations, Lewis (2011) observed that White British people perceived Black men as more attractive compared to White men. In fact, there was a positive association between attractiveness and how Black the faces were. The same findings were reported by Lewis (2012), with Black men being perceived as more attractive than White and Asian men regardless of perceiver's ethnicity. When evaluating the attractiveness of Black men, Hill (2002) observed a weaker relation between skin color and attractiveness comparatively to women, with only the second lightest skin color being significantly more attractive than the darkest one.

However, some studies report a preference for Whiteness in men: Black faces with more White features can be rated as more attractive than more predominant Black faces (Wade et al., 2004), Black African rated as more attractive are lighter than the average (Marks, 1943), and White individuals possess more negative affect towards darker-skinned men comparatively to lighter-skinned (Hagiwara et al., 2012). In a study of Burke et al. (2013) women demonstrated a clear preference for European faces (compared to African and Asian faces) when evaluating the facial attractiveness of men (individual and compound faces). Furthermore, Allen (1976) observed that White women considered attractive White men as more desirable, while rating unattractive and attractive Black men in the same manner as unattractive White men. Jamaican adolescents, when

constructing an ideal boy, also evidenced a preference for Caucasian features and lighter skin (Miller, 1969).

These results, and the greater homogeneity regarding attractiveness in women, might come from a prevalence across time of a fair/light skin tone as a desirable feminine trait in Europe and Western cultures (Hill, 2002). In the USA, the white supremacist culture that existed during some time in this country deepened this association, connecting traits like purity and piety, qualities that were ideal in their "sacred white womanhood" myth, to whiteness, (Hill, 2002). The stigma against darker skin and more African features was so high that there were beauty products to lighten Black women's skin (Neal & Wilson, 1989). For example, in some African countries the use of those skin bleaching products turned into a public health problem since the 80s (Vera Cruz & Mullet, 2014). Black women would also attempt to modify their hair texture, eye color, and the shape of their nose to be more alike the White women standard of beauty (Neal & Wilson, 1989). In fact, African Americans still appear to prefer Black women with chemically treated hair opposite to their natural hair, and consider useful and important to their attractiveness products that combat appearance stigma (e.g., skin whitening creams) (Rudman & McLean, 2016). This preference for lighter pigmentation may also come from the existence of a possible link between lighter skin and both fecundability and youth (Cunningham et al., 1995; van den Bergh & Frost, 1986). According to a biological approach, characteristics that signal youth should be preferred and considered more attractive in women (Cross & Cross, 1971; Korthase & Trenholme, 1982): youth is associated with reproductive value, since the capacity to generate offspring is not possible after menopause (Little, 2014).

Furthermore, some facial characteristics may explain the differences observed in men and women. Regarding women faces, studies across different cultures and ethnicities demonstrate that

more feminine traits evoke better judgments of facial attractiveness (Burke & Sulikowski, 2010; Cunningham, 1986; Jones & Hill, 1993; Perret et al., 1998; Rhodes et al., 2003). It is important to note that literature shows that Black women can be perceived as less feminine comparatively to other races (Burke et al., 2013; Lewis, 2011), meaning that their lower attractiveness compared to White women may also be influenced by this factor.

A less linear relation exists between sexual dimorphism and attractiveness in men's faces. In this case the literature shows ambiguous results. Some studies report a positive association between masculinity/dominance in male faces and attractiveness (DeBruine et al., 2006; Johnston et al., 2001; Keating, 1985; Little & Mannion, 2006) while others reveal a preference for more feminine/low dominant faces (Little & Hancock, 2002; Perret et al., 1998; Rhodes et al., 2003). This divergence might be explained by the traits associated with both femininity and masculinity in men's faces. Although increasing masculinity causes an increase in perceived dominance, masculinity, and age in men, it also reduces the perception of some social valued traits: warmth, honesty, cooperativeness, emotionality, and quality as a parent (Perrett et al., 1998; Sutherland et al., 2015). Therefore, the observed higher attractiveness of feminine faces in men in some studies could be a result of this facial characteristic being less associated with some negative personality traits (Little, 2014). This conflicting results regarding the role of perceived dominance/masculinity and low dominance/femininity on attractiveness, might explain the divergent results regarding facial attractiveness in men of different races, since Black males are perceived as being more dominant and masculine (Lewis, 2011; Wade et al., 2004). Thus, *"masculinity in male faces may be more or less attractive under certain contexts and to certain individuals generating variation"* (Little, 2014, p.627).

Averageness/Prototypicality

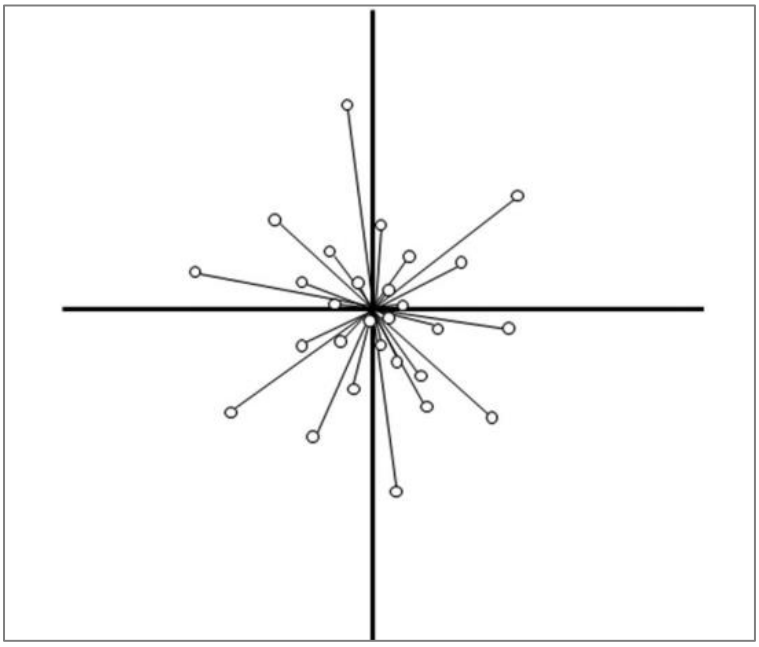
The literature mentioned until now focused more on the consequences of attractiveness and the cultural and racial effects on attractiveness. Nevertheless, what exactly determines attractiveness? There has been a lot of interest on this subject, with some research opting for a feature-measurement approach aiming to identify the facial measures predicting attractiveness. However, some issues were encountered, namely 1) conflicting results within and between studies, 2) the immense amount of possible facial measurements, 3) the incapacity to explain the underlying reasons some facial measures combinations are considered attractive by infants, children, adults (i.e., even if the combinations were found, there would be no explanation to why they cause attractiveness) (Langlois & Roggman, 1990). Alternatively, another division has concentrated more on other constituents of a face and their implications regarding facial beauty. Within these, and according to the interest of this thesis, our focus will be on averageness/prototypicality.

Firstly, it is important to clarify the averageness concept since it caused some misunderstandings when it was introduced. Averageness does not mean a more typical or common face in terms of occurrence in a population. This term is used in a mathematical way, representing the mean configuration of a population of faces (Langlois et al., 1994), which occupies a central location in the multidimensional face-space (Rhodes et al., 2003).

According to Valentine et al. (2016), the face-space can be defined as the *"psychological similarity space"* (p.1998). Therefore, similar faces would be represented close in the face-space and face dissimilarity would increase with the distance. This space would be composed by dimensions in which the faces vary according to a normal distribution, forming a multivariate normal distribution (Valentine et al., 2016). *"The central tendency of the relevant population is defined as the origin for each dimension. Thus the density of faces (exemplar density) is greatest*

at the origin of the space. As the distance from the origin increases, the exemplar density of faces decreases. The faces near the origin are typical in appearance. They have values close to the central tendency on all dimensions. Distinctive faces are located further from the origin" (Valentine et al., 2016, p. 1998). Hence, averageness is negatively correlated with distinctiveness (proximity of faces to other faces in face-pace) (Rhodes & Tremewan, 1996). Figure 1 demonstrates the distribution of faces in the face-space.

Figure 1. *Two-dimensional representation of the face-space as suggested by Valentine (1991).*



Research has demonstrated that an average is usually perceived as a prototype. In fact, the prototype of a certain category corresponds to its central tendency (Reed, 1972). Considering that a facial prototype represents a mean configuration of a set of faces, it should be perceived as a better example of a face and more representative of the population than the individual faces in the set (Langlois et al., 1994). Additionally, literature has demonstrated that infants and adults create an average of a category after being exposed to stimuli representing that category, therefore

producing a mental prototype which later drives their judgments towards that category in different domains (Strauss, 1979).

Since average and prototypes represent the mean configuration of a population of faces, the characteristics of an average face depend on what a person experiences (Rhodes et al., 2003). Consequently, average faces depend on the cultural context of the individuals. This was enlightened in a study of Rhodes et al. (2003): facial attractiveness judgments can suffer alterations when individuals are exposed to distortions (faces concentrically/laterally compressed or expanded), existing a shift towards these distortions regarding attractiveness preferences. Leopold et al. (2001) also observed similar findings. These results suggest a fast renormalization of the face-space caused by a perceptual adaptation since what was prototypical in the moment influenced individuals' perception of normality and attractiveness. This means that the prototype or average face does not have a fixed space in the face-space, it can be altered towards the type of face stimulus being presented (Leopold at al., 2001; Peskin & Newell, 2004). Additionally, it provides further evidence of averageness being more related to its central tendency and not with the attractiveness of some specific facial feature (Rhodes et al., 2003).

Averageness/ Prototypicality and Facial Attractiveness

Regarding the relation between averageness or prototypicality with attractiveness, Langlois and Roggman (1990) proposed that this facial characteristic promoted attractiveness. According to Langlois et al. (1994, p.219), a *"face is perceived as attractive when its facial gestalt is close to the average or mean of a population of face"*. Therefore, the perceived attractiveness is a result of average faces being more facelike and representative of a given population (Collins, 2012).

Literature has corroborated the existence of a link between averageness and attractiveness (e.g., Langlois & Roggman, 1990; Little & Hancock, 2002; Peskin & Newell, 2004; Potter & Corneille, 2008; Rhodes et al., 2003). For example, using line-drawings composites, Rhodes & Tremewan (1996) observed that enhancing face averageness promoted higher perceived attractiveness. This preference for highly prototypical stimuli compared to atypical ones corresponds to the *beauty in averageness effect* or the *prototype preference effect*, which can be observed in faces (Vogel et al., 2021; Winkielman et al., 2006). Therefore, it is important to note that average faces are rated high in attractiveness, i.e., they are not average in that trait. In fact, the relation between averageness and attractiveness implies that 1) averageness is a trait of attractive faces, and 2) attractive faces are closer to the mean, therefore being more prototypical, even if they are not the most typical in terms of occurrence (Langlois et al., 1994).

Potter and Corneille (2008) also evidenced the importance of facial averageness in attractiveness enhancement. However, this effect only occurs when characteristics are average relatively to the group that those faces belong to, i.e., attractive faces are only located close to the prototype of their own group. This means that when individuals make attractiveness judgments about other racial group, they rely solely on the standards of that specific group. For example, Blair et al. (2004) observed the role of racial prototypicality in stereotypical attributions. The stereotypes can emerge from within a category, with individuals being judged regarding how they physically resemble the typical representative of that category: people with more Afrocentric features were considered to possess more stereotypical characteristics of African Americans, independently of their race (African American or European Americans). In fact, racial prototypicality had a stronger effect on stereotypical attributions than the racial category of the targets. This could reflect a tendency to try to avoid and control any formulation of racial-based

prejudice or stereotyping. Therefore, if people are aware of this racial prejudice they can possibly control the expression of the stereotypes. Moreover, a higher perceptual experience with other races can promote a more complete prototype of those races and increase the knowledge regarding the utility of the facial features and the information they convey, consequently leading to an increase in attractiveness ratings (Coetzee et al., 2014).

This preference for average faces can be supported by two different fields of research. According to modern evolutionary biology, average values should be preferred to extreme values in multiple features present in a population. Therefore, evolutionary pressures would favor individuals close to the population mean, decreasing the probability of them being carriers of genetic mutations that would compromise the species wellbeing (Langlois & Roggman, 1990). Another field of research regards fluency: Vogel et al. (2021) observed that prototypes facilitate the activation of category knowledge in memory and inherit more of category valence. Therefore, the preference for prototypes might also come from a relation with fluency sincer their processing would occur faster and more efficiently. Research regarding fluency reports the existence of relation between fluent processing and reactions: improving fluency prompts more positive reactions, enhancing peoples' judgements and attitudes towards a stimulus if the category valence is positive (Lee & Labroo, 2004; Vogel et al., 2021; Winkielman et al., 2003). Although it does not account for the full link between attractiveness and prototypicality, the results of a study by Winkielman et al. (2006) implied that prototypicality preference is influenced by fluency. Therefore, a general mechanism connecting positive affect and fluency would contribute to the appearance of a preference in attractive judgements.

Although averageness portrays an important role in attractiveness judgements formed by adults, for example they were shown to perceive average faces generated by computers as more attractive

than the faces used to create them (Langlois & Roggman, 1990; Little & Hancock, 2002; Rhodes & Tremewan, 1996), this preference may emerge across development: studies using infants appear to report different findings, with preference for less average faces (Rhodes et al., 2002). A possible explanation can come from the different sensorial experiences of the two groups. The differences observed could be due to having distinctive facial prototypes, with infants and children still considering faces closer to the central tendency as the most attractive (Cooper et al., 2006). For example, infants show a slightly preference for faces with high height features (high chin and low forehead) (Geldart et al., 1999), possibly a reflex of glancing up at adults' face (Cooper et al., 2006). Cooper et al. (2006) observed that 4 years old and 9 years old preferred low (low chin and high forehead) and average locations, with the preference for solely faces with average location (the adult pattern of response) being first observed at 12 years old. In fact, the capacity to form prototypes of faces and patterns of dots appears to start to emerge around 3/4 months old (Bomba & Siqueland, 1983; de Haan, 2001).

Beauty in averageness effect and youthfulness, symmetry, familiarity, and the process of averaging

In order to comprehend if the results of Langlois and Roggman (1990) were due to other factors (youthfulness, symmetry, familiarity), Langlois et al. (1994) conducted further studies. One possible explanation would be the fact that average faces are perceived as younger and, since age appears to lead to a decline in the attractiveness of adults, their attractiveness would be increased (Jones & Hill, 1993). Although average faces could be rated as younger, Langlois et al. (1994) did not find a relationship between perceived youth and attractiveness, meaning that the effect of averageness on attractiveness was not due to this factor.

To test the hypothesis of averaging faces being more symmetric, and consequently more attractive, they studied the role of symmetry in attractiveness. In a first study, Langlois et al. (1994) used different types of faces (32 original faces used to construct one female average face in the study of 1990 from Langlois and Roggman; 8 attractive faces; 8 unattractive; 1 averaged; 2 perfectly symmetrical) and found: 1) a significant agreement regarding the ratings of symmetry, 2) that the symmetric faces were rated significantly higher in symmetry than others, 3) no significant correlation between perceived attractiveness and symmetry. In the second study, Langlois et al. (1994) created mirror images (left and right) and compared their ratings of attractiveness to those recorded for the original faces (obtained in the first study). The results showed that the original faces were perceived as more attractive than both types of mirrored faces (left and right). Nevertheless, some faces benefited from the artificial symmetry, obtaining higher scores in attractiveness in this condition. It is important to note though that in the original condition these faces were rated as significantly less attractive than faces that did not obtain higher ratings in attractiveness when mirrored. Resuming, symmetry has some role regarding attractiveness, however normal faces or perfectly symmetric faces do not benefit from symmetry unless the normal face is unattractive.

Additionally, Valentine et al. (2004) conducted a study that tried to completely isolate the influence of symmetry and averageness on facial attractiveness and the results showed that there is an independent effect of both facial characteristics in attractivity. Thereupon, given its role in attractiveness, it would be fair to assume that symmetry does not account for the finding of *beauty in averageness.*

To assess if the effect of averageness on attractiveness was due to the process of averaging, Langlois et al. (1994) conducted a study using individual and average faces whose creation only

differed on the number of different faces used to obtain them: the former were created using different images of the same face, and the latter using images of multiple faces. The results showed that the average faces were rated significantly higher in attractiveness than the individual ones, with only one face of the latter being considered significantly more attractive than all the average faces. Since the average only differ in the types of faces used to create them, it can be concluded that it is the process of averaging multiple faces and not the process of averaging multiple images of the same face that contributes to a higher attractiveness.

Also, alleged image-processing artifacts (poor resolution, stretching, distortion, smoothing, blurring or presence/absence of blemishes) could not explain the effect of averageness on attractiveness, since the techniques were either not used or the similarity between stimuli and their quality was assured (Langlois et al., 1994). The technique Rhodes & Tremewan (1996) applied to create the stimuli in their study (line-drawings composites) also eliminated the possible explanation of this effect being due the type of stimuli presentation (blurring and smoothing) or to incorrect averaging of anatomical locations.

Regarding familiarity, research on the *mere exposure effect* has demonstrated that people tend to like objects they are more familiar with, even if that familiarity arises from nonconscious exposure (Kunst-Wilson & Zajonc, 1980). This happens because mere exposure increases the positive affect towards a stimulus by enhancing perceptual fluency, thus making the stimuli more familiar (Swami, 2016). Although people can attend more to novel stimuli rather than a familiar one, the need to find if the stimulus represents a danger or not might influence the person's perception. Because of this uncertainty and risk evaluation, novelty can cause more negative affect (Zajonc, 1968). For example, Zajonc (1968) demonstrated that the mere exposure to a stimulus caused people to rate it in a more favorable way comparatively to stimuli which were not presented.

This effect was observed in both symbols (Chinese calligraphy characters) and men's photographs. Similar findings were obtained by Peskin and Neweel (2004), with the previous exposure enhancing facial attractivity evidencing a positive association between familiarity and attractiveness.

Familiarity effects can also be observed when evaluating mirror facial images or true facial images. We are more used to seeing our mirror face and people close to us are more familiar with our true face, so, according to the mere exposure effect, we should prefer images depicting our mirror face while our friends should prefer our true face (Swami, 2016). Mita et al. (1977) conducted a study where they observed this effect of mere exposure on image preference, with individuals preferring their mirror faces and close friends/lovers picking the true ones. Interestingly, the participants, in general could not give convincing arguments to justify their choice since both photos were almost indistinguishable. Fraley & Marks (2010) demonstrated that people considerer someone more attractive when they resemble themselves (composite images of their faces) or when primed, without awareness, with their progenitor of the opposite sex.

Even though familiarity can promote an enhancement of facial attractiveness, unfamiliar faces are perceived as more attractive if they are closer to the prototype, i.e., if they are more average than familiar faces (Peskin & Newell, 2004). Contrary to some assumptions, a prototypicality hypothesis does not exclude the role of familiarity. Average and attractive faces can be considered familiar, even if they were never observed, because they correspond to a prototype of “faceness” (Langlois and Roggman, 1990; Peskin & Newell, 2004). In Langlois et al. (1994), when rating the familiarity of the individual faces and the averaged faces, participants considered the latter more familiar even though it was impossible for them to have seen them in real life. There was also a strong positive relation between perceived attractiveness and perceived familiarity like Langlois

and Roggman (1990) suggested. In fact, even if infants do not demonstrate a preference for average faces in terms of attractiveness, they consider average prototypes as more familiar (Strauss, 1979).

Nevertheless, it is important to note that although averageness or prototypicality portrays an important role in attractiveness judgements, it is not the only component influencing this facial characteristic since higher prototypicality will not always lead to a higher perceived attractiveness (Langlois et al., 1994).

Is less facial information more attractive?

People make a lot of inferences in their daily life but it is not always possible to do it under the optimal conditions. This happens when making appearance judgments using incomplete information: for example, in social network sites (SNS) often the pictures of the individuals are small and incomplete (Utz, 2010). Orghian and Hidalgo (2020) conducted a series of studies with the aim of understanding the possible effect of information shortage on facial attractiveness. They compared the attractiveness of small photographs, blurred photographs, photographs with only one-third/half the information/two-thirds (removing random pixels), with the complete versions of those photographs. They verified that faces with missing information were constantly perceived as being more attractive than the complete ones, revealing a positive bias under information shortage.

Similar findings were obtained by Sevilla and Meyer (2020) with people demonstrating a preference for incomplete or fragmented images comparatively to full images. In their study participants had to choose between a pair of attractive faces (full image vs fragmented image) which one they preferred to meet, which one they preferred to date, and which one they considered

the most attractive. The fragmented images (target) varied in terms of fragments of the face displayed (from 1/6 to 6/6) and the results showed a preference for the 4/6 fragment level in all the dimensions. However, in a posterior study they used both attractive and unattractive stimuli and verified that this effect only occurred regarding attractive stimuli: when there was an increment in fragment level in unattractive faces, there was a decrease in preference for the target image compared to the reference image.

Sadr and Krowicki (2019) also found evidence of a "less is more" hedonic enhancement at a higher level. Missing/occluded half faces were considered more attractive than the original face, which seems to imply that missing facial information does not disrupt the holistic processing. In fact the processing occurs fast, with easiness and relish, resulting in a higher attractive appraisal of those types of faces. Sevilla & Meyer (2020) also observed that this effect is not solely observed in the face perception domain. In marketing, some companies use a "peekaboo" tactic with the intent to stimulate the interest of the consumers: the withdrawal of some information would lead to an increase of curiosity towards the product. The optimal effects of positivity and curiosity emerged in situations where 1/3 to 2/3 of the attractive product/face was displayed (Sevilla & Meyer, 2020)

Wearing sanitary masks is another context where visual concealment exists that can affect facial attractiveness perception. Kamatani et al. (2021) observed that the usage of masks during Covid-19 pandemic caused a decrease of the sanitary-mask effect (i.e., reduced perceived attractiveness of mask wearers caused by an association between unhealthiness and sanitary), allowing to comprehend in a less clouded way the possible effect of masks on the perceived attractiveness. Regarding unattractive baseline faces, the usage of a mask produced an enhancement of the perceived attractiveness. This effect was not observed in the baseline attractive faces: in this

condition attractiveness ratings decreased, possibly caused by the occlusion of critical cues present in the lower face that may represent positive features (e.g., smooth skin, symmetric contours). Per contrary, in unattractive faces this occlusion can be beneficial, because it allows the hiding of possible negative features (e.g., pimples, imbalanced arrangements) (Kamatani et al., 2021). This is congruent with Miyazaki and Kawahara (2016) findings: in unattractive faces, perceived attractiveness significantly increased when parts of the face were occluded by objects not associated with unhealthiness. The same magnitude was not observed in highly attractive faces, suggesting that information occlusion might have a higher impact on faces with low attractiveness.

The enhancement on facial attractiveness in incomplete faces can be due to the usage of prototypical faces to create a new holistic representation (Orghian & Hidalgo, 2020). As Sadr and Krowicki (2019) demonstrated the holistic processing is not disrupted by missing facial information. Since prototypical or average faces are rated higher in attractiveness (e.g., Langlois et al., 1994; Potter & Corneille, 2008; Rhodes & Tremewan, 1996), representations generated with them would be considered more attractive than the original complete faces. This would also explain the reason why the incompleteness effect on attractiveness has a larger magnitude for unattractive faces: since those faces are more distant to the prototype, and therefore less attractive, they would benefit more from the creation of an holistic representation using a prototype (Orghian & Hidalgo, 2020).

Support for the role of this prototype mechanism was found in the seventh study of Orghian and Hidalgo (2020): there was a disruption in the positive effect regarding incomplete faces when faces were presented upside-down, a process that affects judgments of distinctiveness/typicality (Leder & Bruce, 1998). Diamond and Carey (1986) observed that the inversion of faces or other stimuli caused a bigger disruption in recognition, especially if individuals had expertise. Those

classes of stimuli possess a shared configuration, and their individuation is caused *"by distinctive relations among the elements that define the shared configuration"* (Diamond & Casey, 1986, p. 110). People would develop fine-tuned averages or prototypes of faces encoding configurational information, and the inversion of faces could disrupt this spatial configuration (Orghian & Hidalgo, 2020). Regarding alternative explanations, Orghian and Hidalgo (2020) demonstrated that positive expectations, similarity, and symmetry (see also Sadr & Krowicki, 2019) did not seem to be the possible mechanisms responsible for this positivity bias of incomplete faces.

Present Study

On the whole, facial attractiveness portrays a truly important role in socialization (Holzleitner et al., 2019), influencing the inferences, judgements, and opinions of individuals (Lewis, 2012). In fact, even from a young age people are able to discriminate attractive faces from unattractive faces while showing already a preference for the former (e.g., Langlois et al., 1987). This preference is also demonstrated with the emergence of a *beauty-is-good* effect, with attractive people having advantages in a lot of domains, ranging from work market benefits (e.g., higher salaries, higher probability of being hired) to better perceived social qualities (e.g., more likeable, more social, more interesting) and life success (e.g., higher marital, parental, and total happiness) (Dermer & Thiel, 1975; Dion et al., 1972, Hamermesh & Biddle, 1994). Therefore, the study of facial attractiveness and its determinants is very important to better comprehend what makes people attractive or unattractive, and to be more aware of the bias we may unconsciously use to guide our and perception and behavior.

Although the exact features affecting facial attractiveness and the magnitude of their effect is still being debated within different perspectives and theoretical frameworks, the literature indicates

an apparent cross-cultural and cross-ethnicity agreement regarding facial attractiveness (Langlois et al., 2000). This suggests the existence of shared views regarding attractive attributes within and between cultures and ethnicities, supplying possible evidence of a more inherited universal beauty standard that transcends human cultures' (Zhang et al., 2019), i.e., is not one acquired through culture and socialization (Langlois et al., 1987).

A factor that appears to have an influence on attractiveness is race, with White people being considered more attractive than Black people (Bernstein et al., 1982; Cross & Cross, 1971). This racial bias seems to be more consensual in the evaluation of women faces, with the existence of divergent findings concerning men (e.g., Lewis, 2011; Wade et al., 2004). The greater homogeneity regarding women might come from a perpetuation of the lighter skin as a desirable trait (Hill, 2002), the stigma against darker skin and African features in women (Neal & Wilson, 1989), the possible link between lighter skin and both fecundability and youth (Cunningham et al., 1995; van den Bergh & Frost, 1986), and the conflicting results regarding facial traits that influence perceived attractiveness in men (Lewis, 2011; Perret et al., 1998; Sutherland et al., 2015; Wade et al., 2004). In this study, with the purpose to further explore possible race effects on attractiveness, we will compare the perceived attractiveness of White and Black individuals. Considering the aforementioned cross-cultural and cross-ethnicity agreement, we expect to replicate the results of higher perceived attractiveness of White individuals using a sample of Portuguese college students.

According to the literature, another factor that seems to enhance attractiveness is information shortage, with incomplete faces being perceived as more attractive than the complete versions (Orghian & Hidalgo, 2020; Sadr & Krowicki, 2019; Sevilla & Meyer, 2020). Therefore, we expect that faces will be considered more attractive when they are missing 1/3 of the facial information, and to assure that this expected *less is more effect* is not due to the occlusion of possible negative

features (Kamatani et al., 2021), the facial information would be randomly removed. An explanation for these expected results would be the holistic completion of those faces, recurring to the usage of the category facial prototype. As literature enlightens, there is a positive relation between prototypicality and facial attractiveness, the *prototype preference effect*, meaning that generally average/prototypical faces are perceived as having high attractiveness (e.g., Langlois & Roggman, 1990; Little & Hancock, 2002; Peskin & Newell, 2004). Consequently, if missing information is being completed with the category prototype, a generally more attractive face than the original one (e.g., Rhodes & Tremewan, 1986), than facial attractiveness should be enhanced in the incomplete condition.

We also ought to extend the results obtained by Orghian and Hidalgo (2020) by exploring possible race effects. According to the prototypicality hypothesis, the magnitude of the less is more effect should be higher for White faces comparatively to Black faces, due to the majority of Portugal's population being White homogeneous Mediterranean. Consequently, Portuguese individuals could have a higher perceptual experience with White faces, forming a more complete prototype of this race, leading to a better knowledge of the important facial cues and an enhancement of perceived attractiveness of this type of faces (Coetzee et al., 2014).

Concluding, the main goal of the present investigation is to further study the role of both race and information shortage on facial attractiveness.

Method

Participants

Of the 127 subjects who participated in the study (M_{Age} = 20.39, SD_{Age} = 5.34; 81.89% females, 14.96 % males, 1.57% non-binary, and 1.57% did not answer), 2 were excluded for not completing the entire study and 1 for answering all the questions with 0. Consequently, the final sample was composed by 124 participants, 62 in each condition (Original and Mosaic). Participants were undergraduate students from the Faculty of Psychology of the University of Lisbon who participated in exchange of course credit. The data was collected between April 12th and May 13th of 2021.

Materials

One hundred and eight individual digitized color photographs of neutral faces were used in order to access ratings of attractiveness: 27 faces per single-race face category (Black, White) per gender. The photographs were sourced from The Chicago Face Database (Ma, Correl, & Wittenbrick, 2005) and in order to select representative stimuli regarding ethnicity (Black or White) and gender (Male or Female), only were taken into account faces that, at least, 90% of the participants had identified as black/white and male/female.

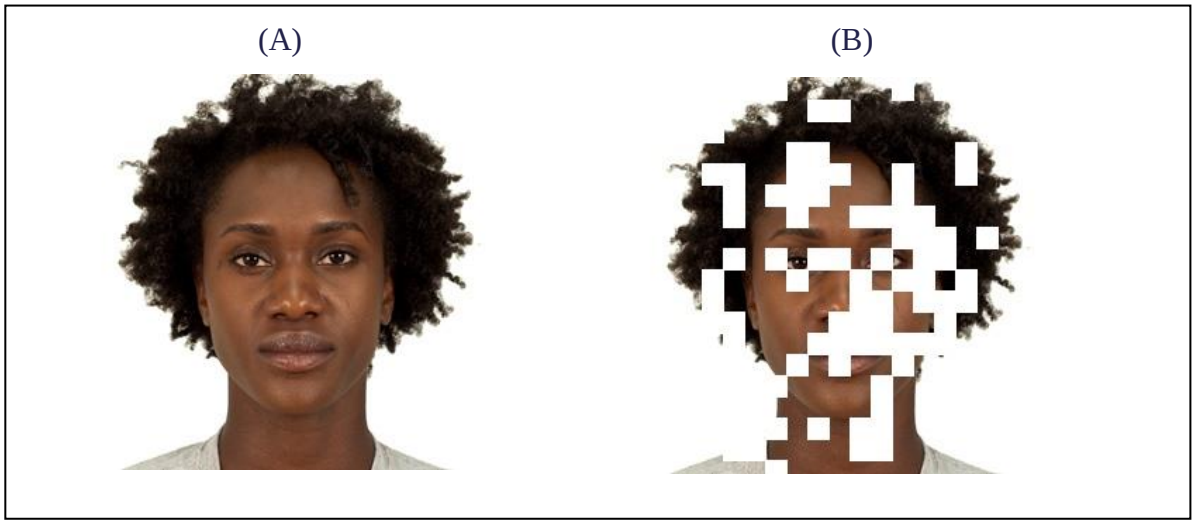
The selection process of the stimuli also took into account the ratings of attractiveness. With the aim to pick faces with varying levels of attractiveness, within the four face categories (black male, white male, black female, white female), the faces in the database were ordered by their ranking of attractiveness (least to most). For the ugly and pretty categories, the faces with lower and higher rankings were chosen, respectively. To select the average stimuli, we assessed the

median of the sample and choose the faces considering this value (e.g., four faces above the median, the median face, 4 faces below the median). To assure that the samples did not differ significantly in their attractiveness, we conducted a 2 (Face Race: White, Black) X 2 (Face Gender: Male, Female) fixed-effects analysis of variance (ANOVA), with no variable or interaction attaining statistical significance (even in Post Hoc comparisons).

The faces presented were modified, comparing to the initial faces obtained from The Chicago Face Database (Ma, Correll, & Wittenbrink, 2005), in terms of pixels (from 2444 (wide) x 1718 (high) to 400 (wide) x 281(high)). The software R-Studio was used to create the pictures of the Mosaic condition. From each face (400 x 281 pixels) it was randomly removed one third of the pixels, by dividing the image in rectangles of 20 pixels each. In order to try to minimize some unintended effect of the removed information on the judgments of attractiveness, by removing some specific face features, 5 incomplete versions of the same face were created. This assured that the removed facial features would vary across participants. Figure 2 depicts an example of the faces used in this study.

Figure 2.

Example of stimuli used in the study. (A) Original condition and (B) Mosaic condition.



Procedure

All participants were instructed that the study concerned judgments of attractiveness and would last approximately fifteen minutes. There was also a disclaimer informing the anonymity and confidentiality of the data collected, and the optimal conditions to take the survey. At the end of this instructions, participants were asked to provide their informed consent. If they choose not to, the study would terminate automatically. The survey was administered using Qualtrics (https://www.qualtrics.com).

Participants were randomly assigned to one of two conditions: Original (n=62) and Mosaic (n= 62). The questionnaire was divided in two main phases: calibration and study. In the calibration phase, the faces used were randomly selected from the 9 faces per single-ethnicity face category per gender per level of attractiveness. The calibration phase was the same in both conditions and its' aim was to make the participants familiar with the study material and to calibrate the level of attractiveness.

Therefore, some training trials were conducted in both conditions. The participants were presented with six male faces and were asked to rate their attractiveness from 1 ("Not attractive) to 100 ("Very attractive). The same procedure was repeated with six female faces. The order of presentation of the stimuli was the same in both conditions and was previously randomized, using Random.Org (https://www.random.org/lists/).

In the study phase, the participants had to rate the attractiveness of ninety-six photographs from 1 ("Not attractive) to 100 ("Very attractive) in both conditions. The faces were randomly with the intuit to minimize possible order effects. In the mosaic condition, for each participant, one version of each face was randomly selected from the 5 versions created.

After the study phase, participants had to answer some demographic questions (age, gender), questions concerning their experience during the study (comments about the survey, the browser they used to answer it, the kind of surrounding environment, eventual problems they had during the survey), and a question about the faces of the study (if they thought the faces were strange or not).

Results

Analytic strategy.

The analyzes were conducted in Jamovi software (Version 2.2.1; https://www.jamovi.org). To access the overall perceived attractiveness, the mean of each photo per condition (Original and Mosaic) was calculated. These means were used when we conducted analyses regarding the attractiveness manipulation check.

To study the variations within and between subjects, the mean of attractiveness for each type of stimuli (black women, white women, black men, white men) was calculated (globally and to every participant).

Attractiveness manipulation check.

We computed a Pearson correlation coefficient to assess the association between the Attractiveness ratings of the faces in the Chicago Face Database (Ma, Correll, & Wittenbrink, 2005) and the Attractiveness ratings of the same faces in our study. The results showed a very strong and positive correlation between the two variables in both conditions ($r_{Original}(122) = .922$, $p_{Original} < .001$; $r_{Mosaic}(122) = .918$, $p_{Mosaic} < .001$), meaning that when the value of one variable increases, the value of the other also tends to increase.

This data suggests that the stimuli's attraction, from the Chicago Face Database, and their labels (ugly, average, and pretty), were positively related with the attractiveness results obtained in this study, meaning that faces' attractiveness was independent of perceivers' culture (United States of America vs Portugal).

Attractiveness ratings as a function of the Face Race, Face Gender, and Condition.

Participants' attractiveness ratings were analyzed in a 2 (Face Race: White, Black) X 2 (Face Gender: Male, Female) X 2 (Condition: Original, Mosaic) mixed analysis of variance (ANOVA) with Condition as the between-participants factor. The Table 1 reports some of the global descriptive measures of the type of stimuli.

Table 1

Means, Standard Deviations, Minimums and Maximums of Attractiveness in both conditions (Original vs Mosaic) in Study Phase.

Condition	Type of Stimuli	*M*	*SD*	*Min*	*Max*
Original	Black Women	37.23	15.80	5.71	71.25
	White Women	39.42	14.24	5.75	67.83
	Black Men	26.04	15.56	3.08	66.25
	White Men	29.03	15.85	1.58	67.00
Mosaic	Black Women	39.07	16.58	1.21	76.25
	White Women	44.08	16.09	2.83	82.00
	Black Men	31.50	15.65	1.33	72.04
	White Men	37.80	15.19	6.17	67.83

Note. N = 124 (n = 62 for each condition)

Regarding Condition, there was a significant between subjects effect, $F(1, 122) = 4.11$, $p = .045$, $\eta_p^2 = .033$, with participants in the Mosaic condition ($M_{Mosaic} = 38.1$, $SE_{Mosaic} = 1.81$) giving higher ratings to face attractiveness than participants in the Original Condition ($M_{Original} = 32.9$, $SE_{Original} = 1.81$). We also found a significant main effect of Face Race, $F(1, 122) = 34.78$, $p < .001$, $\eta_p^2 = .222$, and a significant main effect of Face Gender, $F(1, 122) = 105.424$, $p < .001$, η_p^2

= .464; meaning that White faces (M_{White} = 37.6, SE_{White} = 1.28) were rated higher than Black faces (M_{Black} = 33.5, SE_{Black} = 1.37), and higher attractiveness was attributed to Women faces (M_{Women} = 40.00, SE_{Women} = 1.37) than Men Faces (M_{Men} = 31.1, SE_{Men} = 1.33).

There was a significant interaction between Face Race and Condition, $F(1, 122) = 4.81$, $p = .030$, $\eta_p^2 = .038$. Follow-up comparisons demonstrated that participants gave lower ratings for Black than Whites faces in both conditions, however, such difference was larger in the Mosaic ($t(122) = -5.72$, $p < .001$, Cohen's $d_z = .726$) than in the Original condition ($t(122) = -2.62$, $p = .048$, Cohen's $d_z = .333$)[1]. The follow-up analysis also showed an effect between Black faces in the Original condition and White faces in the Mosaic condition, $t(122) = -3.51$, $p = .003$, Cohen's $d_s = .615$[2]; demonstrating that the former were significantly rated as less attractive than the latter; and there was an effect when the faces were White, with participants in the Mosaic condition giving higher ratings than the ones in the Original Condition ($t(122) = 2.62$, $p = .048$; Cohen´s $d_s = .440$) (See Figure 3). Even though Black faces were rated higher in the Mosaic condition, the difference did not reach statistical significance ($t(122) = 1.33$, $p = .185$)

We also obtained a significant interaction between Face Gender and Condition, $F(1, 122) = 5.02$, $p = .027$, $\eta_p^2 = .039$. Follow-up comparisons showed that Men faces in the Original condition had lower ratings in attractiveness than Women faces in both Original ($t(122) = -8.84$, $p_{tukey} < .001$,

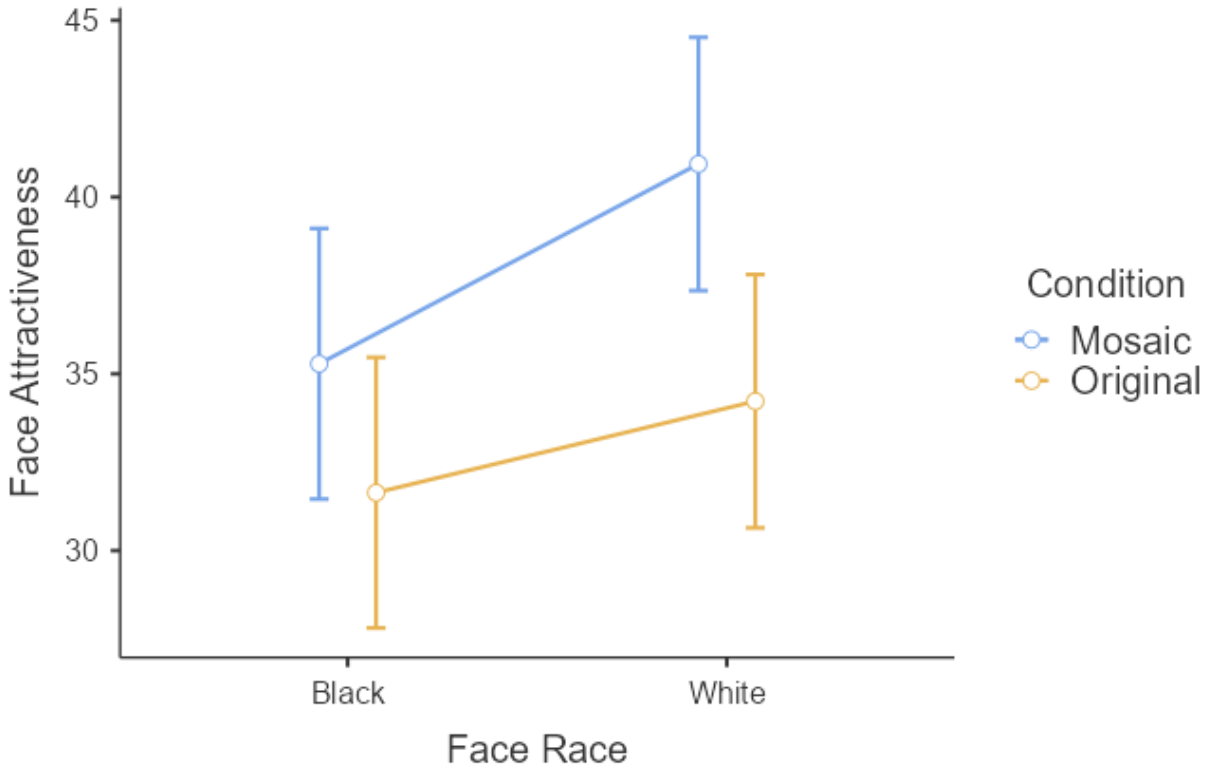
[1] To calculate the effect size estimate Cohen's d_z, we applied the formula provided by Rosenthal (1991), using the t-value and the number of participants: Cohen's $d_z = \frac{t}{\sqrt{n}}$

[2] To calculate the effect size between independent observations for the sample, we used the formula of Cohen's d_s (Cohen, 1988): Cohen's $d_s = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1-1)SD_1^2-(n_2-1)SD_2^2}{n_1-n_2-2}}}$

Cohen's d_z = 1.12) and Mosaic conditions ($t(122) = -5.21$, $p_{tukey} < .001$, Cohen's d_s = 1.00). When the Face Gender was Men, there was an effect between Condition, with Mosaic faces rated as more attractive than Original faces ($t(122) = 2.67$, $p_{tukey} = .042$, Cohen's d_s = .623). At last, in the Mosaic condition was observed an effect of the Face Gender, with Men faces rated significantly lower than Women faces ($t(122) = -5.68$, $p_{tukey} < .001$, Cohen's d_z = .721) (See Figure 4).

Figure 3.

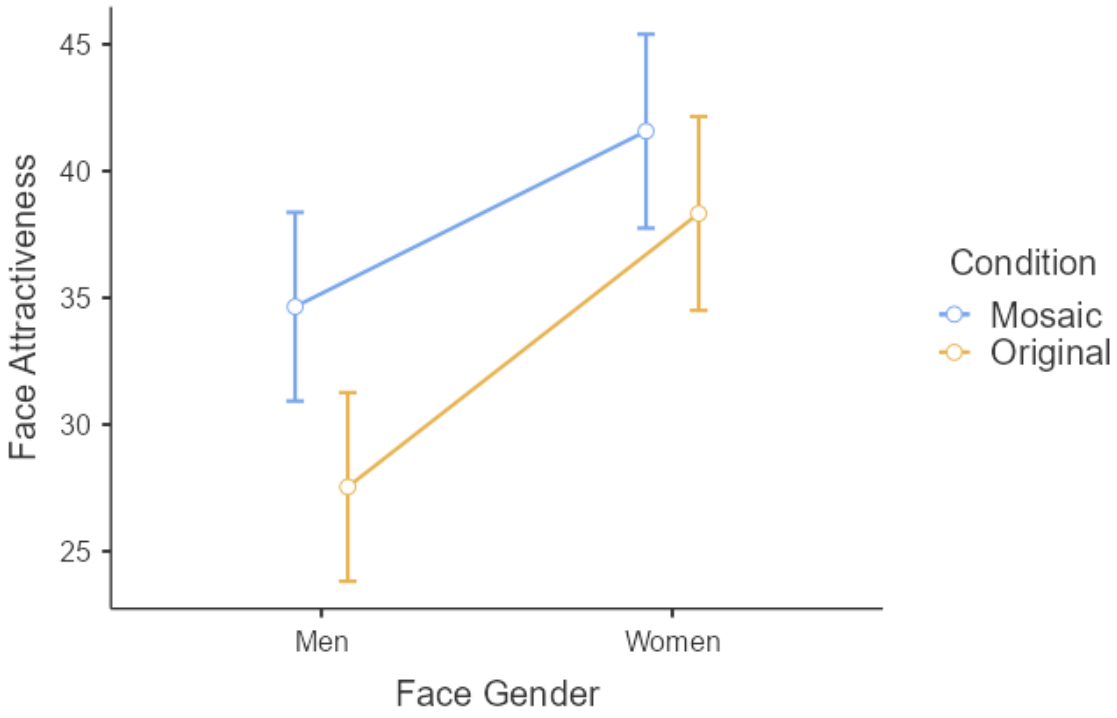
Face Attractiveness as a function of Face Race and Condition



Note. Error bars represent +/-1 standard error around the mean.

Figure 4

Face Attractiveness as a function of Face Gender and Condition



Note. Error bars represent +/-1 standard error around the mean.

Discussion

Attractiveness has been an object of study for a long time, with researchers trying to comprehend what are its determinants and components. This interest emerges from the large effects and influence this characteristic exerts in a lot of domains and areas of people's lives, with an overall general preference for attractive individuals. The apparent halo effect regarding beauty can be observed, for example, in the work market (e.g., hiring decision, careers, salaries), social desirability (e.g., likability, social acceptance, sociability, kindness, interest, popularity), life success (e.g., marital happiness, parental happiness, total happiness), and task evaluations performance. Literature has demonstrated that attractive standards are highly consistent across the world, with different cultures and ethnicities generally reaching a significant agreement regarding facial attractiveness. This concordance appears to be higher within the same culture or relatively to faces of different cultures to which people are more exposed to. A possible explanation for this effect can be the development of more complete prototypes of these ethnicities/races, leading to a better expertise concerning those type of faces. Therefore, individuals would be better at identifying and relying their inferences on important facial cues that those faces signal and that have influence on perceived attractiveness (e.g., health, fitness, quality, reproductive value).

In our study we observed a main effect of race on perceived attractiveness, with White individuals considered significantly more attractive than Black individuals. This finding replicates the results observed in the literature, supplying additional evidence for a possible racial bias regarding White people when making judgments of facial attractiveness (Bernstein et al., 1982; Cross & Cross, 1971). A possible explanation for this effect is prototypicality. Literature has reported that infants and adults create mental prototypes of categories, after being exposed to

stimuli representing them. Afterwards, the judgments made concerning each category would be driven and influenced by the created mental prototype (Strauss, 1979). Applying this to facial prototypes, that represent the mean configuration of a population of faces, their characteristics would rely on what a person experiences, depending on the cultural context (Rhodes et al., 2003). The majority of Portuguese population is White homogenous Mediterranean, with African descendants being a minority in this country. This means that individuals may have a higher expertise to White faces, due to a higher perceptual experience, resulting in the formation of a more developed prototype of this race. Consequently, this allows a better understanding of the important facial cues to attend, even if not consciously, when making judgments of a face. This leads to an enhancement of perceived attractiveness of the White faces comparatively to Black faces, which do not have such complete prototype (Coetzee et al., 2014).

This hypothesis is also supported by another result obtained: the significant interaction between Face Race and Condition. Although Black individuals were rated lower in attractiveness in both conditions, the magnitude of this effect was higher in the Mosaic condition (Cohen's d_z = .726) than in the Original one (Cohen's d_z = .333), meaning that the difference between the reported attractiveness of these two racial groups was enhanced with information shortage. Literature demonstrates that holistic processing is not disrupted in those conditions, happening in a fast, easy, and relish way (Sadr & Krowicki, 2019). Therefore, to create the holistic representation, individuals would resort to the usage of representations of prototypical faces (Orghian & Hidalgo, 2020). Since prototypical faces are considered to be more attractive than individual faces (e.g., Langlois et al., 1994; Potter & Corneille, 2008; Rhodes & Tremewan, 1996), using them to create a new facial representation would make this version more attractive than the original face. Thus, having a more developed and attractive prototype for White faces, would justify the higher

magnitude of the racial bias in the Mosaic condition. The lack of significant differences between Black faces in both conditions (even when gender is taken into consideration) can also be explained using the prototypical face model argument. These results are simply a consequence of the fact that participants do not possess a developed prototype for this ethnicity, probably due to a lower amount of corresponding stimulus in their daily life.

Another factor that may influence a racial bias in general has its roots in colonialism (de Casanova, 2004; Miller, 1969) and on slavery and racial oppression (Hill, 2002). Historically, Portugal was a colonizer country, having some of its colonies in Africa during a long period of time. In fact, the official liberation of some of these colonies only occurred in 1975, after a war between 1961 and 1974 (Infopédia, n.d.). Therefore, it may be possible that some residual effects of the colonial period still influence people's judgements and stereotypes. In fact, it has been recently shown that Black women are still associated with negative stereotypes, while White women on the other hand experience a positive bias in Portugal (Araújo et al., 2016). Additionally, Portuguese children between five and eight years old appear to possess a pro-white/anti-black and pro-light-skinned biases (Neto & Williams, 1997).

Literature has demonstrated that under conditions of information shortage, people tend to do more positive inferences, considering the stimuli as more attractive (Orghian & Hidalgo, 2020; Sadr & Krowicki, 2019; Sevilla & Meyer, 2020). In our study these results were replicated, with faces missing 1/3 of the information considered more attractive than the original complete versions, providing additional evidence for a possible less is more effect. As mentioned before when referring to the Race effects observed in this study, prototypicality may be the mechanism underlying the preference for incomplete faces. In fact, in the study of Orghian & Hidalgo (2020), when judgments of distinctiveness/typicality were affected by the presentation of upside-down

faces (Leder & Bruce, 1998), the positive bias of information shortage was disrupted. This would happen because people develop fine-tuned prototypes of faces, encoding spatial configurational information that would be disrupted by the inversion of faces (Orghian & Hidalgo, 2020). The prototype hypothesis is congruent with the higher magnitude of this less is more effect on unattractive faces observed in literature (Kamatani et al., 2021; Miyazaki & Kawara, 2016; Orghian & Hidalgo, 2020): since prototypicality is associated with attractiveness, faces more distant to the prototype (unattractive) would benefit more from the creation of a holistic representation using a prototype (Orghian & Hidalgo, 2020).

Regarding effects which we did not account for when elaborating our hypothesis, we observed a significant effect of Face Gender on perceived attractiveness, with women considered to be more attractive comparatively to men. This effect was observed within condition (Mosaic and Original) and between condition (Men Original and Women Mosaic), meaning that it really was a significant tendency in our study. Since our samples of men and women were not statistically different when selected, probably the results were not due to an a priori difference between genders' attractiveness. In a study of Bernstein et al. (1982), they also observed a higher perceived attractiveness of women, when using pictures and raters of different ethnicities (Black, Chinese, White). In our case, the majority of the 127 participants were women (81.89%), therefore a possible explanation for this finding could be an own gender bias, with women rating higher pictures of the same gender or lower pictures of the opposite sex. Examples of this bias were already observed by Cross and Cross (1971) observed an own gender bias, with White participants down rating the attractiveness of the opposite sex faces. Additionally, women seem to have a stronger in-group bias than men, even at an implicit level, appearing to possess a cognitive mechanism that bolster this apparent in-group preference (Rudman & Goodwin, 2004).

Unfortunately, due to our limited sample of male participants, we could not explore if this effect was due to women giving higher ratings to faces of their own gender or if it was a general consensus among participants. Additionally, although probably the large majority of college students is White, we did not have information regarding participants' ethnicity to explore the effect observed by Cross and Cross (1971).

Moreover, literature has shown that sometimes men give lower attractiveness values to men's faces than women do (Hills et al., 2018; Maret, 1983; Maret & Harling, 1985). This might be explained by men being afraid of labels with homosexual connotations. For example, in a study of Maret and Harling (1985), male Cruzans initially refused to evaluate the attractiveness of male faces and when asked again to do so ended rating all the male faces as unattractive. Furthermore, Morse et al. (1976) verified that White South African men with higher self-regard evaluated other men more poorly. This might be due to the fact that in South Africa exists a more male-oriented culture and a bigger taboo regarding, homosexuality. Therefore, men with high self-regard may not be willing to indulge in ego-threatening information. However, our sample of men in this study is small (14.46%), so 1) we could not explore this hypothesis; 2) it is less likely that the gender bias effect was solely caused by male ratings.

Regarding the debate about race and men's attractiveness and on a note of curiosity, in this study White men were perceived as significantly more attractive than Black men ($t(122) = -5.39$, $p < .001$). However, this effect was only significant in the Mosaic condition ($t(122) = -5.17$, $p < .001$).

On the whole, in this study we observed a preference for White individuals in facial attractiveness. This effect was more significant when the faces shown were incomplete. Additionally, we replicated Orghian and Hidalgo (2020) findings and gave further evidence of a

possible role of prototypicality as the mechanisms behind shortage information leading to higher perceived attractiveness. Finally, although we observed a gender bias favoring women, further investigation is needed in order to comprehend its origin.

Limitations of this study

One limitation of this study regards the attractiveness of the stimuli used. The Chicago Face Database (Ma, Correll, & Wittenbrink, 2005) did not contain a lot of faces considered highly attractive: the faces are rated from 1 to 7 (less to most attractive) and the a priori mean rating of the pretty samples used in this thesis never exceeded 4.86. Consequently, in our study the pretty sample mean was never higher than 62.60 (Mosaic Condition) or 61.00 (Original Condition). Even if this is not unusual in studies recurring to standardized facial stimuli (e.g., Zhang et al., 2019), the fact that the attractive stimulus in our study do not exactly correspond to highly attractive faces implies that our results might not be generalized to these types of faces.

In terms of our sample, a possible limitation comes from the lack of control of participants' ethnicity. Although one might assume the majority of the Portuguese population and Faculty students is White, the absence of information regarding participants ethnicity does not allow to explore possible own or other race bias. Additionally, the participants in our study were mainly women. Therefore, we could not examine possible perceivers' gender influences on the ratings of faces with different genders and/or races. For example, the higher attractiveness of women faces compared to men might come from an ingroup or own gender bias. However, due to our reduced sample of male participants, we were unable to explore this hypothesis. It is also important to note that our sample consisted of only undergraduate students, with the person of highest age being 48

years old, meaning that the results obtained in this study may not generalize to other age groups or non-student samples.

Regarding our stimuli, we could not assure that all the images had exactly 1/3 of the facial information removed. This was due to factors that complicated the selection of the area where the pixels would be removed: pictures portraying more than just the face, pictures varying in the facial disposition, and the individuals' facial characteristics (height, width). Additionally, participants could observe the hair of the people depicted on the pictures, which can be a factor influencing attractiveness even though it is not related to facial information. This can for example introduce a bias due to stigmas against natural hair in Black women (Neal & Wilson, 1989; Rudman & McLean, 2016).

Future Studies

An important thing to explore is the effect of gender on perceived attractiveness observed in this study. Since our sample of male participants was really short and we did not have information on perceivers' race, we could only hypothesize possible explanations for this finding. The first problem could be resolved by collecting additional data from male participants using the same experience from this thesis or conducting a study with different stimuli and assuring the collection of significant samples from both genders. The second problem would require a new study where the ethnicity of the participants would be disclosed.

In this study, we only used Black and White faces, so it would be interesting to conduct more studies using different types of faces. An example would be the usage of mixed-race faces, that are perceived as more attractive in some literature (e.g., Rhodes et al., 2005). Potter and Corneille (2008) suggested that this preference in attractiveness for mixed-race faces could come from those

faces being near the prototype of their mixed-race (e.g., Euroasian). Therefore, if the mixed-race faces were from ethnic groups that did not have a clear prototype, this preference could be disrupted. In an incomplete condition, this could lead to the facial attractiveness not suffering a significant enhancement, comparatively to other mixed-race faces with a more developed prototype. Another possibility would be to not only see effects between races, but also analyze within the same racial category: Blair et al. (2004) observed that people judge individuals regarding how much they physically resemble the typical representative of that category. Additionally, Eurocentric faces with darker skin tones are more generally classified as being African American, whereas Afrocentric faces with lighter skin are usually more distinguished from Eurocentric faces (Stepanova & Strube, 2018). Therefore, it would be interesting to see the effect of information shortage on these types of faces.

Additionally, resorting to people from different ethnicities and countries would allow us to better comprehend the effects observed and the way they occur (or not) in different backgrounds and contexts.

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