

CHAPTER 7

Youth and Beauty

Age-Based Trait Impressions from Faces

Clare A. M. Sutherland and Andrew W. Young

“Age before beauty, my dear.” Clare Boothe Luce

“Pearls before swine!” Dorothy Parker, in reply
New York Times (reported in 1989)

First impressions are notoriously difficult to overcome. Despite the best wisdom of our folk proverbs, we persist in forming, using, and retaining our impressions of others. One important source of impression formation comes from facial appearance (Secord, 1958) and faces themselves play a vital role in human social communication (Bruce & Young, 2012). In this chapter, we examine which impressions are formed from faces, which facial cues are involved, and how impressions may vary by perceivers and cultures. Throughout, we illustrate how age-related variation in facial appearance contributes to impressions. We suggest that future research in the field focuses on including diverse faces and participant groups, along with longitudinal and lifespan studies.

The process of judging others by their face, or “face-ism,” has been compared to other types of prejudice (Olivola et al., 2014). The social consequences of impressions can indeed be extreme: In one study, impressions of trustworthiness from the face predicted actual death penalty decisions (Wilson & Rule, 2015). Impressions of competence and dominance have in turn been shown to predict real occupational outcomes in white collar (Rule & Ambady, 2009) and military (Mueller & Mazur, 1996) careers. Finally, it is probably not a surprise to learn that facial beauty predicts dating success on online romance websites (Dai & Robbins, 2021). Indeed, impression management is a lucrative business: in 2020, cosmetic face care was suggested to be worth £1 billion in the UK alone (Statista

Research Department, 2022a). In short, first impressions matter, and we know they do (see also Chapters 2 and 4, this volume).

Although we may not always follow the proverbial advice not to judge a book by its cover, the proverb is correct to urge caution. First impressions may show little resemblance to reality especially given the contributions of age, race, or sex-based biases (Todorov, 2017; see also Hedgcock et al., Chapter 5, this volume). Moreover, any “kernel of truth” in the form of links between appearance and reality is so small as to be essentially useless for practical everyday decision-making (Foo et al., 2022; cf. Schwarzmann and Rule, Chapter 2, this volume). Behavior, not appearance, is a much more accurate way to make decisions (Hooper et al., 2019; Olivola & Todorov, 2010).

Despite their low validity, impressions from facial appearance can be hard to overcome. For example, impressions of trustworthiness from faces can predict financial lending decisions even after people have had the chance to learn about the actual lending behavior of partners (Chang et al., 2010; Hooper et al., 2019). Educating people about the biasing effect of faces does not reduce reliance on facial trustworthiness when making criminal justice decisions, and under some circumstances may even increase facial appearance biases (Jaeger et al., 2020).

Several key aspects of impression formation may make it difficult to overcome impressions. Social characteristics that can activate impressions, such as age, race, and sex, are accessed quickly and relatively automatically (Dobs et al., 2019; Yan et al., 2017) and impressions can be formed from a single glance (Willis & Todorov, 2006). Moreover, people may form impressions from facial appearance implicitly (Swe et al., 2020). The difficulty in overcoming first impressions from facial appearance, along with the clear consequences of “face-ism,” have together driven substantial research interest in understanding facial impression formation over the last decade. One key contribution to impression formation is the age of the face (and perceiver).

Age Cues in the Face

Before describing how age affects impressions from faces, it is worth briefly considering how age is conveyed in the face. Both structural and soft tissue changes can affect apparent age (Bruce & Young, 2012). Age-related structural change includes skull growth, which forms a cardioid (heart) shaped pattern such that infants’ eyes are relatively larger and lower in the face than adults (Berry & McArthur, 1986). A mathematical transformation (the cardioid strain) makes faces look older or younger in appearance (Mark & Todd, 1983; Pittenger & Shaw, 1975). Facial features also change, such as the nose and ears, which lengthen (Enlow,

1982). Soft tissue changes become more important from middle- to older-age (Imai & Okami, 2019), including key changes in the distribution of adipose tissue, skin elasticity and texture, size of pores, prevalence of wrinkles, the presence of capillary varicosities, apparent eye size, lip shape and the thickness and texture of eyebrows and other hair (Berry & McArthur, 1986; Enlow, 1982; Imai & Okami, 2019). Changes to hair and skin pigmentation also tend to reduce contrast (Porcheron et al., 2013). Note that age-related changes are relatively gradual, as opposed to more changeable information like emotional expression, which differs from moment to moment. In contrast to trait impressions, facial age cues have an underlying validity, and age judgments from the face show reasonable accuracy (Burt & Perrett, 1995; Henss, 1991), though there are biological differences in rate of aging rates (Belsky et al., 2015), and lifestyle and cosmetics can affect a person's apparent age.

To understand how age is perceived from the face, computer science techniques have been used to great effect, including face morphing and deep neural networks. Face morphing (reviewed in Sutherland et al., 2017; see also Albohn et al., Chapter 11, for more on this and other face-related computer technologies) can change apparent age. For example, an individual face can be transformed to look younger or older through blending it away and toward a pair of faces that differ on age (Burt & Perrett, 1995; see Figure 7.1 (A)). Often, the pairs of images used to transform an individual face may themselves be blends (e.g., the average



Figure 7.1. (A) Face averages representing the twenty oldest and twenty youngest rated male and female faces from a set of 1,000 original everyday images (excluding images with strong head tilt; data reanalyzed from Sutherland et al. (2013), *Cognition*). (B) Transforming individual face photographs relative to these pairs of face averages (middle: original, left: 35% younger, right: 35% older).

of many younger versus older faces respectively; Figure 7.1 (B)). In this way, prototypical cues to aging can be captured in the face and rich insights can be gained into which combinations of cues are important for actual and/or perceived age. Such approaches are “data driven,” as they allow important cues to emerge spontaneously from the data (here, facial appearance from young and old adult faces) instead of working from an a priori hypothesis. Morphing techniques have shown that faces can look older when either shape or color is transformed, with the combination of these cues being more effective than either alone (Burt & Perrett, 1995). However, morphing itself can make it harder to capture all age-related texture changes, because it tends to smooth out wrinkles.

More recently, deep neural networks have also been used to estimate the age of face images (Othmani et al., 2020) as well as change the apparent age of faces in photographs (Peterson et al., 2022). Both face morphing (Sutherland et al., 2013) and deep neural network techniques (McCurrie et al., 2017) have also been used to investigate more subjective trait impressions from faces, as we shall see.

Age Cues and Trait Impressions

Quoted at the start of this chapter is a famous exchange in the 1930s between two American authors, Clare Boothe Luce and Dorothy Parker. Allegedly, the pair found themselves trying to get through the same doorway at the Waldorf Astoria. Luce ushered Parker ahead of her, quoting the aphorism, “age before beauty.” Parker, in a characteristically witty reply, countered with “pearls before swine!” (*New York Times*, 1989). Aside from telling us that Parker was not to be messed with, this amusing anecdote highlights two things about age and impressions. First, age and beauty are often seen as opposites. Second, age may convey other, more subtle yet still positive impressions, such as wisdom, social competence, or morality. As we shall see, both Luce and Parker were right, at least for impressions from faces. Figure 7.2 illustrates that many impressions covary with age-related information.

Leslie Zebrowitz pioneered research in understanding trait perception in relation to facial age. In line with Gibsonian theory, her work has suggested that social perception is “for doing” (Zebrowitz & Collins, 1997). From this perspective, older faces conjure different affordances than younger faces, thus inspiring different social goals. Much of her early work was on faces that look younger, either because they are chronologically younger, or because they look more “babyfaced.” For example, she found that faces with younger-looking features tend to appear more submissive, weaker, and more intellectually naïve than faces with older features (McArthur & Apatow, 1983). Babyfaced

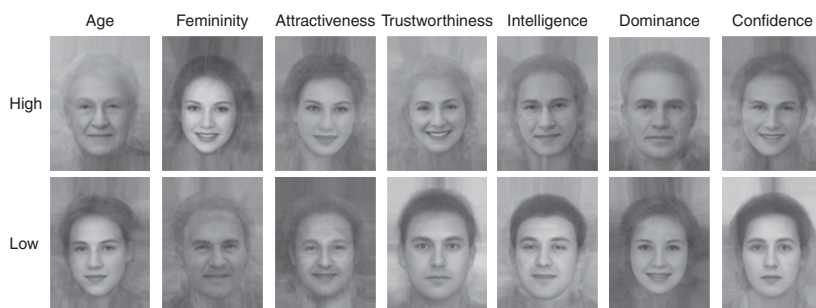


Figure 7.2. Face averages representing the twenty highest and twenty lowest faces rated on age, femininity, attractiveness, trustworthiness, intelligence, dominance, and confidence, taken from a database of 1,000 everyday images. Age changes occur with many of these impressions. Sutherland et al., (2013), *Cognition*.

individuals also tend to look more honest and warmer (Zebrowitz & Montepare, 1992), and for female faces, more attractive (Berry & McArthur, 1986).

More recently, she has extended this work to examine perceptions of older adults, finding that, compared to younger adults, older adults tend to look less babyfaced (although age and babyfacedness are not identical) and less attractive (Zebrowitz & Montepare, 1992). Indeed, the finding that we look less attractive as we grow older must surely be one of the most replicable, albeit dispiriting, findings in psychology (cf. Cross & Cross, 1971; Deutsch et al., 1986; Ebner, 2008; Henss, 1991; Sutherland et al., 2013; Zebrowitz et al., 1993). Sadly, some studies also find evidence of a gendered “double standard” in age-related decline in perceived attractiveness, such that attractiveness declines are earlier and steeper for women compared to men (Åberg et al., 2020; Berman et al., 1981; Deutsch et al., 1986; Henss, 1991), though other studies find equitable changes (Zebrowitz et al., 1993; Zebrowitz & Montepare, 1992).

Aside from attractiveness, facial age can act as a cue to many other traits. Older faces are perceived as less likeable, less distinctive (at least by older participants), less oriented toward growth and more oriented toward prevention of loss, less energetic and more emotional (both happy and sad; although less so by older participants; Ebner, 2008). Older faces are also rated as less hostile and more trustworthy, but also less healthy than younger adult faces (Zebrowitz et al., 2013).

To illustrate these age-related impressions, we reanalyzed data from a database of ratings of 1,000 naturally varying everyday photographs of White adult faces which span teenagers to older adult adults (Figure 7.3).

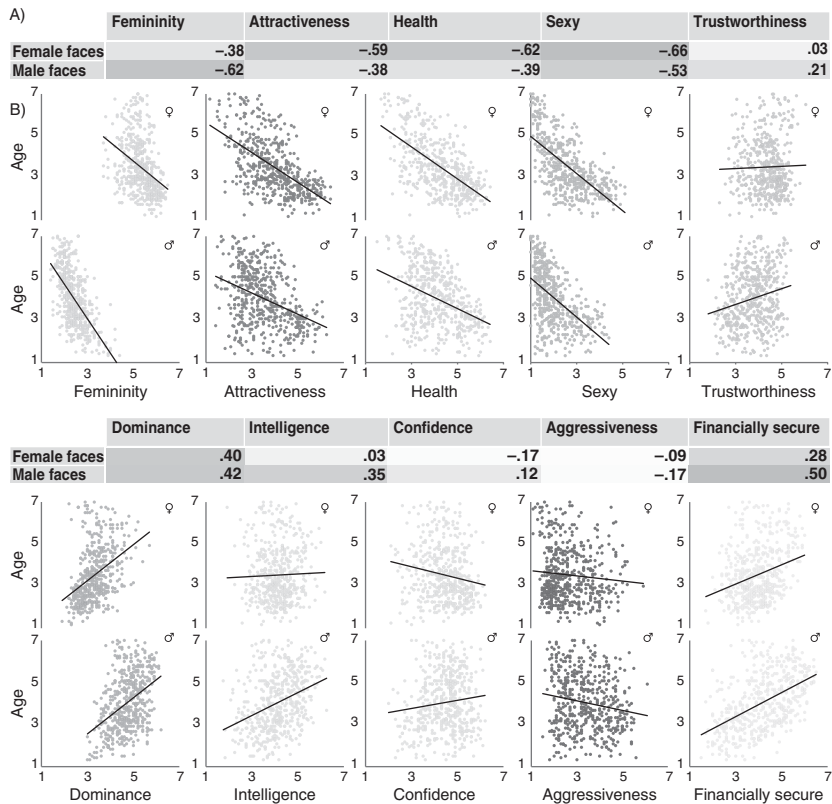


Figure 7.3. (A) Correlations between age and other impressions, based on everyday photographs of 1,000 faces (darker hue = higher correlation). Correlations above $r = .08$ are significant to $p < .05$, $r = .11$ to $p < .01$. Female and male face correlations are significantly different to $p < .01$ for all traits except dominance and aggressiveness ($p > .05$). (B) Corresponding scatterplots for female faces (first and third rows) and male faces (second and last rows). Data from Sutherland et al. (2013), *Cognition*, and South Palomares et al. (2018) *British J. Psych.*

Age conveys many different impressions: As we age, we look less attractive, feminine, healthy, and sexy (Figure 7.3). Yet, we also look less aggressive, more dominant and more financially secure. There is also an age-related double standard: Men but not women look additionally more intelligent, trustworthy, and confident with age, and age-related declines in positive traits (e.g., attractiveness) also appear less severe for men. These patterns replicate many of the findings previously noted in the literature, now with a much larger sample size of faces.

Interestingly, there have been relatively few longitudinal studies of age-related facial impression changes, possibly because the images are difficult to obtain (Zebrowitz et al., 1993, 1996; Zebrowitz & Rhodes, 2004). Zebrowitz and colleagues (1993) found that attractiveness impressions of children (aged ten) could predict their attractiveness as adults (aged fifty-six). However, impressions of babyfacedness for children could only predict impressions up until teenagehood for women, and only until the thirties for men. Likewise, impressions of honesty were not entirely stable through the lifespan (Zebrowitz et al., 1996). The relationship between traits (attractiveness and intelligence) is also not straightforward when examining the same people at different ages (e.g., Zebrowitz & Rhodes, 2004). Thus, not all impressions from faces are stable throughout the lifespan, although these conclusions are complicated by the small samples involved (noted by Zebrowitz et al., 1996).

Does age of perceiver matter? Older and younger participants tend to agree in their impressions for a wide variety of traits, but there also is a tendency for older participants to rate both younger and older adult faces more positively (Adams & Huston, 1975; Castle et al., 2012; Ebner, 2008; Henss, 1991; Ruffman et al., 2006; Sutherland, Burton, et al., 2020; Zebrowitz et al., 2013; Zebrowitz & Franklin, 2014); although some studies find that impressions are very comparable across participant age (Boshyan et al., 2013; Cross & Cross, 1971). Some studies also find subtle own-age effects, including higher within-age than cross-age participant group agreement (Zebrowitz et al., 2013), or more pronounced impressions when judging own-age groups (Zebrowitz & Franklin, 2014). Overall, however, it seems fair to say that age-based impressions are reasonably consensual.

Age-Driven Impressions Are An Important Dimension of Social Perception

As we saw from the previous section, many different impressions are correlated and rely on similar cues, so that age can cue health as well as financial security. How can we make sense of all these different relationships, given that they are interlinked? A helpful approach has been to look for underlying patterns. For example, from Figure 7.3 (A) it is clear that there are clusters of relationships: Age appears to correlate highly with sexiness, health, and attractiveness, and less so with trustworthiness or aggressiveness. Thus, by submitting these impressions to a data-reduction technique, such as principal components analysis or factor analysis, underlying broad dimensions of impression formation can be uncovered. In essence, the analysis looks at the broader picture.

This work has found that a small number of dimensions can account for most of the variation in trait impressions. In 2008, Oosterhof and Todorov

showed that two orthogonal dimensions, closely approximating valence (trustworthiness) and dominance, accounted for around 80 percent of the variation in impressions of standardized photographs and computer-generated faces (see also Todorov & Oh, 2021; Walker & Vetter, 2009). Oosterhof and Todorov (2008) suggested that impressions along these dimensions are functional for social behavior by guiding whom to approach or avoid (Oosterhof & Todorov, 2008). This data-driven functional theory of impression formation builds on earlier work on the ecological function of impressions (Secord, 1958; Zebrowitz & Collins, 1997), and has been very stimulating in driving research over the intervening decade.

Subsequently, we replicated these dimensions using impressions of naturally varying face photographs taken from the internet (Sutherland et al., 2013). The face photographs we used varied on many different facial cues, including age, from young adult to older adult faces. Perhaps as a result, we also found that a separate dimension emerged, which appeared to correspond to youth twinned with beauty (see also South Palomares et al., 2018; Wolffhechel et al., 2014). We suggested that these impressions could result from age-related stereotyping, evolutionary cues for partner selection, and/or both (Sutherland et al., 2013). Our study also showed the importance of using a highly variable set of naturalistic stimuli. Which impressions are entered into the analysis is important too: With a larger set of rated impressions, Lin and colleagues (2021) replicated the youthful-attractiveness dimension, but also found that gender (i.e. femininity) emerged as a separate dimension along with associated stereotypes, such as emotional and submissive.

More recent work has looked beyond perceptions of adult faces by young adult raters. Collova et al (2019) showed that adults' impressions of children's faces fall along two dimensions: niceness and shyness. Although niceness correlated highly with trustworthiness, shyness did not correlate with dominance and appeared more social (i.e., negatively correlated with sociability). This study was important as it suggested that dimensions of impressions may be more flexible than was perhaps assumed: If impressions are functional, then specific impressions should be adapted to the situation or group at hand. Thus, when judging children's ability, shyness may be more appropriate than dominance. It would be interesting to extend this research by looking at children's peer impressions, as children may have different social goals than adults when looking at (other) children.

At the other end of the age continuum, a recent study compared impressions of older adult faces by younger (18–28 years old) and older (65–90) participants (Twele & Mondloch, 2022; Figure 7.4). Impressions from younger and older participants were overall very similar when participants were asked to freely form impressions of older adult faces,

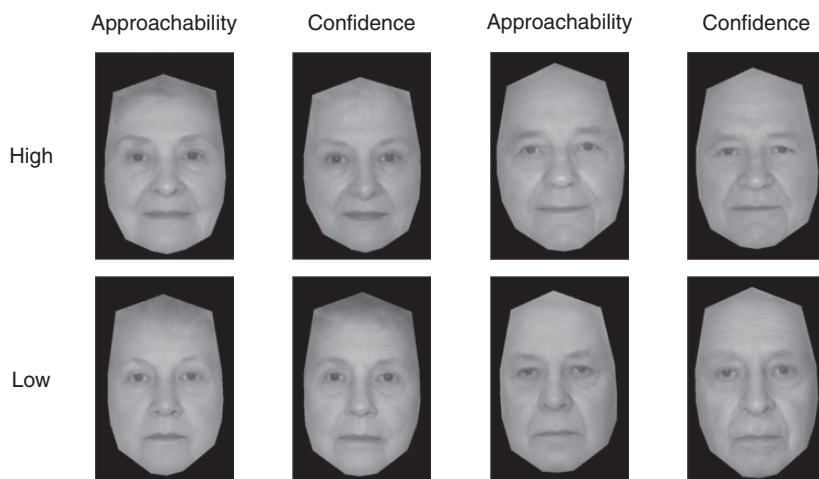


Figure 7.4. Average morphed faces created to illustrate the dimensions underlying impressions of female and male older adult faces found by Twele and Mondloch (2022), *British J. Psych.* With thanks to Anita Twele and Catherine Mondloch for the figure.

although older adult participants were more positive. Two highly similar dimensions also emerged for older adult faces from both young and older adult participant groups (Twele & Mondloch, 2022). The first dimension, sternness, appeared like the trustworthiness dimension found for young adult faces, as it correlated highly with perceived trustworthiness, warmth, and aggressiveness traits. The second dimension, confidence, correlated with competence for both perceiver groups. However, confidence correlated with dominance for older adult perceivers and with shyness for young adult perceivers, perhaps echoing different social goals. Interestingly, attractiveness was rarely spontaneously mentioned (Twele & Mondloch, 2022). Yet, health and attractiveness cues nevertheless contributed to traits along these dimensions; faces low in sternness looked babyfaced and attractive, whereas faces high in confidence looked youthful, attractive, and healthy. These perceptions were largely shared by older and younger participants.

In summary, dimensional approaches have shown that a small number of dimensions can underpin a wide array of trait impressions from faces, including impressions made spontaneously from faces by the participants themselves. The first and major dimension of impressions consists of impressions related to positive or negative intentions (trustworthiness, warmth, niceness and/or sternness), traits which appear to explain most variation in impressions across studies including children and older adult

faces (Collova et al., 2019; Todorov & Oh, 2021; Twele & Mondloch, 2022). Another dimension corresponding to judgments related to ability or capability also appears across studies, but with more variability. Some studies find that physical capability (dominance, linked to masculinity) is important (Oosterhof & Todorov, 2008; Wolffhechel et al., 2014), whereas other studies find that social or skills-based capability is more important, especially for very young or old faces (e.g., competence, shyness, confidence: Collova et al., 2019; Lin et al., 2021; Sutherland et al., 2018; Twele & Mondloch, 2022). Finally, age, health and attractiveness impressions are also important when forming impressions, whether they emerge as a separate dimension (Lin et al., 2021; South Palomares et al., 2018; Wolffhechel et al., 2014) or by their contribution to other trait impressions (Twele & Mondloch, 2022), or both.

Individual and Cultural Differences in Age-Driven Impressions

These previous studies have largely focused on Western participants judging White faces, but the question of whether trait impressions are invariant across culture is highly topical. There are both similarities and differences found across culture (Jones et al., 2021; Lin et al., 2021; Sutherland et al., 2018; Walker et al., 2011). We focus here on investigations that relate most closely to age-based impressions. In an initial data-driven study of dimensions of trait impressions across Chinese and British cultures, we found that impressions correlated highly across culture (Sutherland et al., 2018, see also Walker et al., 2011; Zebrowitz et al., 2012, for different cultures). In our study, we found that dimensions which emerged across culture were sufficiently similar that a pancultural model could be created. Age-related cues contributed to dimensions across culture (Figure 7.5) and a youthful-attractiveness dimension also emerged for both cultures, although there were more dimensions present for own-culture faces. In particular, age and attractiveness split into separate dimensions for the Chinese participant group judging Asian faces, perhaps representing cultural differences in age-related stereotypes, such that the Chinese group attached particularly positive connotations of age as benevolent (Sutherland et al., 2018). This pattern mirrors traditional age-related attitudes in East Asia (Chung & Lin, 2012), although East Asian participants often show equally or more negative attitudes toward aging (Harwood et al., 1996, 2001). Overall, age-related attitudes show considerable similarities across culture (Chan et al., 2012).

Echoing these initial results, Lin and colleagues (2021) also found a highly similar structure of impressions across a larger and more diverse group of cultures, including the US, Philippines, India, Latvia, Peru, Kenya, and Gaza (also Jones et al., 2021, main results, although their exploratory results

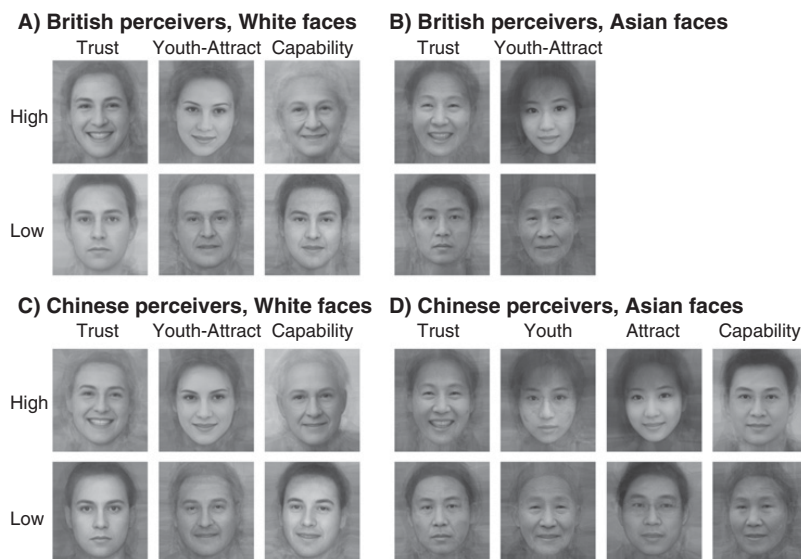


Figure 7.5. Average faces created from the top twenty and lowest twenty scoring faces from dimensional models across culture. Age cues impressions across multiple dimensions, particularly youthful-attractiveness and capability, and especially for Chinese perceivers judging Asian faces, where age conveys enough variance to form its own “youthfulness” dimension. Sutherland et al. (2018) *Personality and Social Psychology Bulletin*.

were more variable). Lin and colleagues (2021) also found an age-related dimension emerged separately in each culture. However, specific loadings of traits on dimensions differed across cultures, within this overall framework of similarity (e.g., the extent to which traits like “prudish” contributed to the age dimension). Consensus between different participants was also especially high for judgments related to age, such as youth, babyfacedness, health, and femininity, across all seven locations.

Although there can be consensus between the trait impressions of different participants, individual perceivers also differ to some degree in their impressions within a culture (Hehman et al., 2017; Hönekopp, 2006). Judgments of trustworthiness and dominance show more individual variability than judgments of attractiveness, which are perhaps based more directly on facial appearance. One recent study tested over 1,000 twins, finding that these individual differences in impressions appeared to be based on unique perceiver experiences (Sutherland, Burton, et al., 2020). Interestingly, older twins tended to show more positive impressions than

younger twins on all three traits, replicating older adult positivity biases described previously.

In summary, both individual and cultural differences exist in impressions, now areas of increased research interest. Despite these important sources of impression variation, impressions do show substantial consensus, as also shown in the figures in the current review. Consensus appears to be especially high when facial cues are strong (Hehman et al., 2017) and judgments based more directly on facial appearance, including age and related impressions such as health and babyfacedness (Lin et al., 2021) and attractiveness (Hehman et al., 2017; Sutherland, Burton, et al., 2020). It is perhaps impressive that there are such commonalities across perceivers, given how subjective the task of “reading from a face” is.

Advantages and Limitations of Data-Driven Approaches

Studies that have used dimensional techniques are often labeled “data-driven” approaches, as the results are heavily guided by the data themselves rather than a priori theorizing by the researchers. There are advantages and disadvantages of data-driven approaches in impression research.

Perhaps the best reason to use data-driven approaches is that one can examine cues which emerge spontaneously. In dimensional models, for example, age has emerged as important without needing to direct participants’ attention to age as a cue. Thus, results can be driven more directly by the participants’ perceptions rather than the researchers’ intuitions about which cues are important. Similarly, an advantage of data-driven research is that new and unexpected relationships can be found, as the results are not as constrained by the researchers’ own preconceptions. In this sense, the techniques are ideal for building new theory, such as the insight that impressions may be flexibly functional (Collova et al., 2019). The disadvantage is that it can be hard to know when (or which) dimensions are the same or different across different studies. Small differences may end up being exaggerated, and semantic and substantive differences can be hard to distinguish. It also takes careful unpacking to differentiate between meaningful variation or noise; for example, when testing different participant samples across cultures (Lin et al., 2021; Todorov & Oh, 2021). We are impressed that there is *any* convergence in social dimensions captured with different types of stimuli across modalities, with participants tested in different languages, and using different testing methods and analysis techniques (e.g., Cuddy et al., 2009; Rosenberg et al., 1968). Nevertheless, differences that emerge can be illuminating (Todorov & Oh, 2021).

Data-driven approaches are also very efficient. By using highly varying, diverse faces, the number of cues available to study is maximized far

beyond what can be achieved by varying single cues in an experimental approach. Moreover, multiple interacting influences can be established. Conversely, data-driven models need to be careful to note that they are limited in scope by the cues included: Most studies do not include faces which vary greatly on age, thus missing this potential variation (Collova et al., 2019; Sutherland et al., 2013; Twele & Mondloch, 2022). Similarly, the majority of investigations have used White faces and/or White participants, but the dimensions can differ across culture (Jones et al., 2021; Lin et al., 2021; Sutherland et al., 2018). Relatedly, impressions of any given face depend on the whole sample of faces being tested. For example, rating attractiveness may take on a different meaning when judging (only) young adult faces versus groups of faces which also include older adults or children (Peterson et al., 2022).

A key advantage of data-reduction techniques, such as principal components analysis, is that these techniques allow for a complex set of relationships to be simplified in ways that can be very helpful for future research. It is not always practical to test many trait impressions at once, especially if using a large sample of faces or a special population, or both (e.g., Sutherland, Burton, et al., 2020). Thus, studies can use the dimensional models as a guide to which impressions are important and/or to sample as diverse a set of impressions as possible. Of course, by focusing on broad patterns of variation, more subtle (but potentially important) differences in impressions can be overlooked: For example, qualitative free descriptions of older adult adults include descriptions that may be more specific to this group, such as “alert” (Twele & Mondloch, 2022). Note that free description studies are also data driven, and often constrain later quantitative studies.

By comparing multiple impressions at once, data-reduction techniques can also indicate which impressions are most important, which is much harder to achieve when focusing on one cue at a time. For example, the valence (trustworthiness) dimension appears to explain most variation in impressions across multiple studies (Collova et al., 2019; Oosterhof & Todorov, 2008; Sutherland et al., 2013). In this respect, data-driven analyses techniques have been useful as they have allowed the field to look beyond specific relationships and focus on larger patterns of underlying variation. However, there is nothing magical about the analysis itself: The patterns of variation can be seen already in simple correlation matrices (see Figure 7.3 (A); also Todorov & Oh, 2021). In some sense, it is unsurprising that these patterns emerge from visualization of the correlation matrix, as principal components and factor analyses are run on correlation or covariation matrices (Kline, 1994). Indeed, in many cases, data-driven techniques have cross-validated hypotheses derived from top-down theory. For example, the youthful-attractiveness dimension found in some studies

correlates highly with impressions of babyfacedness (Sutherland et al., 2013), a cue that has been long recognized to be important in hypothesis-driven theories (Zebrowitz & Franklin, 2014).

A final advantage of the data-driven approach is that it lends itself easily to developing computational models of facial impressions using either linear (Mileva et al., 2019; Oosterhof & Todorov, 2009; Todorov & Oh, 2021; Vernon et al., 2014) or deep neural networks (McCurrie et al., 2017; Parde et al., 2019; Peterson et al., 2022; Song et al., 2017). These computational models have already proved to be remarkably successful. Moreover, they can be used to generate stimuli to test specific hypotheses in the future, and potentially even to understand how computations may work in the human brain.

Why Do We Judge Age and Beauty? Social Learning and Evolutionary Explanations

Why do we judge age and beauty so readily? A key motivation behind both judgments may be the importance of finding a romantic partner. In the partner preferences literature, trustworthiness, social status, and vitality-attractiveness are suggested to be the three main dimensions by which we judge people for romance (Fletcher et al., 1999, 2014). These tripartite models of partner preferences show strong parallels with the three-dimensional face models of trait impressions discussed earlier (South Palomares et al., 2018). For example, the vitality-attractiveness dimension of partner preferences aligns with the youthful-attractiveness dimension from the face impression models. Interestingly, this vitality-attractiveness dimension was prioritized when participants (students) made partner preference judgments from faces (South Palomares & Young, 2019) and in real dating choices (Fletcher et al., 2014; Walster et al., 1966). Thus, beauty and youth are highly entwined in romantic preferences, at least for the student participants tested so far. The link between age and beauty also translates into real-world outcomes. For example, “anti-aging” beauty products are worth billions in sales globally (Statista Research Department, 2022b).

One explanation for the importance of youth for judging beauty situates these judgments in our evolutionary past. Evolutionary accounts aim to understand why people may agree on which faces look attractive. Although impressions of attractiveness do show individual differences (“beauty in the eye of the beholder”), there is also a clear consensual component, which is why some people can make a living as models, and other people as film villains (Hehman et al., 2017; Hönekopp, 2006). Evolutionary theories suggest that youth may be beautiful for three broad reasons: health, linked to natural selection; fertility, often linked

to sexual selection, especially for women; and as a by-product of general information processing (Rhodes, 2006). For example, perceptions of age from facial appearance may be better than chronological age at tracking “biological age” (age-related declines in health: Belsky et al., 2015; Mayes et al., 2010; i.e., our “biological clock”: Pyrkov et al., 2018). Moreover, feminine facial features including full lips or a small jaw, are linked to fertility, decrease with age, and are found to be attractive in female faces (Rhodes, 2006; however, see Scott et al., 2014). Finally, prototypical (average) faces, which are cognitively easier to process, tend to look attractive and younger, although these effects can be dissociated (Rhodes, 2006).

Evolutionary theories concern themselves with development across populations, but development through individual social learning is also important to understand how and why youth and beauty are related (Sutherland et al., 2013). In everyday life, we are bombarded with information about facial beauty from our social environments, culture, and the media. Young women are more likely to be shown in films than young men: This trend switches completely by middle age (and never reverses; Fleck & Hanssen, 2016). Beauty trends change like any other trend (compare TikTok beauty “hacks,” Instagram, and editorial make-up) and trends can signal age-related cohorts. For example, 1940s women emphasized red lipstick, 1960s women wore pink lips and winged eyeliner, and women in the 1980s used bold color (Greep, 2021). People also use make-up differently as they age (Valenti, 2021) and make-up can change apparent age (Russell et al., 2019). Stereotypes are also a potential factor influencing why age-related attractiveness emerges as an important dimension of impressions (Sutherland et al., 2013).

Individual learning and evolutionary processes are intimately linked, dynamically interact, and critically, are both altered through development (Lickliter & Honeycutt, 2003). To illustrate, in support of general evolutionary theories of beauty, even very young children (infants and newborns) prefer to look at more attractive-looking human (Langlois et al., 1987; Slater et al., 1998) and animal faces (Quinn et al., 2008). However, preferences for prototypical faces appear to shift through development so that the faces participants see in their everyday lives influence their perceptions of attractiveness (Cooper et al., 2006). Moreover, one study investigated facial preferences across 4–17 year olds, finding that although all age groups showed preferences for globally attractive faces, more specific preferences for averageness, symmetry, and health did not emerge until middle childhood, and femininity was not preferred until early adulthood (Boothroyd et al., 2014), suggesting that puberty or social learning may also affect face attractiveness preferences. Understanding which aspects of development

are important (and when), for different aspects of impression formation, creates highly important future questions for the field.

Finally, we should recognize that age also correlates with multiple other trait impressions in addition to beauty, as noted earlier. These widespread correlations suggest that facial age also cues other important decisions, like whom to trust (Johansson-Stenman, 2008) or whom to follow for advice (Gordon & Jordan, 2017). Indeed, older adults are stereotyped as more agreeable, socially wise, and warmer, but also as less healthy, active, open, and competent (Chan et al., 2012; Cuddy et al., 2005). We may learn to apply these stereotypes to others based on their facial appearance as youthful or older and potentially differently depending on our own culture (Sutherland et al., 2018). Future research could fruitfully investigate subgroup stereotyping; for example, how might one's impressions of a person's warmth or trustworthiness differ depending on whether people construed them as a stereotypical "grandma" versus "boomer"?

Future Research Directions

The literature on impressions from facial appearance has grown substantially over the last couple of decades, largely stimulated by the insights that trait impressions from faces can be predicted and measured using a data-driven approach (Oosterhof & Todorov, 2008) and through careful unpacking of potential mechanisms (Zebrowitz & Collins, 1997). This literature has shown that age-related facial appearance has an important role in driving face-based impressions. Of course, there is still more to understand. We suggest some profitable future directions here.

First, research has started to show that impressions can vary across faces and perceivers by age (Collova et al., 2019; Twele & Mondloch, 2022), culture (Jones et al., 2021; Sutherland et al., 2018; Walker et al., 2011), and gender (Oh et al., 2019; Sutherland et al., 2015). Dimensions of impressions are also not invariant across perceiver or face age (Collova et al., 2019; Twele & Mondloch, 2022). However, nearly all studies on impressions have used young adult perceivers, not children or older adults. More can be done to understand how and when impressions differ based on facial or perceiver age, or both. For example, it would be interesting to track the structure of impressions in longitudinal samples.

Moreover, although similar basic dimensions of impressions may appear across individual perceivers (Lin et al., 2021; Sutherland, Rhodes, et al., 2020), there are nevertheless considerable individual differences in impressions, including in attractiveness perceptions (Hehman et al., 2017; Hönekopp, 2006). It is not yet clear how conceptual stereotypes of age might play a role in perceptions of age: For example, does age-based prejudice affect the structure of facial impressions, or the cues

people use to form impressions from faces? Investigating age stereotyping of faces in the same way as gender and racial stereotyping would be productive (cf. Oh et al., 2019, 2020; Sutherland et al., 2015; Xie et al., 2021). There are also many more age-related stereotypes which could be investigated. For example, how do people judge older adult subgroups or counter-stereotypical older or younger faces?

An important general finding about first impressions is that they can be highly dependent on initial viewing conditions present in real life or a particular photograph (Jenkins et al., 2011; Sutherland et al., 2016; Todorov & Porter, 2014). In effect, they are actually impressions of *images* rather than faces per se: For example, the same face can look attractive or unattractive in different combinations of lighting, viewpoint, expression, and so on. At the moment, little is known about how these image differences affect impressions of age, and studying these may offer an insight into the relative contributions of direct age-based “affordances” and inferences resulting from age-based stereotypes.

Many of the foundational studies on perceptions of age, especially with attractiveness, were carried out nearly forty years ago (Berman et al., 1981; Deutsch et al., 1986) and with White, well-off, young, and educated participants. Over the last four decades, social attitudes, expectations for romantic partners, and the spaces in which people meet each other have changed completely. Have age-based affordances from faces likewise shifted? We have also witnessed years of a pandemic, with all the ramifications that this global situation entails, including increased concern about health and mask wearing that may have an impact on face trait perception (Kamatani et al., 2021). Important cohort or social group effects may occur as a result. More generally, more research is certainly needed with non-WEIRD participants.

Finally, research has also been hampered by a general lack of diversity in available face samples. Naturalistic and standardized databases with much younger or older faces are correspondingly rare (for exceptions see Bainbridge et al., 2012; Ebner, 2008; Huang et al., 2007; LoBue & Thrasher, 2015; Minear & Park, 2004). We also lack studies that track the same people as they age (Zebrowitz et al., 1993, is an exception); and, perhaps more importantly, we lack freely available longitudinal databases. Multi-lab studies and studies using face images used in facial AI studies, which tend to involve far larger samples of images, will help, as will studies using unique databases (e.g., passport photo databases, which have excellent population capture and multiple photographs of different age groups: Figure 7.6, Summersby et al., 2022). We note that these are not trivial methodological changes, as they require much more effort to collect than convenience samples of student images. Nevertheless, as much attention should be paid to the appropriateness of stimuli as to the diversity of (target) participant sampling.

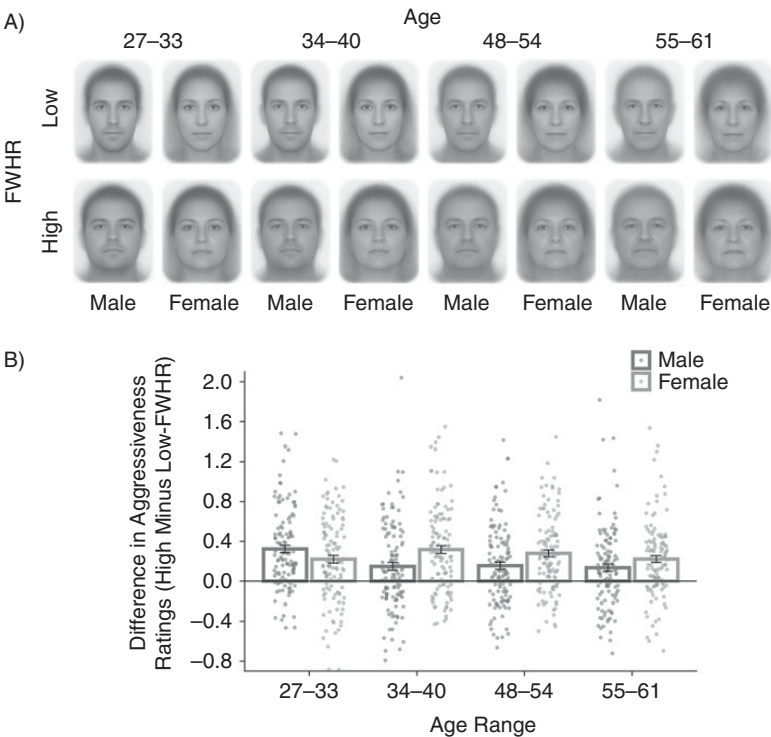


Figure 7.6. (A) Face averages created by sampling from a representative database of more than 17,000 passport images. Averages depict people with high and low facial-width-to-height ratio (FWHR), a feature linked to impression formation. Each average includes 114–121 people, allowing cues to be visualized across age and sex while protecting the identity of the participants. (B) The relationship between perceived aggressiveness and FWHR across a representative sample of 1,893 people from the original passport images (high minus low FWHR), for different age and sex groups. Facial-width-to-height ratio cued aggressiveness more strongly in younger than older adult male faces. Error bars represent standard errors. Summersby et al., (2022), *Royal Society Open Science*.

Conclusions

Modern research has revealed the wealth of social information that can be read from a face. Many of these judgments are linked directly or indirectly with age-related facial appearance. In general, older-looking adults tend to look less attractive, healthy, or sexy, but also wiser, and more dominant,

intelligent, financially secure, warm, and trustworthy compared to younger-looking adults. Understanding these trait attributions and how they relate to apparent age has been greatly assisted by the introduction and development of data-driven techniques, to the point where it is now possible to predict consensual impressions of highly varied face photographs. Future research should focus on improving our understanding of the influences that contribute to individual differences in impression formation. Studies involving more diverse groups of participants and faces are also critical, and especially with the use of longitudinal data to better understand age-related changes to facial appearance and their resulting effects on impressions. Finally, a key future direction will involve studies that unpack the contributions of age-related stereotyping and associated bias on judgments of facial appearance and on resulting social behavior.

References

- Åberg, E., Kukkonen, I., & Sarpila, O. (2020). From double to triple standards of ageing. Perceptions of physical appearance at the intersections of age, gender and class. *Journal of Aging Studies*, 55, 100876.
- Adams, G. R., & Huston, T. L. (1975). Social perception of middle-aged persons varying in physical attractiveness. *Developmental Psychology*, 11(5), 657–658.
- Bainbridge, W. A., Isola, P., Blank, I., & Oliva, A. (2012). Establishing a database for studying human face photograph memory. *Proceedings from the 34th Annual Meeting of the Cognitive Science Society*, 1302–1307.
- Belsky, D. W., Caspi, A., Houts, R., et al. (2015). Quantification of biological aging in young adults. *Proceedings of the National Academy of Sciences*, 112(30), E4104–E4110.
- Berman, P. W., O’Nan, B. A., & Floyd, W. (1981). The double standard of aging and the social situation: Judgments of attractiveness of the middle-aged woman. *Sex Roles*, 7(2), 87–96.
- Berry, D. S., & McArthur, L. Z. (1986). Perceiving character in faces: The impact of age-related craniofacial changes on social perception. *Psychological Bulletin*, 100(1), 3–18.
- Boothroyd, L. G., Meins, E., Vukovic, J., & Burt, D. M. (2014). Developmental changes in children’s facial preferences. *Evolution and Human Behavior*, 35(5), 376–383.
- Boshyan, J., Zebrowitz, L. A., Franklin, R. G., Jr., McCormick, C. M., & Carre, J. M. (2013). Age similarities in recognizing threat from faces and diagnostic cues. *Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 69(5), 710–718.
- Bruce, V., & Young, A. W. (2012). *Face perception*. London: Psychology Press.
- Burt, D. M., & Perrett, D. I. (1995). Perception of age in adult Caucasian male faces: Computer graphic manipulation of shape and colour information. *Proceedings of the Royal Society of London. Series B: Biological Sciences*, 259 (1355), 137–143.

- Castle, E., Eisenberger, N. I., Seeman, T. E., et al. (2012). Neural and behavioral bases of age differences in perceptions of trust. *Proceedings of the National Academy of Sciences*, 109(51), 20848–20852.
- Chan, W., McCrae, R. R., De Fruyt, F., et al. (2012). Stereotypes of age differences in personality traits: Universal and accurate? *Journal of Personality and Social Psychology*, 103(6), 1050–1066.
- Chang, L. J., Doll, B. B., van't Wout, M., Frank, M. J., & Sanfey, A. G. (2010). Seeing is believing: Trustworthiness as a dynamic belief. *Cognitive Psychology*, 61(2), 87–105.
- Chung, C., & Lin, Z. (2012). A cross-cultural examination of the positivity effect in memory: United States vs. China. *The International Journal of Aging and Human Development*, 75(1), 31–44.
- Collova, J. R., Sutherland, C. A. M., & Rhodes, G. (2019). Testing the functional basis of first impressions: Dimensions for children's faces are not the same as for adults' faces. *Journal of Personality and Social Psychology*, 117(5), 900–924.
- Cooper, P. A., Geldart, S. S., Mondloch, C. J., & Maurer, D. (2006). Developmental changes in perceptions of attractiveness: A role of experience? *Developmental Science*, 9(5), 530–543.
- Cross, J. F., & Cross, J. (1971). Age, sex, race, and the perception of facial beauty. *Developmental Psychology*, 5(3), 433–439.
- Cuddy, A. J. C., Fiske, S. T., Kwan, V. S. Y., et al. (2009). Stereotype content model across cultures: Towards universal similarities and some differences. *British Journal of Social Psychology*, 48(1), 1–33.
- Cuddy, A. J. C., Norton, M. I., & Fiske, S. T. (2005). This old stereotype: The pervasiveness and persistence of the elderly stereotype. *Journal of Social Issues*, 61(2), 267–285.
- Dai, M., & Robbins, R. (2021). Exploring the influences of profile perceptions and different pick-up lines on dating outcomes on tinder: An online experiment. *Computers in Human Behavior*, 117, 106667.
- Deusch, F. M., Zalsenski, C. M., & Clark, M. E. (1986). Is there a double standard of aging? *Journal of Applied Social Psychology*, 16(9), 771–785.
- Dobs, K., Isik, L., Pantazis, D., & Kanwisher, N. (2019). How face perception unfolds over time. *Nature Communications*, 10, 1258.
- Ebner, N. C. (2008). Age of face matters: Age-group differences in ratings of young and old faces. *Behavior Research Methods*, 40(1), 130–136.
- Enlow, D. H. (1982). *The handbook of facial growth* (2nd ed.). Philadelphia, PA: W. B. Saunders Company.
- Fleck, R. K. & Hanssen, F. A. (2016). Persistence and change in age-specific gender gaps: Hollywood actors from the silent era onward. *International Review of Law and Economics*, 48, 36–49.
- Fletcher, G. J. O., Kerr, P. S. G., Li, N. P., & Valentine, K. A. (2014). Predicting romantic interest and decisions in the very early stages of mate selection: Standards, accuracy, and sex differences. *Personality and Social Psychology Bulletin*, 40, 540–550.
- Fletcher, G. J. O., Simpson, J. A., Thomas, G., & Giles, L. (1999). Ideals in intimate relationships. *Journal of Personality and Social Psychology*, 76(1), 72–89.

- Foo, Y. Z., Sutherland, C. A. M., Burton, N. S., Nakagawa, S., & Rhodes, G. (2022). Accuracy in facial trustworthiness impressions: Kernel of truth, or modern physiognomy? A meta-analysis. *Personality and Social Psychology Bulletin*, 48, 1580–1596.
- Gordon, J. K., & Jordan, L. M. (2017). Older is wiser? It depends who you ask . . . and how you ask. *Neuropsychology, Development, and Cognition. Section B, Aging, Neuropsychology and Cognition*, 24(1), 94–114.
- Greep, M. (2021, March 25). Experts reveal how beauty trends have changed over the last 100 years. *Mail Online*.
- Harwood, J., Giles, H., McCann, R. M., et al. (2001). Older adults' trait ratings of three age-groups around the Pacific rim. *Journal of Cross-Cultural Gerontology*, 16(2), 157–171.
- Harwood, J., Giles, H., Ota, H., et al. (1996). College students' trait ratings of three age groups around the Pacific Rim. *Journal of Cross-Cultural Gerontology*, 11(4), 307–317.
- Helman, E. A., Sutherland, C. A. M., Flake, J. K., & Slepian, M. L. (2017). The unique contributions of perceiver and target characteristics in person perception. *Journal of Personality and Social Psychology*, 113(4), 513–529.
- Henss, R. (1991). Perceiving age and attractiveness in facial photographs. *Journal of Applied Social Psychology*, 21(11), 933–946.
- Hönekopp, J. (2006). Once more: Is beauty in the eye of the beholder? Relative contributions of private and shared taste to judgments of facial attractiveness. *Journal of Experimental Psychology: Human Perception and Performance*, 32(2), 199–209.
- Hooper, J. J., Sutherland, C. A. M., Ewing, L., et al. (2019). Should I trust you? Autistic traits predict reduced appearance-based trust decisions. *British Journal of Psychology*, 110(4), 617–634.
- Huang, G. B., Ramesh, M., Berg, T., & Learned-Miller, E. (2007). *Labeled Faces in the Wild: A Database for Studying Face Recognition in Unconstrained Environments*. University of Massachusetts.
- Imai, T., & Okami, K. (2019). Facial cues to age perception using three-dimensional analysis. *PLoS ONE*, 14(2), e0209639.
- Jaeger, B., Todorov, A. T., Evans, A. M., & van Beest, I. (2020). Can we reduce facial biases? Persistent effects of facial trustworthiness on sentencing decisions. *Journal of Experimental Social Psychology*, 90, 104004.
- Jenkins, R., White, D., Van Montfort, X., & Burton, A. M. (2011). Variability in photos of the same face. *Cognition*, 121, 313–323.
- Johansson-Stenman, O. (2008). Who are the trustworthy, we think? *Journal of Economic Behavior & Organization*, 68(3–4), 456–465.
- Jones, B. C., DeBruine, L., Flake, J. K., et al. (2021). To which world regions does the valence–dominance model of social perception apply? *Nature Human Behaviour*, 5, 159–169.
- Kamatani, M., Ito, M., Miyazaki, Y., & Kawahara, J. I. (2021). Effects of masks worn to protect against COVID-19 on the perception of facial attractiveness. *I-Perception*, 12(3), 1–14.
- Kline, P. (1994). *An easy guide to factor analysis*. London: Routledge.

- Langlois, J. H., Roggman, L. A., Casey, R. J., et al. (1987). Infant preferences for attractive faces: Rudiments of a stereotype? *Developmental Psychology*, 23(3), 363–369.
- Lickliter, R., & Honeycutt, H. (2003). Developmental dynamics: Toward a biologically plausible evolutionary psychology. *Psychological Bulletin*, 129(6), 819–835.
- Lin, C., Keleş, Ü., & Adolphs, R. (2021). Four dimensions characterize comprehensive trait judgments of faces. *Nature Communications*, 12, 5168.
- LoBue, V., & Thrasher, C. (2015). The Child Affective Facial Expression (CAFE) set: Validity and reliability from untrained adults. *Frontiers in Psychology*, 5, 1523.
- Mark, L., & Todd, J. T. (1983). The perception of growth in three dimensions. *Perception & Psychophysics*, 33, 193–196.
- Mayes, A. E., et al. (2010). Ageing appearance in China: Biophysical profile of facial skin and its relationship to perceived age. *Journal of the European Academy of Dermatology and Venereology*, 24(3), 341–348.
- McArthur, L. Z., & Apatow, K. (1983). Impression of babyfaced adults. *Social Cognition*, 2, 315–342.
- McCurrie, M., Beletti, F., Parzianello, L., et al. (2017). Predicting first impressions with deep learning. *Proceedings of the 12th IEEE International Conference on Automatic Face and Gesture Recognition, FG 2017*, 518–525.
- Mileva, M., Young, A. W., Kramer, R. S. S., & Burton, A. M. (2019). Understanding facial impressions between and within identities. *Cognition*, 190, 184–198.
- Minear, M., & Park, D. (2004). A lifespan database of adult facial stimuli. *Behavior Research Methods, Instruments, & Computers: A Journal of the Psychonomic Society, Inc*, 36, 630–633.
- Mueller, U., & Mazur, A. (1996). Facial dominance of West Point cadets as a predictor of later military rank. *Social Forces*, 74(3), 823–850.
- Oh, D., Buck, E. W., & Todorov, A. T. (2019). Revealing hidden gender biases in competence impressions of faces. *Psychological Science*, 30(1), 65–79.
- Oh, D., Dotsch, R., Porter, J., & Todorov, A. T. (2020). Gender biases in impressions from faces: Empirical studies and computational models. *Journal of Experimental Psychology: General*, 149(2), 323–342.
- Olivola, C. Y., Funk, F., & Todorov, A. (2014). Social attributions from faces bias human choices. *Trends in Cognitive Sciences*, 18(11), 566–570.
- Olivola, C. Y., & Todorov, A. (2010). Fooled by first impressions? Reexamining the diagnostic value of appearance-based inferences. *Journal of Experimental Social Psychology*, 46(2), 315–324.
- Oosterhof, N. N., & Todorov, A. (2008). The functional basis of face evaluation. *Proceedings of the National Academy of Sciences of the United States of America*, 105(32), 11087–11092.
- Oosterhof, N. N., & Todorov, A. (2009). Shared perceptual basis of emotional expressions and trustworthiness impressions from faces. *Emotion*, 9(1), 128–133.
- Opinion | Clare Boothe Luce Said It at the Waldorf. (1989, February 18). *The New York Times*. www.nytimes.com/1989/02/18/opinion/1-clare-bootheluce-said-it-at-the-waldorf-419789.html

- Othmani, A., Taleb, A. R., Abdelkawy, H., & Hadid, A. (2020). Age estimation from faces using deep learning: A comparative analysis. *Computer Vision and Image Understanding*, 196, 102961.
- Parde, C. J., Hu, S., Castillo, C., Sankaranarayanan, S., & O'Toole, A. J. (2019). Social trait information in deep convolutional neural networks trained for face identification. *Cognitive Science*, 43(6), e12729.
- Peterson, J. C., Uddenberg, U., Griffiths, T. L., Todorov, A., & Suchow, J. W. (2022). Deep models of superficial trait inferences. *Proceedings of the National Academy of Sciences*, 119(17), e2115228119.
- Pittenger, J. B., & Shaw, R. E. (1975). Aging faces as viscal-elastic events: Implications for a theory of nonrigid shape perception. *Journal of Experimental Psychology: Human Perception and Performance*, 1(4), 374–382.
- Porcheron, A., Mauger, E., & Russell, R. (2013). Aspects of facial contrast decrease with age and are cues for age perception. *PLoS ONE*, 8(3), e57985.
- Pyrkov, T. V., et al. (2018). Extracting biological age from biomedical data via deep learning: Too much of a good thing? *Scientific Reports*, 8(1), 5210.
- Quinn, P. C., Kelly, D. J., Lee, K., Pascalis, O., & Slater, A. M. (2008). Preference for attractive faces in human infants extends beyond conspecifics. *Developmental Science*, 11(1), 76–83.
- Rhodes, G. (2006). The evolutionary psychology of facial beauty. *Annual Review of Psychology*, 57(1), 199–226.
- Rosenberg, S., Nelson, C., & Vivekananthan, P. S. (1968). A multidimensional approach to the structure of personality impressions. *Journal of Personality and Social Psychology*, 9(4), 283–294.
- Ruffman, T., Sullivan, S., & Edge, N. (2006). Differences in the way older and younger adults rate threat in faces but not situations. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 61(4), P187–194.
- Rule, N. O., & Ambady, N. (2009). She's got the look: Inferences from female chief executive officers' faces predict their success. *Sex Roles*, 61(9–10), 644–652.
- Russell, R., Batres, C., Courrèges, S., et al. (2019). Differential effects of makeup on perceived age. *British Journal of Psychology*, 110(1), 87–100.
- Scott, I. M., Clark, A. P., Josephson, S. C., et al. (2014). Human preferences for sexually dimorphic faces may be evolutionarily novel. *Proceedings of the National Academy of Sciences*, 111(40), 14388–14393.
- Secord, P. F. (1958). Facial features and inference processes in interpersonal perception. In R. Tagiuri & L. Petrullo (eds.), *Person perception and interpersonal behavior*. Stanford, CA: Stanford University Press.
- Slater, A., Von der Schulenburg, C., Brown, E., et al. (1998). Newborn infants prefer attractive faces. *Infant Behavior & Development*, 21(2), 345–354.
- Song, A., Linjie, L., Atalla, C., & Cottrell, G. W. (2017). Learning to see people like people: Predicting social impressions of faces. *ArXiv:1705.04282v1*.
- South Palomares, J. K., Sutherland, C. A. M., & Young, A. W. (2018). Partner preference and facial first impressions models: Comparable or distinct underlying structures? *British Journal of Psychology*, 109(3), 538–563.

- South Palomares, J. K., & Young, A. W. (2019). Facial and self-report questionnaire measures capture different aspects of romantic partner preferences. *British Journal of Psychology*, 110(3), 549–575.
- South Palomares, J. K., & Young, A. W. (2018). Facial first impressions of partner preference traits: Trustworthiness, status, and attractiveness. *Social Psychological and Personality Science*, 9(8), 990–1000.
- Statista Research Department. (2022a). *Market value of skincare cosmetics in Great Britain in 2020, by product type*. Statista.
- Statista Research Department. (2022b). *Size of the anti-aging market worldwide from 2020 to 2026*. Statista.
- Summersby, S., Harris, B., Denson, T., & White, D. (2022). Tracking sexual dimorphism of facial width-to-height ratio across the lifespan: Implications for perceived aggressiveness. *Royal Society Open Science*, 9, 211500.
- Sutherland, C. A. M. (2015). *A basic guide to Psychomorph*. York: University of York.
- Sutherland, C. A. M., Burton, N. S., Wilmer, J. B., et al. (2020). Individual differences in trust evaluations are shaped mostly by environments, not genes. *Proceedings of the National Academy of Sciences*, 117(19), 10218–10224.
- Sutherland, C. A. M., Liu, X., Zhang, L., et al. (2018). Facial first impressions across culture: Data-driven modeling of Chinese and British perceivers' unconstrained facial impressions. *Personality and Social Psychology Bulletin*, 44(4), 521–537.
- Sutherland, C. A. M., Oldmeadow, J. A., Santos, I. M., et al. (2013). Social inferences from faces: Ambient images generate a three-dimensional model. *Cognition*, 127(1), 105–118.
- Sutherland, C. A. M., Rhodes, G., Burton, N., & Young, A. (2020). Do facial first impressions reflect a shared social reality? *British Journal of Psychology*, 111(2), 215–232.
- Sutherland, C. A. M., Rhodes, G., & Young, A. W. (2017). Facial image manipulation: A tool for investigating social perception. *Social Psychological and Personality Science*, 8(5), 538–551.
- Sutherland, C. A. M., Young, A. W., Mootz, C. A., & Oldmeadow, J. A. (2015). Face gender and stereotypicality influence facial trait evaluation: Counter-stereotypical female faces are negatively evaluated. *British Journal of Psychology*, 106(2), 186–208.
- Sutherland, C. A. M., Young, A. W., & Rhodes, G. (2016). Facial first impressions from another angle: Social judgements are influenced by both emotional expression and viewpoint. *British Journal of Psychology*, 108(2), 397–415.
- Swe, D., Palermo, R., Gwinn, O. S., et al. (2020). An objective and reliable electrophysiological marker for implicit trustworthiness perception. *Social Cognitive and Affective Neuroscience*, 15(3), 337–346.
- Todorov, A. (2017). *Face value: The irresistible influence of first impressions*. Princeton, NJ: Princeton University Press.
- Todorov, A., & Oh, D. (2021). Chapter four: The structure and perceptual basis of social judgments from faces. *Advances in Experimental Psychology*, 63, 189–245.

- Todorov, A., & Porter, J. M. (2014). Misleading first impressions: Different for different facial images of the same person. *Psychological Science*, 25(7), 1404–1417.
- Twele, A. C., & Mondloch, C. J. (2022). The dimensions underlying first impressions of older adult faces are similar, but not identical, for young and older adult perceivers. *British Journal of Psychology*, 113(4), 1009–1032.
- Valenti, L. (2021). Makeup for women over 50: A guide from a beauty industry veteran. *Vogue*.
- Vernon, R. J. W., Sutherland, C. A. M., Young, A. W., & Hartley, T. (2014). Modeling first impressions from highly variable facial images. *Proceedings of the National Academy of Sciences of the United States of America*, 111(32), e3353–e3361.
- Walker, M., Jiang, F., Vetter, T., & Sczesny, S. (2011). Universals and cultural differences in forming personality trait judgments from faces. *Social Psychological and Personality Science*, 2(6), 609–617.
- Walker, M., & Vetter, T. (2009). Portraits made to measure: Manipulating social judgments about individuals with a statistical face model. *Journal of Vision*, 9(11), 1–13.
- Walster, E., Aronson, V., Abrahams, D., & Rottman, L. (1966). Importance of physical attractiveness in dating behavior. *Journal of Personality and Social Psychology*, 4(5), 508–516.
- Willis, J., & Todorov, A. (2006). First impressions: Making up your mind after a 100-ms exposure to a face. *Psychological Science*, 17(7), 592–598.
- Wilson, J. P., & Rule, N. O. (2015). Facial trustworthiness predicts extreme criminal-sentencing outcomes. *Psychological Science*, 26(8), 1325–1331.
- Wolffhechel, K., Fagertun, J., Jacobsen, U. P., et al. (2014). Interpretation of appearance: The effect of facial features on first impressions and personality. *PLoS ONE*, 9(9), e107721.
- Xie, S. Y., Flake, J. K., Stoller, R. M., Freeman, J. B., & Hehman, E. (2021). Facial impressions are predicted by the structure of group stereotypes. *Psychological Science*, 32(12), 1979–1993.
- Yan, X., Young, A. W., & Andrews, T. J. (2017). The automaticity of face perception is influenced by familiarity. *Attention, Perception, & Psychophysics*, 79, 2202–2211.
- Zebrowitz, L. A., & Collins, M. A. (1997). Accurate social perception at zero acquaintance: The affordances of a Gibsonian approach. *Personality and Social Psychology Review*, 1(3), 204–223.
- Zebrowitz, L. A., & Franklin R. G., Jr. (2014). The attractiveness halo effect and the babyface stereotype in older and younger adults: Similarities, own-age accentuation, and older adult positivity effects. *Experimental Aging Research*, 40(3), 375–393.
- Zebrowitz, L. A., Franklin R. G., Jr., Hillman, S., & Boc, H. (2013). Older and younger adults' first impressions from faces: Similar in agreement but different in positivity. *Psychology and Aging*, 28(1), 202–212.
- Zebrowitz, L. A., & Montepare, J. M. (1992). Impressions of babyfaced individuals across the life span. *Developmental Psychology*, 28(6), 1143–1152.

- Zebrowitz, L. A., Olson, K., & Hoffman, K. (1993). Stability of babyfacedness and attractiveness across the life span. *Journal of Personality and Social Psychology*, 64(3), 453–466.
- Zebrowitz, L. A., & Rhodes, G. (2004). Sensitivity to “bad genes” and the anomalous face overgeneralization effect: Cue validity, cue utilization, and accuracy in judging intelligence and health. *Journal of Nonverbal Behavior*, 28(3), 167–185.
- Zebrowitz, L. A., Voinescu, L., & Collins, M. A. (1996). “Wide-eyed” and “crooked-faced”: Determinants of perceived and real honesty across the life span. *Personality and Social Psychology Bulletin*, 22(12), 1258–1269.
- Zebrowitz, L. A., Wang, R., Bronstad, P. M., et al. (2012). First impressions from faces among US and culturally isolated Tsimane’ people in the Bolivian rainforest. *Journal of Cross-Cultural Psychology*, 43(1), 119–134.