Personality, Appearance and Temporal Reponses to Potential Romantic Partners.

A thesis submitted for the degree of Masters by Research (MbR)

by

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Declaration

Candidate's declarations:

I, Gareth Evans, hereby certify that this thesis submitted in partial fulfilment of the requirements for the award of Masters by Research (MbR), Abertay University, is wholly my own work unless otherwise referenced or acknowledged. This work has not been submitted for any other qualification at any other academic institution.

Signed [candidates signature]…….
Date……..

Supervisor's declaration:

I, Christopher Watkins hereby certify that the candidate has fulfilled the conditions of the Resolution and Regulations appropriate for the degree of Masters by Research (MbR) in Abertay University and that the candidate is qualified to submit this thesis in application for that degree.

Signed [Principal Supervisors signature]……...
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Certificate of Approval

I certify that this is a true and accurate version of the thesis approved by the examiners, and that all relevant ordinance regulations have been fulfilled.

Supervisor……..…….
Date……..

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Abstract

There is substantial support that individuals make various social judgements which are important in the evaluation of romantic partners (reviewed in Chapter 1). However, relatively little research considers the role of temporal factors in mate choice, such as the extent to which choices may be relatively stable across time and/or factors that predict deliberation when choosing a mate. Two studies in this thesis explore the extent to which i) Behavioral Inhibition (BIS)/and Behavioral Activation (BAS) is correlated with decision making time when responding to faces of desired personality traits and ii) whether judgements of attractiveness/dominance in faces are valid guides to high or low BIS/BAS. In Chapter 2, inhibited participants took longer to accept a hypothetical dating offer from an attractive face, when measured within a one second timeframe. In Chapter 3, findings suggest that perceived attractiveness is a valid guide to BAS (i.e. sensation/fun-seeking, drive) in women's faces and provide preliminary evidence for a dissociable relationship – while BAS is more strongly related to perceived attractiveness than perceived dominance in the same female face prototypes, (low) BIS is more strongly related to perceived dominance than perceived attractiveness in the same female face prototypes. Collectively the findings of this thesis suggest that personality shapes deliberation in response to a 'rewarding' stimulus (an attractive face) and provides early work to suggest that (in women) social treatment of others based on appearance may shape the development of traits related to BAS. Directions for future research are then discussed (Chapter 4).

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Why study mate choice in the laboratory?

Mate choice is an important area of research as selection of a romantic partner represents an important decision from a social and biological point of view. Sexual selection theory has been used as a framework for understanding mate choice in humans and nonhuman species. From the point of view of this theory, while natural selection theory states that favourable traits for survival will enhance the reproductive fitness of that organism, favourable traits for reproduction will be selected for by mates if those traits in turn are heritable (Darwin, 1859). Parental investment theory (Trivers, 1972) has also generated a great deal of testable predictions within research on mate choice in humans and nonhuman species. Parental investment refers to how much care a parent invests in any offspring (usually defined as a minimum obligatory period of investment) which will increase their survival chances but incurs costs on the ability of a parent to invest resources or care into other offspring (Trivers, 1972). From these perspectives within evolutionary biology, ancestral humans are thought to have maximised their own reproductive fitness (passing their genes down across generations) by making 'trade-offs' between the potential indirect benefits (heritable) and direct benefits (e.g. resources/investment) of individuals as mates, and that preferences for possible indicators of these traits may be evident in research that tests for mate preferences even today (see Gangestad & Simpson, 2000 for a review).

In humans, successfully initiating and maintaining a good-quality romantic relationship may be important for various life outcomes. For example, positive and supportive close relationships can alleviate stress and, in turn, alleviate illness or

infection (Cohen et al., 1998). Moreover, in studies of women, positive romantic relationships may increase life expectancy by reducing susceptibility to ill-health (Gallo, Troxel, Matthews, & Kuller, 2003). Conversely, loneliness could be associated with increased feelings of depression, particular in older individuals (Cacioppo et al., 2002). Indeed, meta-analyses suggest high-quality support from social partners more generally directly-increases longevity by approximately 50%, with this relationship independent of gender or life-long health stability (see Holt-Lunstad, Smith, & Layton, 2010 for a meta-analytic review). The relationship between supportive relationships and health may be due, at least in part, to the association between stressful relationships and increased levels of pro-inflammatory cytokine, which are associated with increased risk of age-related diseases in later life (Kiecolt-Glaser et al., 2005).

As supportive close relationships may benefit overall health (e.g., Cacioppo et al., 2002; Cohen et al., 1998; Gallo et al., 2003; Holt-Lunstad et al., 2010; Kiecolt-Glaser et al., 2005), it is important, among other reasons, to understand whether or not recent cultural changes may shape the nature both of romantic interaction and partner selection (e.g. 'courtship'). Scientific and cultural changes, such as the availability of modern contraception (see, e.g., Roberts et al., 2005), access to methods to enhance appearance and/or media with which we compare our (or our mates') appearance relative to others, may lead to changes to the nature of human romantic interaction and/or partner selection which are important to elucidate (reviewed in Roberts, Miner, & Shackelford, 2010). One such cultural and technological change lies in the ability to find and select a romantic partner using an online platform (reviewed in Finkel et al., 2012).

Online dating is now a popular medium for meeting a romantic partner, with approximately 20% of long-term relationships thought to have been formed via two

individuals who met initially online (reviewed in Finkel et al., 2012). Online dating sites are thought to offer three relatively unique features: 1) increased access to a wider 'mating pool', 2) the ability to mediate communication via a computer (before meeting them) and 3) the ability to take advantage of purportedly-successful matching algorithms in order to meet a *compatible* partner (reviewed in Finkel et al., 2012). Some online dating sites even propose to match individuals on measures of biological compatibility, such as GenePartner (Finkel et al., 2012). Although these features may benefit certain individuals who are looking for a long-term partner, online dating may alter mate selection in potentially-negative ways (i.e. from the point of view of facilitating a long-term *durable* relationship). For example, it is possible that the expectations of an online dating user may not be fulfilled. Users will develop an expectation of what a potential partner will be like by interacting with them through communication media such as video chat or text chat. A person's expectations may be violated if a potential partner behaves differently in a face-to-face interaction than they do through interaction via technology/media. The chance that expectation violation will occur is thought to be greater if the time period between initiating an interaction online and having a face-to-face meeting is prolonged (Finkel et al., 2012). Finkel and his colleagues theorize that this could be because stronger expectations are formed through more prolonged online interaction and people in turn become more critical of these expectations when a face-to-face interaction is initiated. It is possible that expectancies are of a partner are built up over time with the influence of two effects. The first of these effects the placebo effect, when partners establish the expectancy that a matched partner on a dating site will be a compatible partner for them (Plassman, O'Doherty, Shiv, & Rangel, 2008). Users believe this as the match has been made 'scientifically', giving the impression that the match is reliable. The

second effect which contributes toward the construction of a partner expectancy is confirmation bias. This refers to when a partner confirms to themselves that a matched partner is compatible with them by discussing topics that they know they have a similar interest in as it was mentioned in their online profile. The conformation bias (Nickerson, 1998; Snyder & Swann, 1978) strengthens the expectancy of compatibility as it helps confirm their initial expectations which were formed by a placebo effect. Over time users strengthen the conformation of their compatibility by communicating with one another. Therefore, researchers have proposed that face-to-face meetings should be initiated as soon as possible after initiating interaction through online communication in order to reduce violation of expectancies that are built up over time (see Finkel et al., 2012 for discussion).

The wide choice of potential partners offered by online dating sites may also have undesirable consequences for selection of a high-quality partner if these websites promote an 'assessment mind-set'. An assessment mind-set refers to when people exert less cognitive effort when evaluating the suitability of a potential partner due to the large number of potential partners there are evaluate (Finkel et al., 2012). While increased choice may increase the likelihood of finding a compatible partner for a durable relationship, browsing for possible partners among a wide range of potential suiters may lead to users evaluating partners more as 'commodities'. Rather it is important to consider a partner's unique desires and needs to ensure good relationship quality (Clark et al., 2010).

Finally, online dating sites may be undesirable from the point of view of securing a good relationship partner, if profile descriptions created by users do not reflect their genuine personality. Veracity in online dating profiles may be an issue if, for example, people are poor at making accurate judgements of their own character traits (Ellison,

Heino & Gibbs, 2006) or if users are consciously dishonest in their profile descriptions in an attempt to present themselves as a more desirable partner (Ellison et al., 2006; Whitty, 2008). Lack of truthfulness in online self-presentation may, therefore, affect the quality of initial face-to-face interactions and user's quality of experience with online dating sites. How people describe themselves is also important in terms of the effectiveness of matching algorithms used by dating websites based on the information users provide them. The effectiveness and scientific validity of matching algorithms are yet to be studied empirically, which is necessary in order to verify commercial claims that their websites predict positive long-term relationship outcomes for specific individuals who use their site (reviewed in Finkel et al., 2012).

As experiences with, and perceptions of, online dating sites may shape how they are used, some researchers have proposed that the nature of online dating may, ironically, increase the weight that individuals place on directly-observable characteristics, if manipulation of trait-descriptions within a dating profile leads to mistrust in potential partners' online presentation (see Roberts et al., 2010 for a discussion). Indeed, researchers have proposed that when faced with an abundance of information to assess and/or choose potential mates, when emphasis is placed on quick decisions (e.g. at speed dating events), increased choice of mates actually facilitates greater appearance-based assessment of others (Lenton & Francesconi, 2010). For instance, speed-daters appear to focus more on physical traits such as height and weight when assessing potential dates than they assess non-surface traits such as occupation or educational achievement (Lenton & Francesconi, 2010). Fast judgements of others may be particularly relevant to contemporary platforms such as Tinder, which can be used for 'hook-ups' and may favour rapid short-term judgements of potential partners, such as 'swiping right' as the initial means of indicating interest

in a romantic partner (David & Cambre, 2016). The following is a review of evidence on preferences for physical and personality characteristics in romantic partners, focussing mostly on research of social judgements of faces given the importance of facial characteristics in social perception and interaction (see, e.g., Rhodes, 2006; Perrett, 2010). Following on from this, I will discuss where specific work demonstrates that trait judgements of others from facial cues can be made without much conscious effort or deliberation (i.e. under minimal time constraint or after brief exposure to faces).

Romantic partner preferences and social attributions of potential romantic partners: Universality and individual differences.

A variety of personality traits are desirable in romantic partners, including honesty, dependability, loyalty, kindness, and intelligence, with less-desirable traits including dominance and a desire for many children (Buss & Barnes, 1986). Women tend to prefer men who are honest, dependable, ambitious, kind and considerate (Buss & Barnes, 1986), with the traits “kind and understanding”, “exciting personality” and “intelligent” ranked highest by women. Traits like kindness and exciting personalities are preferred as they likely provide the basis for positive, stable and strong relationships (Buss & Barnes, 1986). In addition, intelligence may be preferred in partners if intelligent people provide better investment for offspring (e.g., via resource-provisioning; Buss & Barnes, 1986).

Among the ‘Big Five’ personality traits, (agreeableness, openness to experience, conscientiousness, extraversion and neuroticism; McCrae & Costa, 1985), individuals prefer romantic partners who are extravert, agreeable, conscientious and low in neuroticism (Figueredo, Sefcek, & Jones, 2006; Gattis,

Berns, Simpson & Christensen, 2004). For example, cooperation between two partners is desirable for achieving goals within long-term relationships via mutual aid (Buss, 1989), and agreeableness is thought to indicate a general willingness to cooperate (Ellis, 1995). Accordingly, low partner agreeableness is correlated with ratings of low satisfaction in romantic relationships (Botwin, Buss & Shackelford, 1997). In addition, and consistent with the proposal that traits that denote an ability to provide for offspring are attractive (Buss & Schmitt, 1993; La Cerra, 1995) females prefer conscientiousness in a romantic partner (Dijkstra & Barelds, 2008) and conscientiousness is related to marital satisfaction and success more generally (see Dijkstra & Barelds, 2008). Conscientiousness may be attractive because it is associated with greater general intelligence and earning capacity (reviewed in Jencks, 1979), which can be invested in offspring. Moreover, extraversion is thought to be attractive in romantic partners (Dijkstra & Barelds, 2008; Luo & Zhang, 2009), with some studies suggesting sex differences in this preference where women prefer extraversion to a greater extent than men do (Dijkstra & Barelds, 2008). Indeed, some other work suggests that females prefer low neuroticism in partners to a greater extent than males do (Dijkstra & Barelds, 2008), and that, overall, there are no clear preferences for openness to new experiences as a personality trait in a romantic partner (Luo & Zhang, 2009). Collectively, the big five personality inventory is a useful psychometric tool to investigate romantic partner preferences, and these preferences may be important for actual relationship quality (see Botwin et al., 1997; Dijkstra & Barelds, 2008).

Much research on social judgements of romantic partners is underpinned by sexual selection theories of mate preferences (Darwin, 1859; Trivers, 1972), where attractiveness judgements of potential mates may reflect the underlying biological

'quality' of the individual (reviewed in Little, Jones, & DeBruine, 2011), as proposed in many nonhuman animal species where physical indicators of quality (i.e. good underlying health) are preferred in mates (e.g., Griggio et al., 2011; Haas, 1976). In the research on social judgements of romantic partners' faces, much research has tested for links between attractiveness in faces and the properties of the face such as its 'averageness', symmetry and exaggerated features typical of one sex versus the other (i.e. males versus females). Much of this research has investigated these relationships using either faces that have been rated for various qualities or using computer graphic methods to manipulate these qualities systematically in order to test for effects of the manipulation on attractiveness judgements of faces. These three research areas will be outlined in turn, focussing primarily on average preferences for these traits across a sample.

Facial symmetry. Bilateral asymmetry refers to the extent to which there are small anatomical deviations from perfect symmetry when comparing identical features on the left versus right side of the body (Rikowski & Grammer, 1999). Facial symmetry is thought to correlate with good underlying health if, for example, small deviations from perfect symmetry indicate an individual's ability to resist parasites or developmental stressors (Gangestad, Thornhill, & Yeo, 1994; Thornhill and Gangestad, 1999; Thornhill & Moller, 1997; Watson & Thornhill, 1994). From a biological perspective, fluctuating asymmetry may interfere with the maintenance of human biological systems which regulate factors such as body temperature (Cuervo, Dhaoui, & Espeso, 2011). Greater fluctuating asymmetry, as a result of environmental stress is associated with a lack of bodily protein consumption and an increased susceptibility to the effects of harmful bacteria which may cause disease (see Rhodes, 2006 for discussion). Low

fluctuating asymmetry may therefore be correlated with perceived quality as a mate. Accordingly, studies that manipulate facial symmetry using computer graphic methods demonstrate that symmetric faces are more attractive than relatively-asymmetric faces (e.g., Perrett et al., 1999; Rhodes, Proffitt, Grady, & Sumich, 1998). Moreover, some studies suggest these preferences are stable across cultures, with Japanese participants (Rhodes et al., 2001) and members of the Hadza tribe (Little, Burriss, Jones, & Roberts, 2007) rating symmetric faces as more attractive than less-symmetric faces.

***Facial averageness*.** Facial averageness reflects the extent to which an individual's face is typical of a certain population (i.e. the opposite of distinctiveness, Rhodes, 2006). The average face of a population can be created by morphing a sample of faces with one another using computer graphic methods that calculate the average x, y position of a set of standardized landmark points on the face (e.g., Perrett, May, & Yoshikawa, 1994; Rowland & Perrett, 1995; Tiddeman, Burt, & Perrett, 2001). Typical features may be correlated with putative indices of quality in mates if, conversely, distinctive features suggest a difficulty among the organism in resisting developmental stressors within the environment (Thornhill & Møller, 1997). Using historical principles of composite portraiture, whereby averaging a set of images reduces distinctiveness and idiosyncrasies found within individual faces (Galton, 1879), facial averaging increases facial attractiveness, with perceived attractiveness increasing as more individuals are added to the prototype (Langlois & Roggman, 1990). Consistent with these findings, some work suggests that facial typicality is more attractive than facial distinctiveness (i.e. faces that deviate from average; Morris & Wickham, 2001; O'Toole, Deffenbacher, Valentin, & Abdi, 1994, 1999; Rhodes & Tremewan, 1996;

Rhodes, Roberts & Simmons, 1999; Vokey & Read, 1992). Collectively, averaging faces enhances their attractiveness, independent of other variables such as facial symmetry (Rhodes et al., 1999) and positive facial expression (O'Toole et al., 1999; Rhodes et al., 1999).

Sexually dimorphic facial characteristics. Sexually dimorphic physical characteristics are traits that are *exaggerated* to a greater extent in one sex than the other, and are important for mate choice and/or intrasexual competition in a variety of nonhuman animal species (Santos, Scheck & Nakagawa, 2011; Puts, 2010). Moreover, although I focus here on sexually dimorphic *facial* characteristics, an individual's preference for these traits appears to be cross-modal, and generalizes in certain contexts across faces, voices (e.g., raised or lowered pitch) and bodies (e.g., male muscularity), suggesting a common cue to underlying mate quality (Little et al., 2011). In humans, the onset of puberty promotes divergence in facial appearance between males and females (see, e.g., Weston, Friday, & Lio, 2007), thought to be due, at least in part, to sex differences in testosterone and estrogen levels. Here, while testosterone levels at puberty shape bone growth and facial structure in males (e.g. growth of jawline, facial hair and protrusion of the eyebrow ridge), oestrogen levels in females inhibit the development of such traits to the same extent and promote the growth of features such as lip size and greater facial adiposity (see Rhodes, 2006; Thornhill & Møller, 1997 for reviews).

In women, feminine facial characteristics (e.g., small chins, large eyes, high cheekbones, fuller lips) are positively correlated with attractiveness (e.g., Johnston et al., 2001; Perrett et al., 1998; Rhodes, Hickford, & Jeffery, 2000; reviewed in Little et al., 2011; Puts, Jones, & DeBruine, 2012). Feminine women's faces are judged as

relatively more attractive than masculine women's faces are (effect size r=0.64), both in studies that manipulate facial characteristics using computer graphic methods and in studies that use un-manipulated images that are rated for femininity (see Rhodes, 2006 for a meta-analytic review). The overall relationship between male sexual dimorphism (e.g., thick eyebrows, thin lips, defined cheekbone and jawline, smaller eyes) and attractiveness is less-conclusive for un-manipulated faces (effect size r=0.35) and manipulated faces (r=-0.47, see Rhodes, 2006). That masculine men do not appear to be more or less attractive than feminine men, *on average*, does not preclude the existence of individual differences in preferences for masculinity, however (see Little et al., 2011 for a review of findings).

Collectively, sexual selection theory has generated testable hypotheses which suggest that average preferences for specific facial characteristics reflect perceptions of traits that are important from a biological point of view, such as judgements of good underlying health. While a great deal of evidence associates attractiveness with various positive social attributions (i.e. 'halo effects', reviewed in Langlois et al., 2000), we make many other social judgements of faces on various trait dimensions which may be important when selecting a romantic partner.

Social judgements of faces on various trait-dimensions: Attributions and accuracy

We evaluate faces on a variety of trait dimensions at minimal acquaintance (reviewed in Todorov, Olivola, Dotsch, Mende-Siedlecki, 2015). An initial one hundred millisecond encounter is suggested to be an adequate length of time to form a social judgement about someone in face judgement tasks within the laboratory (Ballew & Todorov, 2007; Todorov, Said, Engell, & Oosterhof, 2008a; Willis & Todorov, 2006),

specifically for judgements of attractiveness, likeability, trustworthiness, and competence (Willis & Todorov, 2006).

Research on social judgements of others is of societal importance given that appearance-based judgements could have consequences for many important social outcomes (see, e.g., Little & Roberts, 2012 for a review). For example, social judgement of faces can have positive outcomes for romantic dating (Olivola et al., 2009). Here, males are more successful at dating if they are judged to be fun and outgoing from their physical appearance while females' dating success decreases if they are judged as intelligent or serious from their facial appearance (Olivola et al., 2009). Appearing more physically competent and dominant (in face photographs) is also related to the likelihood of Chief Executive Officers' (CEOs) working for a financially-successful company and is also correlated with their annual pay (Graham, Harvey, & Puri, 2010; Rule & Ambady, 2009), suggesting that trait judgements may be related to measures of status.

Social judgements may also be related to negative social outcomes for individuals. For example, individuals who are judged as appearing untrustworthy are less likely to be trusted by other players in economic strategy games (Stirrat & Perrett, 2010; Tingley, 2014). Indeed, social judgements may affect stringency or leniency in punishment. Individuals who appear untrustworthy are more likely to be judged as guilty of committing a crime (Porter, ten Brinke & Gustaw, 2010). Furthermore, people who are judged as looking more like a criminal are more likely to be selected as the offender of a crime from a police line-up (Flowe & Humphries, 2011). Actual election outcomes can also be predicted by naïve observers' judgements of how competent a candidate's face appears (Todorov, Mandisodza, Goren, & Hall, 2005). Moreover, subtle facial cues such as Afrocentric features (Blair, Judd, Chapleau, 2004) and

attractiveness (Mazzella & Feingold, 1994) can influence the severity of sentencing decisions made in the courtroom.

In order to determine whether social judgements of others (at minimal acquaintance) on various trait dimensions are accurate, one method to test this is to compare social judgements of others on various traits against the actual self-reported scores of those photographed individuals on that same trait dimension. The 'Big-Five' is a widely used measure on five trait dimensions, as covered earlier in the chapter (see, e.g., Barrett & Pietromonaco, 1997; McCrae & Costa, 1987; Watson, 1989), with early research into this inventory suggesting a moderate correlation between self- and peer-reports (after fifteen minute interactions) on three of the five dimensions (extraversion, conscientiousness and openness to experience; Passini & Norman, 1966). Despite initial null findings for agreeableness, accurate judgements appear to be made about extraverts and people who score high on agreeableness (Ambady, Hallahan, & Rosenthal, 1995). When judging facial photographs there is more certainty that judgements derive from the perception of a person's face rather than other factors. Judgements of the five trait dimensions from facial photographs have been analysed previously (Borkenau & Liebler, 1992). Consistent with the literature, this same study found significant relationships between self-reports and judgements of both extraversion ($r=0.33$) and conscientiousness ($r=0.32$) from photographs alone. Although the same study found null findings for judgements of agreeableness there appeared to be a positive relationship between self-reports and judgements ($r=0.19$). Recent reviews suggest that, from knowledge thus far, judgements made about extraversion, conscientiousness and agreeableness are generally accurate while the accuracy of judgements of other traits on the big five are less robust across studies (reviewed in Todorov et al., 2015). With the use of computer graphic techniques that

create averages of the typical characteristics of a set of faces (Galton, 1879; Tiddeman et al., 2001; see, e.g., Perrett et al., 1994), facial prototypes can be manufactured that represent the typical facial characteristics of both high and low extremes of each of the five trait dimensions. If we are able to make accurate personality judgements for these trait dimensions, then it would be expected that people would be capable of distinguishing a facial prototype high on that dimension from a prototype low on that dimension at levels greater than chance, if the facial prototypes are optimally-representative of their given category (Rowland & Perrett, 1995).

These computer graphic methods have been used to create optimum representations of each of the five trait dimensions in order to investigate accuracy in social judgements of faces (Penton-Voak, Pound, Little, & Perrett, 2006). This is achieved by grouping together responses of those who self-report as particularly high or low for each trait dimension within the total sample. The original photographs of these people would then be delineated with a standardized template affixed to landmark points on each face. Each of these templates are then used to calculate the average characteristics of the set of faces (i.e. a particular extreme of a given trait dimension). For instance, all of the faces of those who score highly for extraversion would be averaged together to create a face that is intended to represent the facial characteristics of 'extreme extraversion' with the process repeated for faces of individuals who report low levels of extraversion.

With regards to the original (un-manipulated) photos of both male and female faces, significant relationships between self-reports and others' judgements are found for extraversion, emotional stability (low neuroticism), agreeableness, conscientiousness and openness to experience (Penton-Voak et al., 2006). This suggests that, at levels greater than chance, we can accurately assess the personality

of an unfamiliar face on some dimensions. Here, judgements of extraversion are accurate for both male and female faces, while judgements of openness and emotional stability (low neuroticism) are accurate for male faces only (Penton-Voak et al., 2006).

When manufacturing facial prototypes based on high/low questionnaire scores on the 'Big-Five', the average facial characteristics of males with desired personality traits (The computer generated faces of males of high agreeableness, conscientiousness, extraversion, and emotional stability/low neuroticism) were judged as more attractive than average facial characteristics of males who scored low on those same dimensions. When examining judgements of female prototypes, high agreeableness, openness to experience and extraversion were rated as more attractive in prototypes than female prototypes that represented low levels of these same trait dimensions. Collectively, these findings suggest that, on some trait dimensions, judges are more attracted to faces (regardless of gender) that may reflect desired personality traits in a romantic and/or social partner. Moreover, judges were able to accurately differentiate between high and low extremes of both extraversion and emotional stability (neuroticism) for male face prototypes and were able to differentiate between high and low extremes of extraversion and agreeableness for female face prototypes (Penton-Voak et al., 2006). Differences in accuracy when judging the same trait in natural photographs versus facial prototypes may be due to the process of averaging faces. For example, while openness in the original photographs of male faces was judged correctly, participants could not assess openness in prototypes for either gender. Here, features such as hairstyle are visible in original photographs which can give insights into openness if the hairstyle is particularly extravagant, in contrast to prototypes which remove external cues such as hairstyle.

Social judgements may also be made on an individual's desire to engage in either a long-term or short term sexual relationship. Individuals who are labelled as 'restricted' are those who are more likely to pursue long-term sexual relationships whereas individuals who are labelled as 'unrestricted' are those who are more likely to pursue short-term sexual relationships (Simpson & Gangestad, 2001). An individual's propensity to engage in long-term or short term relationships is known as their sociosexual orientation, as measured by the Sociosexual Orientation Inventory (SOI; Simpson & Gangestad, 1991). High SOI scores are associated with a greater proclivity to engage in short-term sexual relationships whereas low SOI scores are associated with a weaker proclivity to engage in short-term sexual relationships. Social judgements of SOI made from facial appearance alone can be made with a degree of accuracy. Females can make accurate judgements of males' self-reported SOI from video footage (Gangestad, Simpson, DiGeronimo, & Biek, 1992) and in general people are able to make accurate judgements of SOI from the facial appearance of composite faces and real faces (Boothroyd et al., 2008). These social judgements could be shaped by the different attributions associated with high SOI and low SOI individuals. Attributions associated with high SOI include more masculinised physical traits (2D:4D ratio), and may even be linked to facial masculinity in females (Clark, 2004; Schaefer et al., 2005). Furthermore, unrestricted (high SOI) male facial composites are associated with increased facial masculinity (Boothroyd et al., 2008), and facial symmetry is also associated with high SOI in men (Simpson, Gangestad, Christensen, & Leck, 1999; Thornhill & Gangestad, 1994). As discussed previously, decreased fluctuating asymmetry is correlated with physical attractiveness (Penton-Voak et al., 2001; Rhodes et al., 2001). Therefore, it is possible that individuals with a less restricted sociosexual orientation will be perceived as more physically attractive. This

prediction has been supported as unrestricted SOI facial composites and real faces of females are perceived as more physically attractive than restricted SOI faces (Boothroyd et al., 2008). Perception of cues to attractiveness, masculinity and symmetry may inform how people distinguish between high and low SOI from facial appearance.

Computer modelling suggests that social judgements of faces can be reduced to two primary dimensions of perceived trustworthiness and perceived dominance (Oosterhof & Todorov, 2006). With these two dimensions, face evaluation at minimal acquaintance is thought to have a functional benefit, if rapid social evaluations on these dimensions are relatively low-cost if proven inaccurate in the long term in contrast to an *absence* of such rapid evaluations that are then proven incorrect (i.e. a speed-accuracy trade-off; Todorov, Baron, & Oosterhof 2008b; see also Watkins, 2013). Consistent with this work, areas of the brain implicated in the processing of reward (orbitofrontal cortex) and emotion (amygdala) are thought to moderate approach versus avoidance behaviours in response to faces that vary in trustworthiness (Engell, Haxby, Todorov, 2007; Said, Baron, & Todorov, 2009; Todorov et al., 2008a, 2008b; Winston, Strange, O'Doherty, & Dolan, 2002). Neotenous or youthful features may be related to trustworthiness judgements, at least partly. For example, individuals with 'babyish' facial features, such as small chins and enlarged eyes, are judged to be socially and physically weaker and, in turn, more approachable, than individuals with older looking faces (Berry & Brownlow, 1989). Babyish features are also associated with perceived warmth (Berry, 1991). By contrast, facial dominance is associated with facial characteristics that suggest developmental maturity (i.e. shaped at puberty) such as masculine physical characteristics (reviewed in Puts, 2010; Watkins, Jones, & DeBruine, 2010).

Consistent with the proposal that stereotypes may contain a small 'kernel of truth' (Berry, 1990), social evaluations of faces on dominance and/or trustworthiness may be accurate (reviewed in Todorov et al., 2015). For example, judgements of dominance made from facial appearance positively correlate with those individuals' actual rank attained within the military (Mazur, Mazur, & Keating, 1984) as well as employment from more successful companies (Graham et al., 2010; Rule & Ambady, 2009). Moreover, untrustworthy-looking individuals appear to be more willing to accept roles within experimental tasks that require exploitation than individuals who look more trustworthy (Bond, Berry, Omar, 1994), and judgements of trustworthiness from faces are positively correlated with self-reported trustworthiness (Berry, 1990).

By using average facial composites of trait dimensions then it can be determined whether an individual's desired personality in a romantic partner is reflected in their preference for faces which resemble high and low levels of a particular personality trait. Previous research has found that desired personality is reflected in face preferences for some personality traits such as assertiveness, easy-going, less 'scatter brained' and warmth (Little, Burt & Perrett, 2006). This means that a face which possess a trait that is desired by an individual should be preferred over a face which does not possess the trait which is desired by the individual. Moreover, faces which appear to possess traits which are socially desirable are judged as being more attractive than faces that do not possess socially desirable traits. It is plausible that socially desirable levels of the big five dimensions may be related to preferences for faces constructed to capture the typical characteristics of each of these dimensions. By comparing desired personality and face preferences using facial prototyping (Little et al., 2006) it can be determined whether facial cues to desired personality traits guide an individual's decision to date a particular partner at levels greater than chance.

The time-course of partner selection: How and why might people differ in their decisiveness?

The evidence reviewed so far suggests both that i) attractiveness judgements of potential romantic partners can be understood in light of sexual selection theories (reviewed in Little et al., 2011; Puts et al., 2012; Rhodes, 2006) and that ii) first-impression judgements of faces on some trait dimensions may facilitate an initial assessment of a romantic partner which could shape an initial interaction with that person. A relatively underexplored area of the literature is the temporal processes involved in the assessment of potential mates, on dimensions such as attractiveness and/or personality.

In nonhuman species, mate choice is shaped by temporal factors which are important to consider within analyses (reviewed in Sullivan, 1994). From this perspective, simple traits that can be assessed almost instantaneously, such as physical traits that indicate mate quality, will be used to a greater extent in mate assessment when time is constrained. By contrast, when time is less-constrained, cues that takes longer to assess, such as those that indicate direct benefits (e.g. paternal investment or traits indicated through behaviours) will be prioritized in this scenario (reviewed in Sullivan, 1994). As reviewed previously, there is a good deal of evidence to suggest that characteristics important in the assessment of a romantic partner, such as attractiveness, likeability, trustworthiness, and competence can be assessed from very brief exposure to faces (Ballew & Todorov, 2007; Todorov, et al., 2008b; Willis & Todorov, 2006). Moreover, some recent work suggests that temporal factors shape romantic partner choice in ecologically-valid settings. For example, when there are many potential mates to choose from and mate assessment time is

limited people exert less effort in evaluating characteristics that would require more time to properly assess (Lenton & Francesconi, 2010). Instead, people are more likely to assign greater importance to the assessment of characteristics which can be assessed more quickly (i.e. directly-observable characteristics). For instance, characteristics such as height and weight are more apparent than education or employment status, therefore meaning that height and weight can be assessed more quickly. This has been found in the context of speed dating in which single partners have limited time to interact with an unfamiliar date before they have to move on to another interaction with a different unfamiliar single. As there is limited time to assess a partner efficiently in a speed dating context people tend to assign more importance to the assessment of more accessible traits such as height and weight (Lenton & Francesconi, 2010).

Complementing this work, analyses of speed dating organizations (e.g., Hurry Date; Kurzban & Weeden, 2004) have revealed that singles are more likely to use easily-accessible physical characteristics to inform decisions about which partners they would like to have contact with again. Within a limited assessment time of three minutes, both males and females were more likely to assess characteristics such as height, age, physical attractiveness and body mass index (BMI) than they were to assess more complex characteristics such as education status, religion, sociosexuality, and desire to have children (Kurzban & Weeden, 2004). In another study, following ten minute interactions with an unfamiliar date, people's judgements of attractiveness, warmth and trustworthiness were related to a stronger desire for future contact with that partner (Fletcher, Kerr, Li, & Valentine, 2014).

In a variety of speed dating studies, males rely more than females on judgements of attractiveness to inform their choices, which can be quickly assessed

when assessment time is limited in a speed dating context (Eastwick & Finkel, 2008; Fisman, Iyengar, Kamenica, & Simonson, 2006; Todd, Penke, Fasolo, & Lenton, 2007). By contrast, women are relatively more likely than men to use judgements of intelligence (Fisman et al., 2006) and earning capacity to inform their mate choice in speed dating when mate assessment is time constrained. Collectively, the literature of temporal factors in mate choice (primarily from speed-dating studies) suggests that people are more likely to assess characteristics that require less cognitive effort to assess when mate assessment is time constrained. It generally appears that physically accessible traits are evaluated more frequently in speed dating scenarios when mate assessment is time constrained. This is perhaps because physical traits take less time to assess as they can be judged visually, whereas several complex traits are not directly visually accessible. With this in mind, if trait dimensions can be assessed from physical facial appearance and are easily accessible they may be particularly important in informing individual responses to dating requests under different time constraints. The current research will analyse the importance of physical trait dimensions which can be detected from facial appearance such as five factor model traits (Ambady et al., 1995; Borkenau & Liebler, 1992; Passini & Norman, 1966), SOI, (Boothroyd et al., 2008; Gangestad et al.,1992) and attractiveness, when responding to dating requests in different time constraints. The current research differs from previous speed dating studies as it will include a shorter mate assessment time constraint of one second rather than minutes considering social judgements can be made within the first one hundred milliseconds of meeting an unfamiliar face (Willis & Todorov, 2006). The current research will also analyse the influence of approach and withdrawal behaviour in the process of mate selection. The following provides an overview of the individual differences in behaviour on the BIS/BAS behavioural

dimensions and how these dimensions may have implications for romantic decision-making.

The Behavioural Inhibition and Behavioural Activation Scales

Research in emotional processing can give insight into how and why a person will behave in a particular way in a given social situation. Human emotion is a lateralised function which is established in the early years of brain development (Fox & Davidson, 1986) and is lateralised into two different behavioural and motivational systems. The behavioural inhibition and the behavioural activation systems are frameworks for explaining individual differences in behaviour and emotional processing. The Behavioural Activation System (BAS) is responsible for modulating positive emotions including joy and satisfaction (Gray, 1977), and is associated with positive affect (Carver & White, 1994; Harmon-Jones & Allen, 1997). The BAS system underpins impulsive, approach style behaviour with the positive notion that material rewards or benefits can be obtained by eliciting such behaviour (Degnan et al., 2011; Depue, Krauss & Spoont, 1987). Impulsive actions or decisions are the crux of BAS orientated behaviour (Diaz & Pickering, 1993). The left frontal lobe of the brain is responsible for the processing of positive emotions (Davidson, 1992), creating a basis for the theory that BAS orientated behaviour is more characteristic of left hemispheric dominance.

Behavioural Activation System Subscales

Various behaviours have been linked to the behavioural activation system such as high levels of extraversion or outgoingness, high psychoticism, a positive mentality and increased joy when a reward is imminent (Jorm et al., 1998). When measuring BAS, there are three sub-scales measured by thirteen items within a twenty-four item

questionnaire measuring the behavioural activation and inhibition scales (Carver & White, 1994). The “drive” and “fun-seeking” scales are both measured by four items whereas the “reward responsiveness” scale is measured by five items. The “reward responsiveness” scale aims to determine how positively an individual will react when presented with the opportunity to achieve a potential reward. The “drive” scale measures individual motivation towards pursuing and obtaining particular goals. The “fun-seeking” scale measures an individual’s willingness to engage in new experiences or activities which could be exciting or exhilarating. Furthermore, high BAS activity is associated with positive life outcomes (Degnan et al., 2011). For instance, extravert children generally appear more socially competent by the age of eighteen and further develop this competency as they enter adulthood (Caspi et al., 2003). Extraverted children are more capable of exhibiting stable, well-managed emotions and behaviours (Dennis, Hong & Solomon, 2010) and conversely stable emotion regulation predicts more positive social behaviour (Rydell, Thorell & Bohlin, 2007). In addition, extraversion in adolescence is positively correlated with self-confidence and teacher’s ratings of pupils’ social capability (Davey, Eaker, & Walters, 2003; Grazlano & Ward, 1992).

Behavioural Inhibition System

The behavioural inhibition system (BIS) is the second motivational system and is also modulated by human emotion. Anxiousness and negative affect are common emotions associated with BIS orientated behaviours (Degnan & Fox, 2007). Individuals can experience feelings of anxiety when they are presented with difficult decisions and are faced with the option of either approaching or avoiding certain situations. The septohippocampal system is regarded as the region of the brain responsible for mediating BIS (Gray, 1970). This region of the brain, similar to the functions of BIS,

mediates inhibitory behaviour in individuals during times of increased stress resulting from the decision of whether to approach or avoid a particular situation. High levels of BIS are positively associated with timid and cautious behaviour (Fowles, 2000), and prevent individuals from approaching situations or exhibiting impulsive behaviour that may result in material rewards or benefits. This avoidant behaviour reduces the possibility that an individual will suffer negative consequences such as disappointment or rejection from behaving impulsively (Gray, 1977) – however inhibition could prevent the attainment of material rewards because an individual is less likely to engage in reward orientated behaviours (Gray, 1977). High-functioning BIS has been linked more intense negative feelings of anxiety and nervousness (Carver & White, 1994). Considering negative emotions and withdrawal behaviour are localised in the right frontal lobe (Davidson, 1992), it could be the case that the behavioural inhibition system is characterised by the functions of the right frontal lobe. The behavioural inhibition system could be regarded as what is known as a proactive coping mechanism (Aspinwall & Taylor, 1997), which helps to minimise anxiety. It could be the case that longer decision times help these people to feel that they have made the best possible choice rather than a rushed or possibly irrational choice that could have negative repercussions for them in the future. This is evident from completion times of certain novel tasks in which BIS orientated individuals take longer than BAS orientated individuals to complete the task (Wright & Hardie, 2012). However, the behavioural inhibition and behavioural activation systems are independent motivational systems meaning that people can exhibit (high or low) levels of both BIS and BAS.

The Revised Reinforcement Sensitivity Theory r(RST) (Gray & McNaughton, 2000) redefined the meanings of BIS and BAS and more recently a new r(RST) scale has been developed (Corr & Cooper, 2016) to measure BIS, BAS and Fear in more

depth. The r(RST) also includes a third scale known as the Fight-Flight-Freeze System (FFFS). This system is implicated in the presence of an aversive stimulus. When FFFS is activated the general response is usually aversive or defensive behaviour which protects individuals' in situations which pose a potential threat, (Heym, Ferguson & Lawrence, 2008). The BAS scale is activated in situations where potential reward or immediate gratification is likely in which impulsive approach behaviour is the likely outcome. The BIS scale acts as a conflict resolution system which resolves goal conflict between the differing activations of BAS and FFFS. The most notable difference between FFFS and BIS is that FFFS is responsible for fear regulation whereas BIS is responsible for the regulation of anxiety. Therefore, it is possible that avoidant behaviour is mediated by feelings of both fear and anxiety (Beck et al., 2009; Heym et al., 2008). The BIS/BAS scale (Carver & White, 1994) views BIS as a system that encapsulates all forms of avoidant behaviour under one category with FFFS featuring as a small subscale of BIS. Although the BIS/BAS scale is a highly valid measure of approach and withdrawal tendencies, in regards to r(RST) it could be deemed as slightly outdated as only two of the eleven items of BIS are specific to FFFS. Supposing that FFFS (fear) mediates withdrawal behaviour independently then an updated measure of BIS/BAS scale is needed to quantify FFFS as a separate scale in accordance with the definitions of r(RST). The newly developed r(RST) scale (Corr & Cooper, 2016) measures FFFS with ten separate items which is a different approach to measuring individual differences in behaviour than that of the BIS/BAS scale (Carver & White, 1994).

Handedness

Individual hand preference can also have an effect on the time in which an individual deliberates before making a decision. Hand preference (related to motor dominance) is contralateral to hemispheric brain dominance (Levy & Nagylaki, 1972). In other words, left hand dominance is generally associated with strong right hemisphere lateralisation and right hand dominance is generally associated with strong left hemisphere lateralisation. This association is reflected within language lateralisation with left-handed individuals more likely to possess right hemisphere language dominance. Although left-handed individuals are more likely to have right hemisphere language dominance than right-handers, only around fifteen percent of left-handers have right hemisphere language lateralisation whereas seventy percent of left-handers have left-hemisphere language lateralisation (Knecht et al., 2000). This means that left-handed people, like right handers, are more likely to have left hemisphere language lateralisation than right hemisphere language lateralisation. BIS and BAS are lateralised in a similar way, with BIS activation generally specialised in the right hemisphere and BAS activation specialised in the left hemisphere (Spielberg et al., 2011). There is supporting evidence that left-handed individuals are more prone to behavioural characteristics similar to those of the BIS system with left-handers experiencing greater state anxiety while engaging in a novel task (Wright, Hardie, & Wilson, 2009), independent of gender (Wright & Hardie, 2012). These findings suggest that left-handed individuals have particularly high levels of BIS activation.

Recent research suggests that non-right-handers score higher on the BIS scale than right-handers (Beaton, Kaack, & Corr, 2015). Handedness strength has been closely examined as it is thought to influence behaviour and susceptibility to anxiety. Individuals can be specifically categorised into one of four groups, inconsistent or

consistent, left or right handers (Lyle, Chapman, & Hatton, 2013). Consistent-handed individuals are those who are dominant with a particular hand and very weak with other, whereas inconsistent individuals are less dominant with a particular hand but are able to complete some tasks with the other hand. Individuals can be categorised as based on scores on the Edinburgh Handedness Inventory (Oldfield, 1971). The following cut-off scores can be made, consistent left-handers (-100:-80), inconsistent left-handers (-80:0), inconsistent right-handers, (0-80) and consistent right-handers, (80-100) (Lyle et al., 2013). However, there is some debate that the cut-off point can influence responses, and this has been found recently for the BIS/BAS Scale (Hardie & Wright, 2014). The degree of hand consistency is only general to the ten items of the Edinburgh Handedness Inventory which includes fine skilled motor tasks such as writing to tasks that require less motor skill such as using broom or a toothbrush. Consistent-right-handers showed greater levels of anxiety on the BIS/BAS scale compared to their inconsistent counterparts (Lyle et al., 2013). The level of consistency does not have an effect on the amount of anxiety experienced by left-handed individuals which may be because all left-handers experience similarly high levels of anxiety. Most importantly Lyle et al. (2013) found support that inconsistent left-handers experience greater anxiety than inconsistent right-handers. Although left-handed individuals demonstrate significantly more state anxiety than right-handed individuals (Wright & Hardie, 2012), there are also null findings on effect of handedness and consistency on levels of state anxiety (Lyle et al., 2013). This means that it is possible that left-handed individuals are more prone to anxiety in stressful situations than right-handers are, as opposed to overall anxious tendencies. Although differences in behaviour are well documented between left and right-handed individuals, it may prove more beneficial to analyse inconsistent and consistent handers because the

behavioural differences are more distinguished than a simple left versus right split (Christman & Prichard, 2016). For instance, it may well be the case that consistent right-handers have higher BAS activation than inconsistent right-handers and consistent left-handers have higher BIS activation than inconsistent left-handers.

Time Deliberation

The degree and direction of handedness as well as scores on the BIS and BAS scales are of potential importance for behaviours and decision making related to human mate choice. As discussed previously, left-handed individuals tend to be more behaviourally inhibited than right-handed individuals, (Wright, Hardie, & Wilson, 2009) and are also more likely to experience fear (Rogers, 2009). Moreover, left-handed individuals deliberate longer when engaging in novel manual tasks, particularly in latency to respond (Wright, Hardie, & Rodway, 2004; Wright & Hardie, 2011; Wright & Hardie, 2015). This possibly results from a conflict between separate goals caused by increased anxiety (Wright et al., 2009) and activation of BIS (Wright & Hardie, 2011). Recent research has also found that while left-handedness is not correlated with FFFS, it is correlated with higher levels of BIS (Beaton, Mutinelli & Corr, 2016) using the newly developed Reinforcement Sensitivity Theory of Personality Questionnaire (Corr & Cooper, 2016). As this research measures FFFS and BIS separately, it is more affirmative that the BIS is significantly related to handedness rather components of FFFS. Also this reaffirms that the relationship between handedness and anxiety is influenced by BIS sensitivity.

As first impressions are crucial in mate selection it may be important to understand to what extent BIS/BAS moderates decision making processes involved in mate choice, such as time deliberation. Although we make social judgements of others

from minimal information such as facial cues, responses to facial cues may be moderated by anxiety related time deliberation, for example, if high and low BIS individuals weight up the costs of a new romantic relationship differently to one another. of the first experimental chapter examines the extent to which i) face preferences in a hypothetical online dating task are driven by preferences for desired personality, and the extent to which decisions to accept certain faces as dating partners are moderated by i) time constraint and ii) trait level differences in BIS/BAS scores.

Chapter 2. Even within a second, inhibited people take longer to accept an offer from an attractive date.

Abstract. The current study investigated whether individuals were more likely to accept dating requests from composite faces that resembled the average characteristics of i) attractive individuals and ii) individuals who score high on various desired personality traits from the Big Five Inventory and a questionnaire measuring desire for a long-term relationship. Furthermore, it was investigated whether choices to accept or reject dating requests were moderated by time constraints (self-paced vs. one second time limit) and behavioural inhibition and behavioural activation scores. The results revealed that participants were more likely to accept a dating offer from an attractive face and reject a dating offer from a less-attractive face, with an identical pattern found for agreeable faces. Further analyses on attractive and agreeable faces revealed that behavioural inhibition scores were positively correlated with decision making time to accept a dating offer from an attractive face, while under a time constraint of one second. The results support previous work that we can make rapid social judgements and that facial cues to desired personality traits (agreeableness) can influence mate preferences. There is also evidence that individual sensitivity to reward/punishment (high BIS) shapes temporal responses to offers from 'rewarding' (i.e. attractive) potential dating partners.

Introduction

Faces are judged on many dimensions that are important in selecting (or avoiding) romantic partners (as previously discussed in Chapter 1) such as an individual's attractiveness, underlying health, dominance, cooperativeness and/or trustworthiness and intelligence or competence. Moreover, facial characteristics appear to be more important in shaping social judgements of others on some dimensions (e.g. attractiveness) than other physical characteristics are (e.g., bodily attractiveness; Currie & Little, 2009; Furnham, Lavancy, & McClelland, 2001; Peters, Simmons, & Rhodes, 2008). As discussed earlier in chapter one, social judgements of faces on various dimensions are made rapidly (reviewed in Todorov et al., 2008a, 2015) and are correlated with particular trait judgements made at longer exposure intervals to faces, (Willis & Todorov, 2006). Collectively, face perception is important for social behaviour and in guiding judgements of potential romantic partners.

Consistent with historical interest in inferring character traits from physical appearance (e.g., Jastrow, 1885; Liggett, 1974), social judgements of faces have a degree of accuracy on some trait dimensions (see Todorov et al., 2015 for a recent review). For example, individuals are accurate in judging extraversion and conscientiousness from original (i.e. un-manipulated) photographs (Borkenau & Liebler, 1992; Penton-Voak et al., 2006) and are accurate in judging extraversion from portraits (Borkenau, Brecke, Möttig, & Paelecke, 2009). Moreover, when using computer generated facial composites, (the process of which is discussed in chapter one), individuals are able to accurately judge agreeableness and extroversion from these facial composites, and can judge emotional stability in males faces only (Penton-Voak et al., 2006). Collectively, these findings suggest that face perception may shape initial romantic interaction based on inference of character traits from physical cues.

If face perception is important for romantic partner choice (Little et al., 2011; Rhodes, 2006) and trait-evaluations derived from facial cues contain a degree of accuracy (reviewed in Todorov et al., 2015), a potential partner's face may guide initial assessments of his or her personality, for example, in dating contexts. In nonhuman species, theoretical models suggest that short timespans favour assessments of mates on directly-observable cues that suggest putative quality (Sullivan, 1994). Indeed, extended mate search can incur high energetic costs (Byers, Wiseman, Jones, & Roffe, 2005). Consistent with the proposal that temporal factors shape mate choice, in some species, females are less selective over mates when the costs to discriminating between mates are difficult, such as when mating calls are difficult to assess in large male groups (e.g., Bishop, Jennions, & Passmore, 1995; Gerhardt & Klump, 1988) or when perceived costs of mate search are greater such as when access to male mates is delayed experimentally (Lindstrom & Lehtonen, 2013).

Time factors also appear to shape human mate choice. Consistent with the proposal that low trust in the veracity of online dating profiles (reviewed in Finkel et al., 2012) might, ironically, favour assessment of mates via cues that are directly observable (e.g., height or appearance in photographs) over those that are harder to assess (see Roberts et al., 2010 for discussion), temporal factors also shape assessment of mates in speed-dating experiments. For example, when choice is abundant and, therefore, there are more potential daters to select from within a relatively similar time period, choice is based to a greater extent on quick-to-assess characteristics such as physical appearance (Lenton & Francesconi, 2010). As choice from a wider mating pool is a characteristic selling-point of online dating sites (reviewed in Finkel et al., 2012), users of dating sites such as Tinder (mentioned earlier in chapter one on page 5), may rely on fast judgements based on outward appearance,

in which romantic interest is indicated by swiping right on a person's physical photograph. Thus, the first aim of the current experiment is to test whether facial appearance alone is related to decisions to accept or reject a potential date who is interested in the chooser, and to test whether decision-making differs when time is constrained versus unconstrained. In order to investigate this, participants will be asked to respond to dating requests (accept or reject) from facial composites manufactured based on traits that may be more or less desirable in a romantic partner (attractiveness, interest in short-term relationships, scores on the 'Big-Five' personality inventory). If preferences for facial characteristics in composites manufactured in similar ways reflect preferences for desired personality in romantic partners (Little et al., 2006), they would be predicted to guide the decision to accept a dating offer from a facial composite that scores high on the desired trait and reject a dating offer from a facial composite that scores low on the desired trait. Moreover, if social judgements of faces at minimal exposure are correlated with judgements of those faces at longer time intervals (Willis & Todorov, 2006), decisions to accept or reject a face would not be expected to be moderated by whether the task is self-paced or time-constrained.

The second aim of the current experiment is to test whether personality traits related to approach-avoidance moderate participant responses to desired faces. Error Management Theory (Haselton & Buss, 2000; Haselton & Nettle, 2006) proposes that decision-making functions such that individuals select the less-costly of two alternatives, even if that choice incurs some cost. While approach-oriented individuals are motivated toward the possibility of reward, inhibited-individuals are motivated toward the possibility of punishment (Degnan & Fox, 2007; Gray, 1977). Individuals would be predicted to weigh the potential costs of accepting or rejecting an interested dating partner differently according to their own tendency to pursue novelty versus

avoid threat and/or punishment if, for example, poor relationship choices are salient among those sensitive to potential costs more generally. Thus, individuals who score high on behavioural activation (i.e. are approach-oriented) would be predicted to take less time to respond to a desirable date whom they know is interested in them than individuals who score low on this trait, if, for example, the perceived costs to pursuing a new relationship (e.g., which may dissolve; see Perilloux & Buss, 2008) are relatively low for those who are generally approach-oriented. However, high-inhibited individuals would be predicted to take longer than less-inhibited individuals to reciprocate the interest of a date when the search costs to discriminating between mates are high.

Finally, this experiment will test whether the predicted relationships between BIS/BAS and decision-making time in response to offers from dates are specific to responses to attractive faces or if they generalize to other desired traits in a partner captured within the facial composites. Evidence for the former prediction would be consistent with research which shows that attractive faces activate brain regions implicated in the processing of reward (O'Doherty et al., 2003; reviewed in Hahn & Perrett, 2014), as greater motives to reciprocate interest of a rewarding stimulus should facilitate faster decision-making time in response to attractive faces among approach oriented individuals and longer decision-making times among inhibited individuals. Evidence for the latter prediction would extend recent work on face preferences in romantic partners reflecting preferences for the typical appearance of mates with desired personality traits (Little et al., 2006), by considering the extent to which these findings vary according to behavioural activation/inhibition.

With regards to handedness effects it would be expected that left-handed participants would take longer to make a decision than right- handers. This prediction is made as other research suggests that left-handed individuals take longer to make

decisions in certain novel tasks than participants who are right-handed (e.g. Wright & Hardie, 2015). Supposing that left-handed people are, on average, more inhibited than right-handed people (as discussed previously in Chapter 1) it would be expected that left-handed participants would take longer to make a decision in response to prototype faces used in the hypothetical online dating task. Furthermore, it is expected that degree of handedness will have an effect on mate choice response times in the current study. Previous research has reported that consistent handers are more anxious than inconsistent handers (Lyle et al., 2013). Based on this, it is predicted that consistent right-handed individuals will have longer response times towards the face stimuli in the current study than inconsistent right-handers as the consistent group have been reported to experience greater anxiety levels. It is also predicted that inconsistent left-handed participants will have longer response times towards the face stimuli in the current study than inconsistent right-handed participants again as inconsistent left-handers experience greater levels of anxiety (as previously discussed in Chapter 1, Lyle et al., 2013).

Method

Participants

One hundred thirty-three individuals took part in the laboratory experiment (58 males, 9 self-identified homosexual, 8 self-identified bisexual, Mean age = 23.15 years, SD=4.19 years). Participants were a mixture of a sample of convenience and students participating for course credit. All procedures for recruitment and testing were approved by the Ethics Committee of the School of Social and Health Sciences at Abertay University.

Face stimuli

Face stimuli were taken from a set of stimuli available to researchers that uses computer graphic techniques (FantaMorph) to extract the prototypical appearance of a set of faces (Holtzman, 2011; see also Penton Voak et al., 2006 for similar methods using different software). The face prototypes were constructed based on both self and peer-reports of young Caucasian participants without makeup to psychometric measures of the 'Big Five' personality inventory (Neuroticism, Agreeableness, Openness to experience, conscientiousness and extraversion), a questionnaire measure of preference for short-term relationships and a questionnaire on self- and other-rated attractiveness (see Holtzman, 2011 for further technical details). These prototypes were used in an online dating experiment, with prototypes manufactured for each dimension of the Big-Five, high versus low attractiveness and high versus low preference for short-term relationships (i.e. 14 facial prototypes per sex). The physical faces that were used for the judging in the current study cannot be represented due to copyright regulations however to see examples of the proto types which were used in the current study (see Penton Voak et al., 2006).

Procedure

The experiment was run via Superlab 4.5 on a HP Elite Display E201 LED backlit monitor. Participants were randomly allocated to one of two task conditions: a condition where they were instructed to make a decision on each trial within one second (or the program would proceed to the next trial) or a condition where they were they were not given such an instruction (i.e. the task was self-paced). All participants viewed faces that matched their self-identified sexual preference. On both tasks, participants were instructed to imagine that they were using an online dating

application and that fourteen individuals had expressed an interest in them. They were asked to press the 'Y' key if they were also interested in that individual or the 'N' key if they were not interested in that individual. They were asked to place a finger by the 'Y' key and the 'N' key for the duration of the task. In the time-limited condition they were explicitly informed that they had one second to make each decision and that the computer would move on to the next person after this time if they did not make a decision. In the main task, a fixation cross was presented in between each trial for 500 milliseconds and trials were presented in a randomized order with faces centred onscreen (1024x768 pixels).

Following on from the main phase of the experiment, participants were asked to complete several questionnaires on Surveymonkey, including those unrelated to the current study. For the purpose of this study, participants were asked to complete the BIS/BAS questionnaire ($M_{\text{BIS score}}$=20.81, *SD*=4.75, range=9-28; $M_{\text{BAS score}}$=40.15, *SD*=5.48, range=19-51; Carver & White, 1994), the Edinburgh Handedness Inventory (24 left-handers, $M_{\text{EHI score}}$=44.51, *SD*=59.85, missing data replaced with average score for three participants; Oldfield, 1971) and a questionnaire devised specifically for this study. Here participants were asked to indicate using a 1 (not at all desirable) to 5 (highly desirable) scale, the extent to which several traits were important to them personally in a romantic partner (agreeableness, conscientiousness, physical attractiveness, wants a long-term relationship, is open to new experiences, is an extravert, is neurotic). After this task, participants were debriefed and dismissed.

Initial processing of data

For initial analyses, each face is used as the unit of analysis. Here, the proportion of times that each face was selected across the sample was analysed. High scores

indicate a stronger tendency to be selected as a dating partner and, conversely, low scores indicate a stronger tendency to be rejected as a dating partner. For decision-making time data, data were excluded where the response time exceeded three standard deviations from the mean for that participant.

Results

Initial exploratory analyses: Average tendency to accept or reject individuals based on facial appearance

First, one sample t-tests against the chance value of 0.5 were conducted to test whether participants, on average, were more likely to accept or reject each of the fourteen interested dating partners in their inbox. All t values reported in-text are absolute values. These analyses confirmed that participants, on average, were more likely to accept the dating request from the attractive face (M=.66, SEM=.04; $t(116)=3.59$; $p<.001$, d=0.33) and reject the dating request from the less-attractive face (M=.30, SEM=.04; $t(114)=4.54$; $p<.001$, d=0.42). Participants were also more likely to accept the dating request from the agreeable face (M=.60, SEM=.05; $t(112)=2.20$; p=.03, d=0.21) and reject the dating request from the less-agreeable face (M=.29, SEM=.04; $t(119)=5.00$; $p<.001$, d=0.46). For the remaining five trait dimensions, the sample did not accept the face representing a desirable trait while *simultaneously* rejecting the face that differed on that same trait-dimension (see Table 1). Consequently, follow-up analyses were conducted on attractive and agreeable faces only.

Table 2.1. Proportion of trials on which each face was selected (Ns between 113 and 120). Negative t values indicate a tendency to reject the face as a dating partner.

	High prototype					**Low prototype**				
Trait Dimension	*M*	*SEM*	*T*	*P*	*D*	*M*	*SEM*	*T*	*P*	*D*
Attractiveness	.66	.04	3.59	<.001*	0.33	.30	.04	-4.54	<.001*	0.42
Neuroticism	.50	.05	.09	.93	0.01	.38	.05	-2.69	<.01*	0.25
Agreeableness	.60	.05	2.20	.03*	0.21	.29	.04	-5.00	<.001*	0.46
Openness to experience	.44	.05	-1.32	.19	0.12	.59	.05	2.07	.04*	0.19
Short-term mating	.61	.05	2.44	.02*	0.22	.44	.05	-1.21	.23	0.11
Conscientiousness	.58	.05	1.77	.08*	0.16	.44	.05	-1.32	.19	0.12
Extraversion	.54	.05	.84	.41	0.08	.47	.05	-.65	.52	0.06

Independent samples t tests on the between subjects factor *experimental condition* (time limited, time constrained) revealed that the tendency to accept the attractive and agreeable face did not differ across both conditions (both absolute t <1.28, both p>.21). The tendency to reject the less-attractive and less-agreeable face also did not differ across experimental conditions (both absolute t <0.85, both p>.40). Independent t tests revealed that men (M=.79, SEM=.06) were more likely than women (M=.55, SEM=.06) to accept the offer from the attractive potential partner (t(114.89)=2.78; p<.01, d=0.52). Men and women did not differ in their tendency to accept the offer from the agreeable partner (p=.78).

Table 2.2. Mean response times in milliseconds with standard deviations in parenthesis towards high and low prototypes for each of the seven traits in both time unlimited and time constrained conditions.

	Time Constrained	Time Unlimited	Time Constrained difference	Time Unlimited difference
Attractiveness (Low)	763 (175.97)	1903.94 (1179.39)	(t(47)= -1.65; p=.1)	(t(64)= .377; p=.7)
Attractiveness (High)	749.86(130.87)	1873.32 (1044.92)	(t(49)= .261; p=.7)	(t(64)= .283; p=.7)
Neuroticism (Low)	697.75 (158.49)	1799.12 (760.83)	(t(46)= -.631; p=.5)	(t(63)= 2.43; p=0.018)*
Neuroticism (High)	788.30 (137.46)	2039.41 (1632.23)	(t(51)= .650; p=.5)	(t(64)=2.62; p=0.011)*
Agreeableness (Low)	719.54 (191.22)	1970.03 (1840.08)	(t(52)= -.428; p=.6)	(t(63)= .017; p=.9)
Agreeableness (High)	743.36 (149.12)	2142.35 (1530.99)	(t(45)= .226; p=.8)	(t(60)= 1.43; p= .1)
Openness (Low)	742.96 (168.04)	1908.91 (1117.09)	(t(48)= -.366; p=.7)	(t(62)= .876; p=.3)
Openness (High)	719.19 (173.89)	2039.91 (1505.73)	(t(46)= .795; p=.4)	(t(64)= .211; p= .8)
Short-Term Mating (Low)	727.55 (193.44)	2008.72 (1310.04)	(t(49)= .373; p=.7)	(t(63)= 2.56; p=0.013)*
Short-Term Mating (High)	700.15 (182.91)	1974.72 (1168.43)	(t(50)= .813; p=.4)	(t(63)=. 687; p=.4)
Conscientious (Low)	757.42 (133.75)	2270.56 (1781.85)	(t(46)= .187; p=.8)	(t(64)= .742; p=.4)
Conscientious (High)	755.06 (150.73)	2039 (1377.14)	(t(49)= -1.03; p=.3)	(t(63)= .874; p=.3)
Extraversion (Low)	772.10 (150.88)	1819.15 (1312.21)	(t(47)= -1.07; p=.2)	(t(64)= -.142; p=.8)
Extraversion (High)	733.41 (172.48)	2142.46 (1283.47)	(t(47)= .643; p=.5)	(t(63)= .842; p=.4)

Independent samples t tests revealed that there was a significant difference in response time between the low neuroticism face (t(63)= 2.43; p=0.018) and the high neuroticism face (t(64)=2.62; p=0.011) with a longer response time towards the high neuroticism face in the time unlimited condition.

Next, independent samples t tests were conducted to test whether men and women differed from one another in their tendency to accept or reject each of the

fourteen interested potential dates. These analyses revealed that men were more likely than women to accept offers from the low-neurotic (M_{male}=0.60, *SEM*=.07, M_{female}=0.22, *SEM*=.05, *t*(88.33)=4.19; *p*<.001), less-open (M_{male}=0.71, *SEM*=.07, M_{female}=0.51, *SEM*=.06, *t*(108.81)=2.31; *p*=.02), extravert (M_{male}=0.63, *SEM*=.07, M_{female}=0.33, *SEM*=.06, *t*(113)=3.35; *p*<.01), attractive (M_{male}=0.79, *SEM*=.06, M_{female}=0.55, *SEM*=.06, *t*(114.89)=2.78; *p*<.01), neurotic (M_{male}=0.70, *SEM*=.06, M_{female}=0.35, *SEM*=.06, *t*(117)=4.01; *p*<.001), open (M_{male}=0.60, *SEM*=.07, M_{female}=0.31, *SEM*=.06, *t*(112)=3.18; *p*<.01), high short-term mating orientation (M_{male}=0.79, *SEM*=.06, M_{female}=0.47, *SEM*=.06, *t*(115.80)=3.78; *p*<.001) and conscientious (M_{male}=0.73, *SEM*=.06, M_{female}=0.47, *SEM*=.06, *t*(112.44)=2.89; *p*<.01) facial prototypes. Women were more likely than men to reject a dating offer from the less-agreeable face (M_{female}=0.19, *SEM*=.05, M_{male}=0.42, *SEM*=.07, *t*(95.20)=2.75; *p*<.01). Men and women did not differ from one another in their tendency to accept or reject offers from the remaining faces (all non-significant *p*>.09). In order to further explore these differences, one sample t tests against chance (i.e. 0.5) were then conducted separated by sex in order to test whether men and women were more likely to accept the face on the desirable trait dimension and simultaneously reject the face on the less-desirable equivalent of that same trait dimension (e.g. accept the less-neurotic composite face and reject the neurotic composite face). These analyses revealed that for the eight faces above that men were more likely than women to accept, men were not more likely to reject the other face on those same trait dimensions at levels that differed from chance (see Table 2.3 for summary and statistics). For the face that women were more likely than men to reject (less-agreeable), women were not more likely to accept the agreeable face at levels greater than chance (*t*(65)=1.49; *p*=.14).

Table 2.3. Proportion of trials on which each face was selected by males. Values below chance (i.e. 0.5) indicate a tendency to reject the face as a dating partner.

	High prototype					**Low prototype**				
Trait Dimension	*M*	*SEM*	*t*	*p*	*d*	*M*	*SEM*	*t*	*p*	*d*
Attractiveness	.79	.06	5.04	<.001	0.70	.39	.07	1.60	.12	.23
Neuroticism	.70	.06	3.11	<.01	0.43	.60	.07	1.32	.19	.19
Agreeableness	.62	.07	1.63	.11	0.40	.42	.07	1.11	.27	.15
Openness to experience	.60	.07	1.43	.16	0.20	.71	.07	3.29	<.01	.47
Short-term mating	.79	.06	5.04	<.001	0.70	.51	.07	.14	.89	.02
Conscientiousness	.73	.06	3.57	<.01	0.50	.52	.07	.28	.78	.04
Extraversion	.63	.07	1.86	.07	0.26	.63	.07	2.00	.051	.28

Self-reported desired personality in a romantic partner

One sample t tests against chance (i.e. 3.0) revealed that participants, on average, desired agreeableness, conscientiousness, physical attractiveness, desire for a long-term romantic relationship, openness to new experiences, extraversion and (low) neuroticism in a potential romantic partner at levels greater than chance (see Table 2.4).

Table 2.4. Self-reported desirability of various traits in a romantic partner that were also measured in the face prototypes. (N=132). All p values are <.001.

Trait Dimension	*M*	*SEM*	*T*	*D*
Physical attractiveness	3.86	.06	13.83	1.20
Neuroticism	2.01	.08	-12.86	1.12
Agreeableness	3.77	.08	10.20	0.89
Openness to new experiences	4.35	.06	24.60	2.14
Wants a long-term romantic relationship	3.83	.09	9.56	0.83
Conscientiousness	3.86	.07	12.41	1.08
Extraversion	3.34	.08	4.21	0.37

Exploratory analyses on handedness and response times

Table 2.5 Mean response times in milliseconds with standard deviations in parenthesis of left and right-handed participants towards high and low prototypes of the seven traits in both time constrained and unlimited conditions.

	Time Constrained	Time Unlimited
Low Attractiveness (Left)	687.27 (239.04)	2027 (1236.88)
(Right)	784.92 (150.10)	1879.33 (1177. 83)
High Attractiveness (Left)	758.58 (141.53)	1955.27 (1147.15)
	747.18 (129.25)	1856.93 (1033.89)
(Right)		
Low Neuroticism (Left)	671.09 (129.88)	2289 (986.33)
(Right)	705.68 (166.81)	1699.33 (674.90)
High Neuroticism (Left)	813.90 (135.36)	3170.27 (2386.12)
(Right)	782.35 (138.83)	1813.24 (1356.42)
Low Agreeableness (Left)	697.36 (214.78)	1978.64 (908.82)
	725.21 (187.07)	1968.28 (1983.12)
(Right)		
High Agreeableness (Left)	753.56 (113.19)	2814.67 (2388.56)
	740.95 (157.62)	2028.19 (1334.31)
(Right)		
Low Openness (Left)	725.40 (183.59)	2178 (1427.40)
(Right)	747.35 (166.13)	1853.06 (1049.55)
High Openness (Left)	764 (91.31)	2128 (1205.69)
(Right)	710.23 (185.60)	2022.29 (1567.78)
Low STM (Left)	747 (144.81)	2893.09 (2234.44)
(Right)	722.20 (206.06)	1828.57 (966.95)
High STM (Left)	740.09 (164.27)	2196.27 (1771.45)
(Right)	689.44 (188.03)	1929.59 (1021.87)
Low Conscientious (Left)	765 (138.29)	2635.73 (2027.63)
	755.67 (134.47)	2197.53 (1740.05)
(Right)		
High Conscientious (Left)	708.11 (130.21)	2370.45 (1791.22
	765.12 (154.31)	1971.48 (1287.36)
(Right)		
Low Extraversion (Left)	723.44 (94.57)	1767.36 (953.05)
(Right)	783.05 (159.73)	1829.51 (1379.78)
High Extraversion (Left)	769.50 (149.04)	2457.60 (1237.32)
(Right)	726.37 (177.48)	2085.16 (1294.39)

Table 2.6 Exploratory analyses. Examining possible correlationscorrelation between EHI score and response time towards high and low prototypes of the seven traits for the time constrained condition.

	EHI Score
Low Attractiveness	rs=.05, p=.7
High Attractiveness	rs=.079, p=.5
Low Neuroticism	rs= -.030, p=.8
High Neuroticism	rs= -.043, p=.7
Low Agreeableness	rs= -.059, p=.6
High Agreeableness	rs= -.055, p=.7
Low Openness	rs= -.031, p=.8
High Openness	rs= -.233, p=.1
Low Short-Term Mating	rs= -.031, p=.8
High Short-Term Mating	rs= -.236, p=0.09
Low Conscientiousness	rs= .129, p=.3
High Conscientiousness	rs= .150, p=.2
Low Extraversion	rs= .035, p=.8
High Extraversion	rs=.207, p=.1

Table 2.7. Examining possible correlations between EHI score and response time towards high and low prototypes of the seven traits for the time unlimited condition.

	EHI Score
Low Attractiveness	rs= .055, p=.6
High Attractiveness	rs= -.025, p=.8
Low Neuroticism	rs= -.267, p=0.03*
High Neuroticism	rs= -.190, p=.1
Low Agreeableness	rs= -.175, p=.1
High Agreeableness	rs= -.203, p=.1
Low Openness	rs= -.01, p=.9
High Openness	rs= -.217, p=.08
Low Short-term Mating	rs= -.096, p=.4
High Short-term Mating	rs= .103, p=.4
Low Conscientiousness	rs= -.131, p=.2
High Conscientiousness	rs= -.013, p=.9
Low Extraversion	rs= .003, p=.9
High Extraversion	rs= .017, p=.8

A 2x2 between subjects ANOVA was conducted on the dependent variable response time, with the factors *handedness* (left-handed, right-handed) and *time condition* (one second, self-paced) . These analyses revealed a main effect of *handedness* ($F(1,1608)= 9.25$, $p=.002$), a main effect of *time condition* ($F(1,1608)= 431.97$; $p<0.001$) and an interaction between *handedness* and *time condition* ($F(1, 1608)= 9.81$; $p=.002$). Follow up independent t-tests revealed no significant difference

between the response time of left and right-handers in the one second time condition (t(697)= -.390; p=.697). There was however a significant difference between handedness and response time in the self-paced condition with left-handers (mean= 2340.32) taking longer than right-handers (mean=1926.12) to complete the task (t(910)= 3.40; p=0.001).

Correlations between BIS/BAS and decision-making time to respond to dating offers from attractive and agreeable individuals

As response time was normally distributed when time was constrained (D(51)=.06; *p*=.20) but not when time on the task was unconstrained (D(66)=.17; *p*<.001), nonparametric correlations were conducted between response time and BIS score and BAS score separately across the two face trials (attractive face, agreeable face) and two experimental conditions (time constrained, time unconstrained). These analyses revealed a close-to-significant correlation between BIS score and decision-making time when time was constrained (*rs*(51) = .26; *p*=.065). BIS score was not correlated with response time toward the attractive face when time on the task was unconstrained (*rs*(66) = .19; *p*=.14) and was not correlated with response time toward the agreeable face in either experimental condition (both *rs* <.11, both *p*>.42). BAS scores were not correlated with the decision-making time when responding to attractive or agreeable faces in either experimental condition (all *rs* <.10, all *p*>.48).

As data from the time-constrained condition were normally-distributed and initial analyses revealed that general responses to attractive faces were specific to scores on the Behavioural Inhibition Scale, initial hypotheses were then tested using regression analyses. Here, regression analyses were conducted on the predictor variable BIS score and the outcome variable decision-making time, separately for

when participants accepted an offer from an attractive face and for when participants rejected an offer from an attractive face. These analyses revealed that BIS score was positively correlated with decision-making time to accept an offer from an attractive date (Standardized beta = .41, *t*=2.50; *p*=.018, see Figure 1), but was not correlated with decision-making time to reject an offer from an attractive date (Standardized beta = -.03, *t*=-.12; *p*=.91). The relationship between BIS score and decision-making time to accept an offer from an attractive date remained significant when controlling for participant's handedness score (Standardized beta = .41, *t*=2.46; *p*=.020), which did not predict decision-making time (*p*=.86).

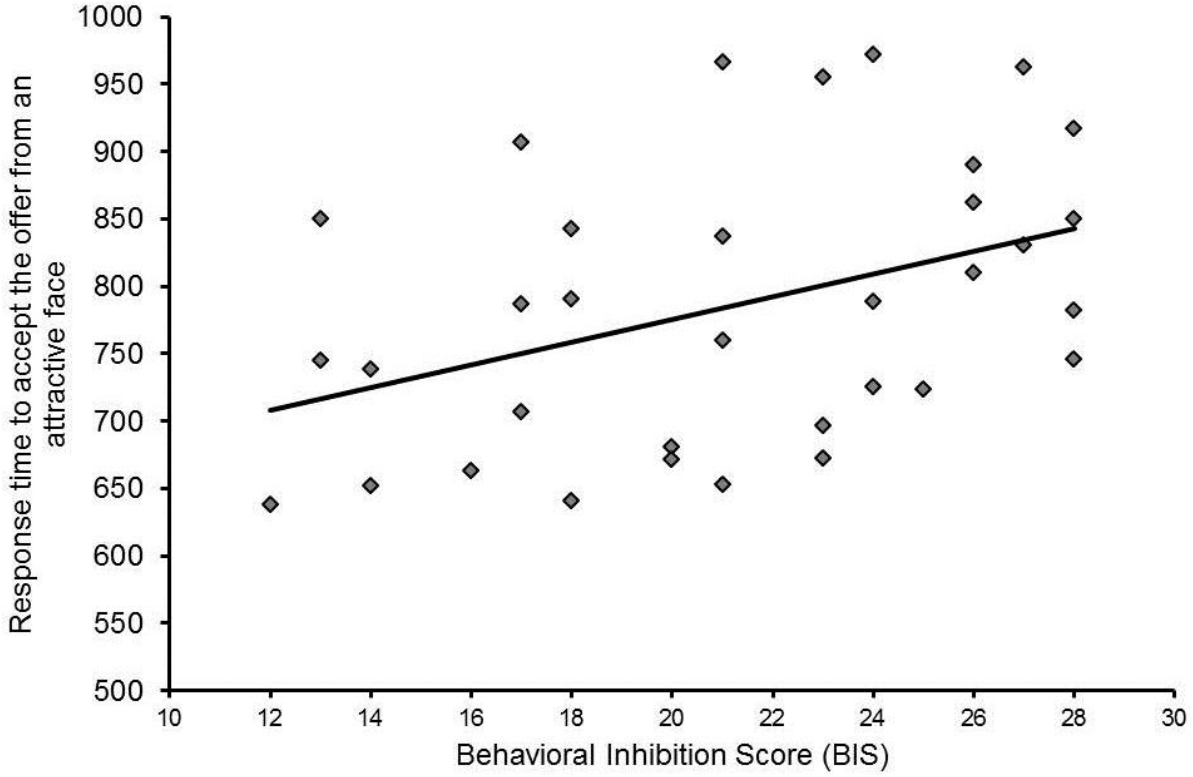


Figure 2.1. The positive correlation between BIS score and decision-making time to accept the offer from an attractive dating partner (N=34, Standardized beta = .41). The regression model shows that each standard unit increase in BIS score corresponded to an extra 42 milliseconds in decision-making time (Standardized beta * SD in outcome variable).

Discussion

The data from the first study shows that participants were more likely to reciprocate romantic interest from an attractive face and, in turn, reject interest from a less-attractive face. Moreover, participants were more likely to reciprocate romantic interest from a facial composite representing the average characteristics of individuals who score high on a psychometric measure of agreeableness and, in turn, were more likely to reject interest from the low-agreeable facial composite. By contrast, although participants on all of our trait dimensions (attractiveness, desire for long-term relationship, each dimension of the 'Big Five' personality inventory) desired each trait in the predicted direction at levels above chance when measured via likert-scale ratings, participants were not more likely to reciprocate the interest of the facial composite representing the remaining desired traits and simultaneously reject the less-desired composite on the same trait dimension. Collectively, these findings complement prior work which suggests that agreeableness may be detectable from facial cues alone (Penton-Voak et al., 2006), and that face preference may reflect preferences for desired personality on some trait dimensions (Little et al., 2006). Here, participants may use minimal information (i.e. facial characteristics) to inform their response to romantic partners that differ in agreeableness when informed with knowledge that the potential date has a romantic interest in them. The finding that attractive faces were favoured over less-attractive faces replicates the well-established correlation between attractiveness and dating success (Byrne, Ervin, & Lamberth, 1970; Walster, Aronson, Abrahams, & Rottman, 1966) and in the dating success of attractive females, (Krebs & Adinolfi, 1975). Moreover, that preferences for attractive and agreeable faces were not moderated by the nature of the task (self-

paced or time constrained) is consistent with prior work demonstrating that social judgements of faces can be made after brief exposure to faces (Willis & Todorov, 2006; reviewed in Todorov et al., 2015). The ability to gauge agreeableness in a dating partner from minimal exposure to facial cues may be functionally adaptive if agreeableness predicts relationship satisfaction in both shorter- and longer-term relationships such as marriage (Dyrenforth, Kashy, Donnellan, & Lucas, 2010; Shackelford, Besser, &, Goetz, 2008)

The analysis of handedness revealed that left-handers did not differ to right-handers for response times in the one second time condition, however and as predicted left-handers generally took longer to respond to trials than right-handers in the self-paced condition by around four hundred milliseconds. This latter finding is consistent with previous research on handedness and inhibited response times (Wright, Hardie, & Rodway, 2004; Wright & Hardie, 2011; Wright & Hardie, 2015; see also Chapter 1). The current findings suggest that left-handers deliberate longer than right-handers before responding to a dating request in a self-paced experimental condition which may be applicable to real world dating. Strength of handedness (measured by EHI score), was analysed for the relationship with response times towards high and low prototypes on each of the seven traits. In the time constrained condition strength of handedness was not significantly correlated with any of the response times towards high or low prototypes on each of the seven traits. In the self-paced time condition strength of handedness was negatively correlated with the response time towards the low neuroticism prototype only. In other words, stronger left handers took longer to respond toward the *less* neurotic facial prototype. Previous research (e.g., Figueredo, Sefcek, & Jones, 2006; Gattis, Berns, Simpson & Christensen, 2004; see Chapter 1) suggests that people prefer low neuroticism in

romantic partners. Left-handers here may take longer to respond to less neurotic potential dates if this desirable trait is related to more anxiety for left handers (as discussed previously in chapter 1, Wright, Hardie, & Wilson, 2009). As participants were not more likely to prefer the less neurotic face over the neurotic face, however, when this was examined across the sample, further work will be required to examine this possibility.

Further analyses suggested possible sex differences in response to the dating task. For some of the traits captured within the composites, men were more likely than women to accept a face which represented a desirable trait (e.g. less neurotic, extraversion, attractiveness). These findings suggest that, consistent with ecologically valid speed-dating experiments (e.g., Todd et al., 2007) women, in general, were more selective on the task than men were (i.e. rejected more offers) based on facial cues alone (Little et al., 2006), these differences cannot be explained by sex differences in specific preferences for facial cues to desirable personality traits captured within the facial prototypes. When possible sex differences were examined further, individuals were not more likely to accept the desirable face on a given trait dimension and reject the less desirable face on that same trait dimension. Thus, other aspects of the face may account for possible sex differences in responses to facial composites using this paradigm, which should be examined in further work.

Of note, although evidence for detection of extraversion from faces at levels above chance is relatively robust (reviewed in Todorov et al., 2008a), participants did not use extraversion to facilitate choice of dating partners from facial cues alone, although extraversion was desired among the sample on average when measured via questionnaire response. These findings may be due to attraction to extraversion within our sample being relatively weak (although statistically significant). For example, the

effect size of preference for agreeableness was over twice the size of the effect of preference for extraversion when measured via questionnaire. Further work in larger samples may be useful to examine the extent to which differences in preferences for specific traits predict acceptance of offers from dates that denote those preferred traits through facial appearance (Little et al., 2006) after minimal exposure to those faces.

Secondly, when analysing desired faces (attractive and agreeable facial composites), the data demonstrate that behavioural inhibition, but not behavioural activation, is correlated with decision-making time to accept offers from attractive dates. Specifically, when time was constrained (i.e. within one second) participants with high scores on a questionnaire measure of behavioural inhibition took longer to accept an offer from an attractive date than participants with low scores on this questionnaire. The regression model here suggests that one standard unit increase in behavioural inhibition score corresponded to approximately 42 milliseconds extra in decision-making time. By contrast, behavioural inhibition or behavioural activation scores were not correlated with decision-making time to reject attractive faces or to accept or reject agreeable faces more generally, which suggests that the findings reported here are specific to delays among inhibited people in response to rewarding stimuli (i.e. attractive faces, see Hahn & Perrett, 2014 for a review), even when exposure to the stimulus is relatively brief.

Collectively, these findings are consistent with the initial prediction that the perceived costs and benefits of approach/avoidance behaviour (as indexed by trait level personality measured via BIS/BAS; Carver & White, 1994) would shape decision-making time in response to a desirable/rewarding stimulus (a dating offer from an attractive face). In sum, these findings suggest that personality shapes lower-order

cognitive processes in response to attractive faces, which may prove fruitful for further research into decision-making in dating contexts at the neural level.

While the findings of this chapter suggest that behavioural inhibition shapes decision-making time in response to offers from attractive potential dating partners, and this finding was evident within a short timeframe (one second), it is also possible that inhibition in responses to potential mates reflects one's perceived value on the 'mating market' (e.g. own attractiveness). As the sample within the current study provided face photographs, the next chapter uses facial prototyping to examine the extent to which social judgements of anxiousness and impulsiveness in faces are a valid guide to self-reported BIS/BAS scores, as these traits relate to BIS/BAS behaviour. Furthermore, the extent to which attractiveness and dominance are a valid guide to BIS/BAS scores will be examined given the influence that attractiveness and dominance judgements have on social judgements (e.g., Oosterhof & Todorov, 2006; Willis & Todorov, 2006; see also Chapter one). An influential theoretical framework (Keltner, Gruenfeld, & Anderson, 2003) is used to outline the rationale for the study in the next Chapter.

Chapter 3: Perceived attractiveness in faces is a stronger guide than perceived dominance to high reward orientation (BAS) in women

Abstract

Attractiveness and dominance perceptions are important for social behaviour and may shape important real-world outcomes indicative of success or 'social power'. While power is thought to shape approach/avoidance responses, little is known about whether prior positive experience of social treatment shapes later behaviour. Here, this was investigated by examining the extent to which perceived attractiveness and perceived dominance from facial prototypes (averages) were valid guides to high behavioural activation (e.g., extraversion and sensation-seeking) and low behavioural inhibition in a sample of women who were photographed and completed the BIS/BAS questionnaire. Firstly, our sample could detect traits indicative of high BAS (extraversion) in women's faces at levels significantly greater than chance. Secondly, although participants, on average, only associated high BAS in women's faces with perceived attractiveness, a dissociable pattern of findings was observed. Here, when judging the same pairs of face prototypes across judgements of attractiveness and dominance, while attractiveness was a stronger guide than dominance to high BAS in women, dominance was a stronger guide than attractiveness to low BIS in women. These preliminary findings are consistent with the initial proposal that future expectations of positive feedback from others shape approach behaviour among attractive women and that greater ability to offset the costs of risk (e.g. by being particularly dominant) would shape low inhibition among women.

Introduction

Attractiveness and dominance perceptions are important for social behaviour (see, e.g., Langlois et al., 2000; Little et al., 2011; Puts, 2010; Todorov et al., 2015 for reviews). As mentioned earlier in chapter one, physically attractive individuals are preferred as social and/or romantic partners and are afforded a variety of positive trait attributions (e.g., Dion, Berscheid, & Walster, 1972; Eagly, Ashmore, Makhijani, & Longo, 1991; Jackson, Hunter, & Hodge, 1995; Kurzban & Weeden, 2005; Langlois et al., 2000; Rhodes, 2006). Moreover, dominance, a critical trait dimension on which we judge others (Oosterhof & Todorov, 2008; see also Puts, 2010), is gauged from physical characteristics at early ages (e.g., Thomsen, Frankenhuia, Ingold-Smith, & Carey, 2011) and across cultures (e.g., Keating, Mazur, & Segall, 1981; McArthur & Berry, 1987; Perrett et al., 1998; Rule et al., 2010; Sell et al., 2009). There is evidence that social judgements of others on the attractiveness and dominance trait dimension are correlated with various social outcomes. To refer back to chapter one,measures of physical attractiveness are associated with positive social outcomes with regards to income and sentencing (Fruhen, Watkins, & Jones, 2015; Little & Roberts, 2012; Mazzella & Feingold, 1994). Furthermore, attractiveness in children confers advantages in educational settings in terms of teacher expectancy (see Talamas, Mavor, & Perrett, 2016 for recent discussion). Physically dominant characteristics have also been related to progression within the military (Mueller & Mazur, 1996) and workplace success (e.g., height; Judge & Cable, 2004) and, in organizational leaders, objective measures of their company's success (Rule & Tskhay, 2014; Wong, Ormiston, & Haselhuhn, 2011). Collectively, both attractiveness and dominance perceptions shape first impressions which may, in turn, influence success in important life outcomes.

From the point of view of evolutionary biology, individuals with 'desirable' characteristics who are in good physical condition, (i.e. attractive and/or dominant individuals) should be better-placed, all else equal, to pursue goals and/or disregard the welfare of others (see Sell et al., 2009) because their 'market demand' (i.e. attractiveness) is high and/or they are in a better position to inflict costs on others for access to resources (i.e. dominance, see also Puts, 2010). Researchers have theorized that the potential leverage or power associated with being attractive or dominant may shape behaviour in turn, such that powerful people are more oriented toward approach behaviours and disinhibition and less-powerful people are more oriented toward threats and inhibited behaviours, (Keltner et al., 2003). Here, this issue is investigated in women by testing whether trait judgements of unfamiliar faces (their attractiveness and dominance) differ according to the typical characteristics of those faces. Specifically, using prototype based image transformation to extract the average shape and colour features of a set of faces according to responses to a personality questionnaire measuring behavioural activation (BAS) and, separately, behavioural inhibition (BIS; Carver & White, 1994), this study examines whether perceived attractiveness is a stronger (or equivalent) cue to high BAS/low BIS in women than perceived dominance. Behavioural activation is comprised of traits related to the pursuit of reward, fun/novelty and general drive to pursue goals (Carver & White, 1994, see also chapter 1). As attractive faces represent a rewarding class of stimuli (see, e.g., Hahn & Perrett, 2014 for a review) that people will expend effort on (Hayden, Parikh, Deaner, & Platt, 2007), attractiveness in women would be predicted to be a valid cue to BAS in unfamiliar faces, if those in receipt of positive stereotypes/reinforcement (Langlois et al., 2000) are more likely to approach novel tasks in light of expectation of positive feedback and/or support.

By contrast, as risk-taking and reward/sensation-seeking are distinct theoretical constructs (reviewed in Cross, Copping, & Campbell, 2011), women should also be sensitive to potential costs and/or threats within their environment when pursuing goals. Indeed, while there are no sex differences in sensitivity to reward, women are more sensitive to punishment than men are (see Cross et al., 2011 for a meta-analytic review). Greater sensitivity to risk and/or punishment among women has been proposed in light of, for example, the costs incurred from risk-taking while caring for offspring (see, e.g., Campbell, 2013) and also the greater costs of incurring injury in light of average sex differences in measures of strength (see, e.g., Archer, 2009; Puts, 2010 for discussion). Perceived dominance in women's faces would be predicted to be a valid guide to low inhibition if such women are better-placed to pursue their goals with impunity (see also Watkins et al., 2013 for discussion). Moreover, facial dominance would be predicted to be a more valid cue to low inhibition in women than facial attractiveness if, for example, well-established proxies for attractiveness in women's faces (e.g. facial femininity; Rhodes, 2006) are negatively associated with corresponding perceptions of women's dominance and/or strength (Jones et al., 2010; Watkins et al., 2010). Collectively, it is predicted that while facial attractiveness will be a stronger predictor of high BAS in women than facial dominance, facial dominance will be a stronger predictor of low BIS in women than facial attractiveness (i.e. a dissociable pattern of results). This study will also test in initial analyses whether traits indicative of BIS (anxiety) and BAS (extraversion/impulsiveness) can be detected from facial cues alone at greater than chance levels. If this is the case, then high BIS/BAS facial prototypes will be selected as more anxious and extravert/impulsive respectively than low BIS/BAS facial prototypes.

Method

Participants

Forty-two participants took part in the online study (13 males, M_{age}=25.78 years, *SD*=7.62 years). Participants were recruited to an online study hosted via surveymonkey.com. Duplicate responses from the same device were not permitted for this task. All procedures for testing and recruitment were granted full ethical approval.

Face stimuli

Following prior research (e.g., Penton Voak et al., 2006; Quist et al., 2011), face prototypes were constructed based on participant's responses to a personality questionnaire (Behavioural Activation and Behavioural Inhibition scales; Carver & White, 1994). Participants in a wider lab study (*N*=133, 59 males, M_{age} = 23.15 years, *SD*=4.19 years) completed the questionnaire and from this data we selected the top and bottom ~16% of females within the sample based on their behavioural activation score ($Mean_{age}$= 22.30 years, SD=2.55 years; $M_{BAS\ LowGroup}$=33.08, range = 30-35, $M_{BAS\ HighGroup}$=47.17, range=46-49) and the top and bottom ~16% of females within the sample based on their behavioural inhibition score (Mean age=22.10 years, SD=1.86 years; $M_{BIS\ LowGroup}$=14.50, range = 9-18, $M_{BIS\ HighGroup}$=27.08, range=26-28). Twelve female face images were used per prototype. Average BIS and BAS scores differed significantly between high versus low groups of women who constituted the facial prototype (both t>17.28, both p<.001). There was 42% overlap (10/24 women) between the women who constituted the BIS prototypes and the women who constituted the BAS prototypes. Of this overlap, four women were at the extremes of low BIS and high BAS, three women were at the extremes of high BIS and low BAS,

two women were at the extremes of high BIS and high BAS and one woman was at the extreme of low BIS and low BAS.

From this data, prototype-based image transformation (Tiddeman et al., 2001) was used to calculate the average shape and colour features of women in each BIS/BAS group who also provided us with a photograph of their face. Each participant posed with a neutral expression. This process generated four face prototypes that differed in behavioural inhibition (high, low) and behavioural activation (high, low), which were then standardized on pupil position, masked so that only the face, neck and ears were visible and resized to 300x400 pixels (see Figure 1). Prototypes were saved as jpeg files and high and low prototypes were presented alongside one another with labels ‘Image A’ and ‘Image B’ presented above left and right image respectively.

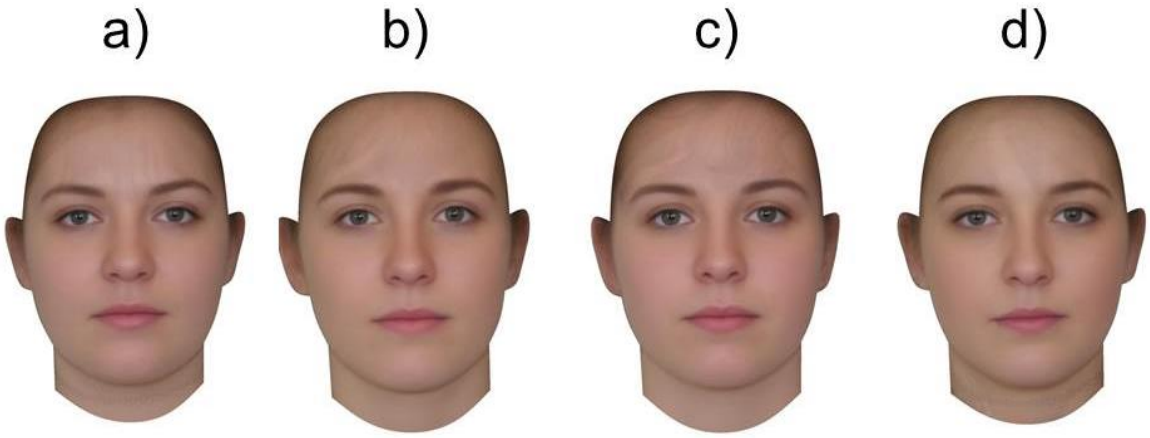


Figure 3.1. Low (a) and high (b) facial prototypes on the behavioural activation scale and low (c) and high (d) facial prototypes on the behavioural inhibition scale.

Procedure

Participants in the main study judged pairs of female face prototypes (high BIS versus low BIS and, separately, high BAS versus low BAS) in a randomized order on their i) attractiveness (i.e. two trials), ii) dominance (i.e. two trials), iii) extraversion/impulsiveness (i.e. one trial) and iv) anxiety (i.e. one trial). On each trial, participants rated a high prototype and a low prototype constructed based on the same trait dimension (i.e. BIS or BAS). The constituents of each of the four prototypes (high BAS, low BAS, high BIS and low BIS) were identical regardless of the trait being judged in the task (i.e. attractiveness, dominance, extraversion/impulsiveness or anxiety). Participants were asked to indicate whether image A or B was more attractive, dominant, impulsive/extraverted or anxious relative to the other face in the pair. Responses were recorded on scale ranging from, 'slightly more', 'somewhat more', 'more' or 'much more'. The participants made two different judgements for each of the four traits, one for the high BAS and low BAS prototype pair and the other for the high BIS and low BIS prototype pair (See Figure 3.2 for example trial on the face judgement task). Trial order was randomized and the side of the screen on which the high-trait prototype was presented was counterbalanced across trials.

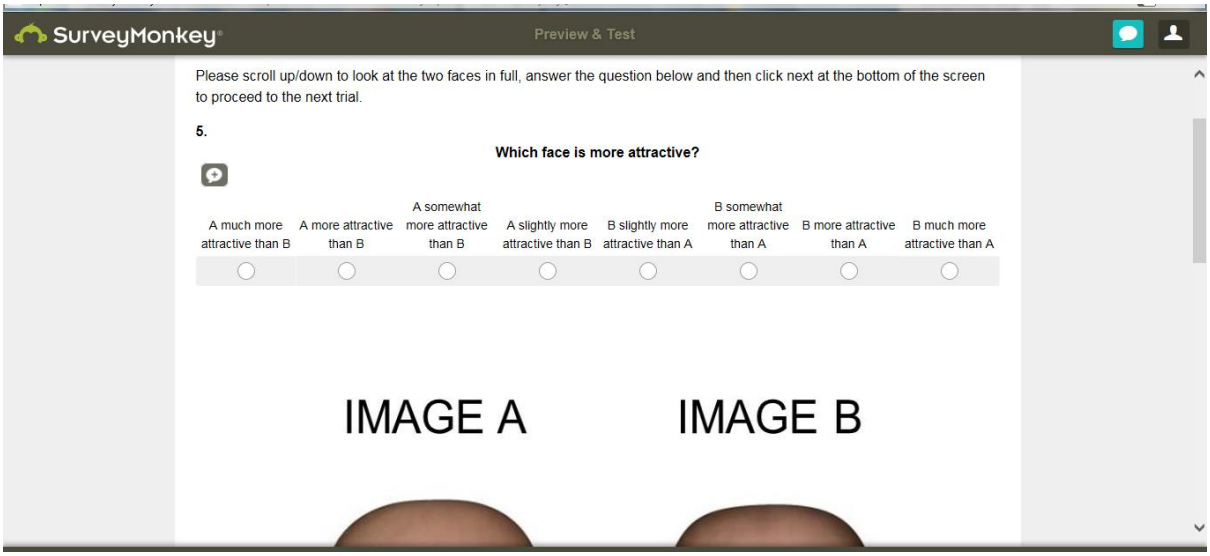


Figure 3.2. An example of the actual trial that participants were asked to complete on SurveyMonkey.com

Initial processing of data

Data were coded so that high scores on the task (i.e. above chance, 3.5) were in the same direction as the initial predictions of the research, with the exception of judgements of anxiety where low scores (i.e. *below* chance, 3.5) are in the predicted direction. Responses were coded separately for each trial using the following scale:

0-3: high-BIS/low-BAS face rated much more attractive/dominant/extravert[OR]impulsive/anxious (=0), more attractive/dominant/extravert[OR]impulsive/anxious (=1), somewhat more attractive/dominant/extravert[OR]impulsive/anxious (=2), or slightly more attractive/dominant/extravert[OR]impulsive/anxious (=3) than the low-BIS/high-BAS face.

4-7: low-BIS/high-BAS face rated slightly more attractive/dominant/extravert[OR]impulsive/anxious (=4), somewhat more

attractive/dominant/extravert[OR]impulsive/anxious (=5), more attractive/dominant/extravert[OR]impulsive/anxious (=6), or much more attractive/dominant/extravert[OR]impulsive/anxious (=7) than the high-BIS/low-BAS face.

This process for coding the data reflected the extent to which the four facial cues were a valid guide to Behavioural inhibition and/or Behavioural activation. Scores significantly above/below chance (i.e. 3.5) reflect the validity of various facial cues as a guide to trait-level BIS and/or BAS. Male prototypes were manufactured and used in the current study but their data were not analysed, due to noticeable differences in facial hair between male prototypes representing a potential confound (e.g. by potentially altering perceptions of dominance in the opposite direction to the predictions, see, e.g., Neave & Shields, 2008).

Results

Initial analyses

First, one sample t tests against chance (i.e. 3.5) were conducted in order to test whether participants were accurate in associating the high BAS female prototype with extraversion/impulsiveness and the high BIS female prototype with anxiety. Analyses revealed that, as predicted, participants could detect traits typical of high BAS (extraversion/impulsiveness) from the high BAS prototype at levels greater than chance (M=4.69, SEM=.22, t(41)=5.49; p<.001, d=.85). As predicted, participants tended to associate the high BIS female prototype with anxiety (M=3.00, SEM=.25, t(41)=2.00; p=.053, d=0.31), although this relationship only approached significance.

Main analysis

A 2x2x2 mixed-design ANOVA was conducted on the dependent variable trait association score, with the within-subjects' factors *facial prototype trait dimension* (BIS prototype, BAS prototype) and *face judgement* (attractiveness, dominance) and the between subjects factor *sex of participant* (male, female). This analysis revealed no significant main effect of *facial prototype trait dimension* ($F(1,40)=1.06$; $p=.31$) or *face judgement* ($F(1,40)=.29$; $p=.59$) but a significant interaction between *facial prototype trait dimension* and *face judgement* ($F(1,40)=5.24$; $p=.03$, np2=.12, see Figure 2). No other effects or interactions were significant (all $F<3.25$, all $p>.079$) which included no main effect of *sex of participant* ($F(1,40)=3.24$; $p=.08$, np2=.08).

Paired samples t tests to interpret the two-way interaction between *facial prototype trait dimension* and *face judgement* demonstrated that while facial attractiveness was more likely to be associated with high Behavioural Activation in women than was facial dominance ($t(41)=2.31$; $p=.03$, $d=0.36$), facial attractiveness was less likely to be associated with low Behavioural Inhibition in women than was facial dominance ($t(41)=1.71$; $p=.10$, $d=0.26$). Although paired t tests show that this latter difference was not significant, importantly, the significant two-way interaction demonstrates a dissociation in the validity of different trait judgements (i.e. attractiveness versus dominance) as guides to BIS versus BAS in women (i.e. the validity of perceived attractiveness versus perceived dominance as cues to personality differs significantly when judging composites constructed based on BAS score versus composites constructed based on BIS score).

Follow-up one sample t tests against chance (i.e. 3.5) demonstrated that, on average across the sample, facial attractiveness was a valid guide to high BAS in women ($t(41)=2.57$; $p=.014$; $d=0.40$) but was not a guide to low BIS in women, nor

was facial dominance a valid guide to high BAS or low BIS in women (all absolute t<1.48, all p>.14).

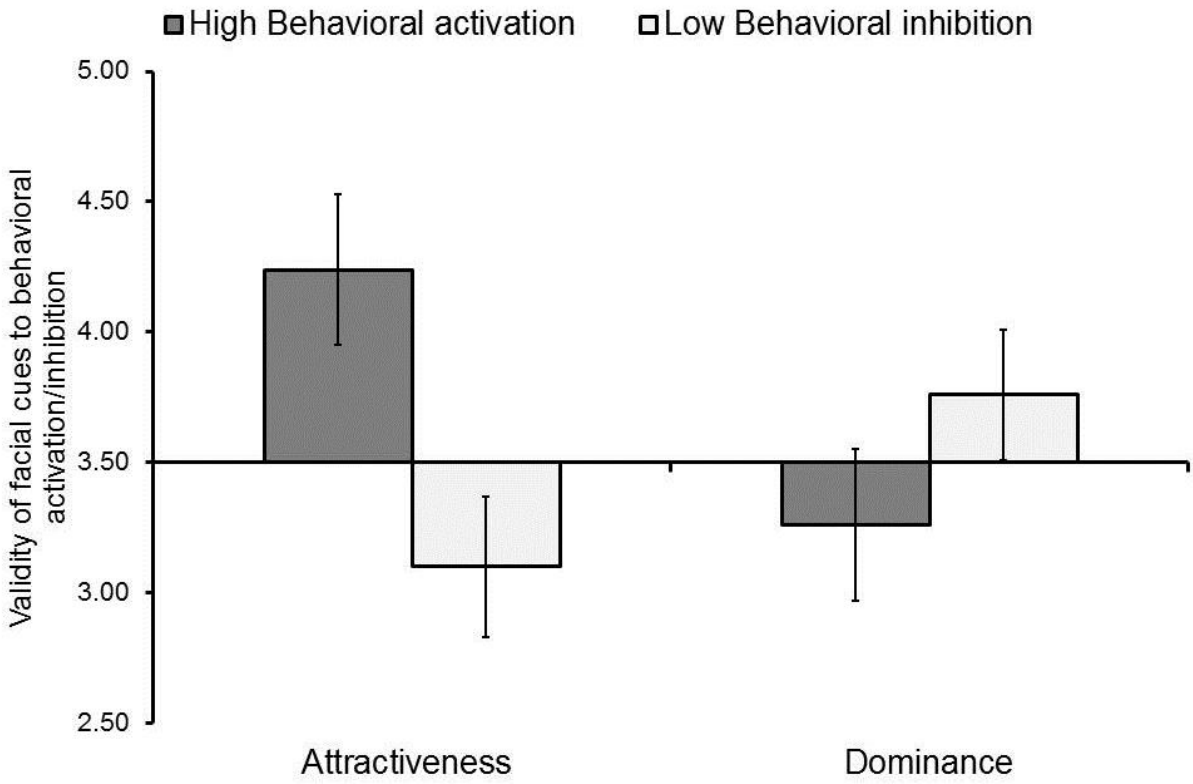


Figure 3.3. The significant interaction between facial prototype trait dimension and face judgement when judging prototypes whose constituents differed in BIS or BAS score (N=42, np2=.12). On the y axis, 3.5 indicates chance. High scores for these two face judgements indicate that our facial cues were a valid guide to high BAS and low BIS in the predicted direction.

Discussion

As predicted, the data demonstrate that while the average facial characteristics of women who score high on the Behavioural Activation scale are more strongly related to perceived attractiveness than perceived dominance, the average facial characteristics of women who score low on the Behavioural Inhibition scale are more strongly related to perceived dominance than perceived attractiveness. In general, participants were able to accurately gauge traits indicative of BAS (extraversion and impulsiveness) at levels greater than chance, complementing prior work on the

detection of extraversion from facial cues alone (e.g., Penton-Voak et al., 2006; see Todorov et al., 2008a, 2015 for reviews). In addition, follow-up tests demonstrate the validity of facial attractiveness as a cue to Behavioural Activation in women (i.e. sensation/fun seeking and drive; see Carver & White, 1994).

Although follow-up tests do not suggest that facial attractiveness is a cue to low BIS in women, or that, as was predicted, facial dominance is a valid guide to high BAS or low BIS in women, importantly the significant higher order interaction demonstrates the predicted dissociable pattern of results. Here, when judging identical pairs of facial composites, perceived attractiveness was more strongly associated with the high BAS composite than was perceived dominance and, conversely, perceived dominance was more strongly associated with the low BIS composite than was perceived attractiveness. Collectively, these findings are consistent with the proposal that, as risk-taking and reward/sensation-seeking are distinct theoretical constructs (reviewed in Cross et al., 2011), different women may evaluate the costs and benefits of risk-taking and sensation-seeking in differing ways in light of expectations of treatment from others. While attractive women, in receipt of positive stereotypes (Langlois et al., 2000), may be particularly likely to pursue novelty (high BAS) in light of expectations of support and reciprocation of their social effort, dominant women, by contrast, may be more likely than their attractive peers to be disinhibited if they are more physically equipped to offset the costs of risk (e.g. if facial cues to dominance and attractiveness are negatively correlated in women; see, e.g., (Jones et al., 2010; Watkins et al., 2010). Further work exploring these issues using un-manipulated face images that vary in BIS/BAS score will be of utility in providing converging evidence for this proposal.

Of note, although the sample here was biased toward females, responses to the BIS/BAS prototypes on the task did not differ according to the sex of the participant making the judgement. Although the initial proposal discussed in this chapter suggests that both dominance and attractiveness may be relevant to women's 'social power' when competing for a mate, and its potential relationship with behaviours related to BIS/BAS, at present, the findings perhaps speak more directly to our understanding of women's judgements of other women (i.e. 'rivals for mates') and further work with a balanced sample may reveal findings that are pertinent to mate choice as well as judgements of same-sex competitors (i.e. to test further whether associations between women's appearance and BIS/BAS generalize across both contexts). In addition, further research on judgements toward BIS and BAS male prototypes is needed as this analysis was not included in the current study and there may be differences in responses to men versus women in this paradigm.

These data provide the first preliminary evidence, to knowledge, for an association between facial appearance and approach/avoidance behaviour. Given that physical attractiveness is correlated with a variety of positive social outcomes, such as measures indicative of high status within the workplace (see Fruhen et al., 2015 for a recent review), the data complement theoretical proposals on associations between power and approach/avoidance behaviour (reviewed in Keltner et al., 2003), at least in young undergraduate women. Here, attractive women may be more likely to approach novel situations than their less-attractive peers, all else equal. Investigating whether this hypothesis is supported in behavioural tasks would likely prove fruitful. Moreover, due to differences in facial hair between male face prototypes representing a confound, data from men unfortunately could not be analysed in the current study. Establishing whether the effects reported here are equivalent in men, or

stronger/weaker among men will be essential in order to establish whether the findings reported here are sex-specific.

To conclude, using facial prototyping, evidence is presented that individuals can detect traits indicative of Behavioural Activation (i.e. 'approach' tendencies; Carver & White, 1994) from facial cues alone, at least in young undergraduate women. Moreover, these findings suggest new, albeit preliminary evidence, that different women may weigh the costs and benefits of approach/avoidance behaviour differently in light of differences in their appearance and potential social responses to their appearance.

Chapter 4. General Discussion: Overview, limitations, future directions and conclusions

Overview of empirical chapters

While a great deal of work has explored social judgements of faces of potential romantic partners (Little et al., 2011; Rhodes, 2006; Todorov et al., 2015 for reviews), relatively little work has explored i) the time course of responses made toward potential romantic partners and ii) the extent to which personality traits shape temporal responses to romantic partners. In addition, no work, to knowledge, has examined the possibility that people learn about stereotypes afforded to them (e.g. looking attractive or dominant) which in turn shapes future behaviour such that appearance provides a valid guide, at least in part, of the extent to which people are motivated to pursue novelty versus avoid risk/punishment (i.e. because they possess a degree of 'social power'; as discussed in chapter three see Keltner et al., 2003). The two empirical chapters here provide novel evidence to address these issues. These initial findings are of potential interest to researchers interested in behaviour on online dating sites, as greater choice online may favour an 'assessment mind-set' discussed in chapter one (reviewed in Finkel et al., 2012) which may favour dating applications such as 'Tinder' In addition, these initial findings may be of interest to online dating if they suggest that i) some people deliberate more than others when responding to dating requests based on appearance cues alone (i.e. inhibited people) and that ii) some people may benefit more from others from positive stereotypes (e.g. if women's attractiveness shapes behaviours indicative of high BAS).

The first experiment within this thesis (chapter two) presented evidence that Behavioural Inhibition is positively correlated with decision-making time to accept a

dating offer from an attractive face in a time-constrained (1 second) condition of the experiment. Initial analyses within this experiment complements prior work mentioned in chapter one, such as the association between physical attractiveness and dating success (Byrne, Ervin, & Lamberth,1970; Walster, Aronson, Abrahams, & Rottman, 1966), that judgements of others based on appearance cues are consistent across longer time intervals (Willis & Todorov, 2006), and that some dimensions of desired personality (e.g. agreeableness) shape attractiveness judgements of faces (Little et al., 2006). Importantly, these findings present novel evidence that aspects of the judge shape temporal responses to faces, which is interesting in light of theory from evolutionary biology on the costs of extended mate search in nonhuman species (reviewed in Sullivan, 1994). Here, the potential perceived costs of responding positively to a rewarding category of stimuli (attractive faces; reviewed in Hahn & Perrett, 2014) appear to moderate deliberation in mate choice.

The second study within this thesis (chapter three) extends the prior chapter by investigating the relationship between facial appearance and trait level BIS/BAS among the women who took part in the initial experiment. Here, this research presents preliminary evidence that facial attractiveness is a stronger guide to BAS in women than is facial dominance, while conversely facial dominance is a stronger guide to low BIS in women than is facial attractiveness. While, contrary to predictions, facial attractiveness/dominance was not a valid guide (on average) to BIS/BAS in certain instances (i.e. at levels that differed from chance), the data appear to present robust evidence for an association in women between facial attractiveness and high behavioural activation (e.g. impulsiveness, outgoing, extraverted and approach orientated). Consistent with the theoretical proposal that social power (see Keltner et al., 2003) shapes behaviour, and that positive stereotypes (e.g. ‘halo effects’) are

correlated with a variety of positive social outcomes (e.g., occupational success; see Introduction, Chapter 3), this work suggests that attractiveness in women shapes their tendency to pursue novelty, which was predicted to be less costly for such women in light of learnt expectations of positive feedback.

Potential Limitations

There are however potential limitations of the current research that need to be considered in future research. In chapter two the study which was designed analysed the responses to dating requests made by a manipulated facial composite that resembled high attractiveness. It was found that people took longer to accept a dating offer from an attractive date, the more inhibited they were, (the higher they scored on BIS). Future research should aim to replicate these findings by analysing the response times to accept or reject original and un-manipulated faces of individual people that have been rated for high and low levels of physical attractiveness. Using un-manipulated photographs would be a similar method to that of previous research in social judgements of faces mentioned in chapter one (Borkenau & Liebler, 1992; Penton-Voak et al., 2006). If this future research replicates the findings of the current research, then it would imply that the findings of the current research are quite robust. In other words, it would suggest that the more inhibited people are more likely to take longer to accept an attractive face regardless of whether the face is manipulated or un-manipulated. Secondly, the data in the first study was not suitable to examine in the unconstrained time condition. Therefore, if study one of the current research were to be run again an alternative approach could be to analyse response times in longer time intervals. A similar approach to that of (Willis & Todorov, 2006) could be taken however instead of 100, 500 and 1000 millisecond time intervals, increased time

intervals could be used. For instance, future research could use 1, 5 and 7 second time intervals when asking people to respond to dating offers made by a face. This would expand on the findings of the current research and could determine whether more inhibited people take longer to accept an attractive date in different time intervals other than a one second time interval.

The second study of the current research, which is discussed in chapter three, also has limitations. The main limitation of the second study is that there is no analysis of how physical attractiveness and dominance in male faces may be associated with their BIS and BAS behaviours. Again this is because male faces were excluded as one of the facial composites had more facial hair than the other which would affect dominance judgements. A replication of the second study in the current research should include male faces by controlling for facial hair to determine whether the findings are sex specific or applicable to both sexes. Specifically, it would be interesting whether traits which are typical of BAS can be detected from high BAS, male faces. Furthermore, it would be interesting to analyse whether high BAS in male faces is associated with perceived attractiveness. Likewise, it would informative to determine whether the same dissociable pattern, with attractiveness as a stronger guide to BAS and dominance as a stronger guide to BIS, exists in the judgement of male faces. The sample in the second study was not large enough to test whether or not the judgements made by participants were consistent across both genders. A larger photographed sample number would also be needed in order to test whether or not different BAS sub-scales are more valid guides to physical facial attractiveness.

Directions for future research

Further research is needed into the responses towards romantic partners under different time intervals. Although the current research gives an insight into how inhibited individuals respond to attractive romantic partners in a short time interval, it does not account for how an inhibited individual will respond to an attractive date in a real life interaction. This may be an important factor to consider in future research, particular if face-to-face interactions facilitate the perceptual processing of facial expressions which are not evident in computer-mediated-communication (Finkel et al., 2012), (i.e. still facial photographs). Therefore, future research should analyse whether inhibited individuals are likely to take longer to accept or reject real life partners who score high and low on measures of BIS, BAS, attractiveness, desire for a short- term relationship and the 'Big Five' personality traits. This could be studied in a speed dating context similar to that discussed in chapter one (Kurzban & Weeden, 2005), in which participants would decide whether they would like to get in further contact with a particular date within interactions of different time intervals. This could determine whether inhibited individuals take longer to accept real life attractive individuals than they do when presented with a facial photograph of an attractive individual.

Future research could also include the analysis of other personality traits, which have not been analysed in current research that are detectable from facial appearance. Facially detectable personality traits such as likeability, trustworthiness, and competence (Willis & Todorov, 2006), could be analysed. This could determine if high and low facial dimensions of these traits predict whether people accept dating offers from one facial dimension of a trait whilst simultaneously rejecting the other facial dimension of the same trait. It can also be analysed whether inhibited individuals take longer to accept or reject high and low faces of likeability, trustworthiness and

competence. This would reveal whether inhibited individuals take longer to accept individuals based on other personality traits and whether or not this finding is specific to facial attractiveness. Future research should replicate the second study that is presented in chapter three but in a younger and/or older sample than the sample which was used in the current research. This way it can be determined whether the ability to detect BAS typical behaviours from faces and associating attractiveness as a stronger predictor to BAS and dominance as stronger predictor to BIS, is applicable to individuals of varying age groups. Finally, to expand the findings of chapter three, research should determine if BIS and BAS scores increase when an individual is aware that they are physically attractive or dominant.

Conclusion

To conclude it is possible that individuals make accurate social judgements of one another, which informs individuals of mate suitability, particularly with regards to physical agreeableness and attractiveness. The current research is novel by, for example, demonstrating that personality shapes the tendency to deliberate when making decisions in the context of mate choice. In particular, inhibited individuals take longer to accept a dating request made by an attractive individual. This may have implications within ecological settings such as online dating if inhibited individuals deliberate longer before initiating contact with an attractive match.

Appendices

Appendix 1

School of Social and Health Sciences
Application for Ethical Approval

Section 1: Checklist and Declaration

Title of Project: **Personality, appearance and temporal responses to potential romantic partners**

Project type: **STAFF** / **RESEARCH POSTGRADUATE** / TAUGHT POSTGRADUATE / UNDERGRADUATE

Name of researcher(s) _____Gareth Evans, Christopher Watkins_____

Name of Supervisor (if appropriate).__

	YES	NO
Is your research based solely upon reviewing existing literature?		X
If YES, will you be accessing literature that could be sensitive or potentially damaging to the University's reputation?		
If NO, would you like your ethical submission to be expedited? **If so, there is no need to include additional paperwork other than signing this form.**	X	

If your research is not a literature review, or you are accessing potentially sensitive literature then you must make a full submission as normal.

		YES	NO	N/A
1	Will you describe the main experimental procedures to participants in advance, so that they are informed about what to expect?	X		
2.	Will you tell participants that their participation is voluntary?	X		
3.	Will you obtain written consent for participation?	X		

4.	If the research is observational, will you ask participants for their consent to being observed?			X
5.	Will you tell participants that they may withdraw from the research at any time and for any reason?	X		
6.	With questionnaires will you give participants the option of omitting questions they do not want to answer?	X		
7.	Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	X		
8.	Will you debrief participants at the end of their participation (i.e. give them a brief explanation of the study)?	X		

If you have ticked No to any of Q1-8, you must ensure that the reasons for this are made explicit in your project proposal.

		YES	NO	N/A
9.	Will your project involve deliberately misleading participants in any way?		X	
10.	Is there any realistic risk of participants or researchers experiencing either physical or psychological distress or discomfort? If yes, give details on a separate sheet and state what you will tell them to do if they should experience any problems (e.g. who they can contact for help).		X	

If you have ticked Yes to Q9 or Q10 you must ensure that the reasons for this are made explicit in your project proposal.

			YES	NO	N/A
11.	Does your project involve work with animals**? If yes, you should also investigate whether you require a home office licence? Provide the answer to this in your proposal**			**X**	
12.	Do participants fall into any of the following groups**? If they do, refer to professional body guidelines and include some reference to these in your proposal.**	Children (under 16 years of age)		**X**	
		Schoolchildren of all ages		**X**	
		Any person who may have difficulty understanding information provided to them		**X**	
		Patients		**X**	
		People in Custody		**X**	
		People engaged in illegal activities (e.g. drug taking)		**X**	

Declaration:

- I am familiar with, and will follow, the University of Abertay's Code of Good Practice in Research
- I am familiar with, and will follow, the governing body of my field's own ethical guidelines.
- I will abide by the Declaration of Helsinki throughout the research process
- I have considered all of the potential ethical implications of this study and I consent to it being brought before the School Research Ethics Committee.

Print Name (Lead Researcher): …… Date: …10/09/15……

By printing your name and submitting this form you agree to the declaration above

Print Name (Supervisor if appropriate): ……  …….. Date: …10/09/15……..

By printing your name as supervisor you agree that the student will abide by the declaration above

School of Social and Health Sciences
Application for Ethical Approval

Section 2: Health and Safety

MANAGEMENT OF HEALTH AND SAFETY AT WORK REGULATIONS 1999

GENERAL RISK ASSESSMENT

DEPARTMENT/SCHOOL/UNIT	*Social and Health Sciences, Division of _Psychology____*	**REF NO.**	**N/A**
TASK/OPERATION BEING ASSESSED	**Lab-based psychology experiment**		

PURPOSE/METHOD OF WORK
Researcher will test students, staff and peers in a lab-based study conducted within the Division of Psychology (30 minutes approx.).

SPECIFIC LEGISLATIVE REQUIREMENTS
N/A

LEVEL OF SKILL/TRAINING REQUIRED
Students will be fully informed by supervisor regarding any specific procedures/protocols within the lab and will be directed to the details contained in the general lab risk assessment form.

CHEMICALS/MATERIALS INVOLVED	**HSC NO.**	**ASSESSMENT DATE**
N/A		

SPECIFIC WORK EQUIPMENT PROVIDED
N/A

MAIN HAZARDS IDENTIFIED	WHO WILL BE AFFECTED	CONTROL MEASURES TO REDUCE THE RISK
Student alone with participants when carrying out testing	Student	Student advised of number for security/reception. Student to carry out testing on campus, and to stick to university email as the means of communicating with participants.
Use of electrical equipment	Students & participants	Only PAT tested electrical equipment will be used. Any trailing cables etc will be taped down.
Normal emergency situations (e.g. fire)	Students & participants	Students should familiarise themselves with fire drill and any other relevant emergency procedures at the activity location. Student to be reminded to contact security if there are any problems during testing or if working after hours.
Loss of Data	Student	Student will be reminded to regularly back up their data. Student to lock lab after use.

MANUAL HANDLING RISK	
Has a manual handling risk been identified?	**NONE**
Is the risk considered to be Low	High / Medium /
Is a further detailed assessment required?	**NO**
If the answer to the above question is YES a separate manual handling assessment will be required to fulfil the	

PERSONAL PROTECTIVE EQUIPMENT REQUIRED	
N/A	
Is training and instruction required	YES/NO

requirements of the Manual Handling Operations Regulations 1992.	Is there need for special accommodation YES/NO Is there need for test/examination YES/NO Is all P. P. E. compatible YES/NO

FREQUENCY OF MONITORING				
N/A	3 Months	6 Months	1 Year	> 1 Year
X				

ASSESSMENT REVIEW PERIOD				
< 1	2 Years	3 Years	4 Years	> 4

Print Name: …CHRISTOPHER WATKINS…….. Post/Title: …LECTURER IN PSYCHOLOGY…..

Signed: ……  …….. Date: …10/09/2015……

School of Social and Health Sciences

Application for Ethical Approval

Section 3: Project Proposal

Estimated Start and completion dates:
<u>September 2015 until April 2016 (approx.)</u>

Aims of study and Rationale (500 words maximum)**:** *Provide an overview of why the research is being suggested, what the researchers aim to achieve, and what impact this may have. Researchers are encouraged to write this as a lay summary.*
While a great deal of research has explored the physical (Thornhill & Gangestad, 1999; Jones, Little, Feinberg, Penton-Voak, Tiddeman, Burt & Perrett, 2004) and personality characteristics (Paunonen, 2006) that humans prefer in long-term romantic partners, little to my knowledge has explored its temporal dynamics. My recent research has demonstrated that there are sex differences in decisiveness when men and women are asked to select traits that are important to them in a long-term romantic partner, as measured via time to completion.

Moreover, independent of gender, individuals who score high on trait-levels of behavioural activation take less time in selecting characteristics that are important to them in a long-term partner. Collectively, my research thus far suggests that individual differences in trait-levels of personality and differences between the sexes in the costs of partner selection (Trivers, 1972) may shape the temporal processes involved in mate assessment.

While information about a potential mate's personality has obvious use in our assessment of them as a mate, prior research suggests that these personality traits may be accessible, at least to some extent, from facial cues gathered from *first-impression* judgements. If this is the case, facial cues to desired personality traits may save time in mate selection if the judgements that we make about individuals based on facial appearance have any degree of accuracy to them (reviewed in Todorov et al., 2015 *Annual Review of Psychology*). Here, I will extend my current line of research to investigate whether facial cues to traits that might be desired in a long-term partner, such as their cooperativeness and assertiveness, influence mate selection in timed card-sorting tasks that parallel my previous work on personality and mate assessment.

By conducting this research, I hope to achieve three main objectives. Firstly, to replicate my prior work on a gender difference in time taken to select preferred traits in a long-term partner, using via facial cues to personality traits rather than text-based descriptions of said traits. These faces are manufactured using prototype-based image transformation (see Holtzman, 2011). I predict that men, on average, will take longer to complete the task than women.

Secondly, to test whether facial cues to personality traits facilitate assessment of mates. Given the design of my task, if individuals are more likely to place the face that represents the average features of individuals who score *high* on a trait dimension into the 'preferred pile', than they are for faces that represent the average features of individuals who score *low* on the same trait dimension (or vice-versa for undesirable traits), this will suggest that facial cues to personality traits alone may be sufficient to guide assessments of mates via implicit 'first-impression' judgements.

Finally, to test my predictions in my second objective through two separate studies, using publically-available prototypes of faces on various trait dimensions (Hotlzman, 2011) and face prototypes constructed from the photographs of students who take part in my initial study (i.e. a quasi-replication of study 1).

External Partners:

List any organisations or partner groups to be involved in the proposed project.

N/A

Expertise:

Where appropriate make a statement about the qualifications/expertise of the researcher. For example, if the researcher is providing counselling, using clinical psychometrics, taking blood etc.

Gareth will be trained in the specific protocols within the laboratory, and will adhere to the BPS code of ethics throughout testing. No specialist training required. The supervisor has over five years' experience in the conduct, analysis and dissemination of research on social judgements of faces.

Method:

Participants

State the maximum number of participants you will recruit. Provide a description of the participants, including recruitment methods, age, exclusion/inclusion criteria, and any other relevant demographic information.

Approximately 75 males and 75 females. No inclusion/exclusion criteria will be enforced. Participants will be a mixture of undergraduate students (some participating for course credit via SONA) and friends/colleagues of the researcher. Participants will be recruited via flyers, adverts posted on the intranet and through snowball sampling.

Materials &/or apparatus

1. The face judgement task will be run via Superlab 4.5.
2. The Behavioural Activation Scale and Behavioural Inhibition Scale (Carver and White, 1994)
3. The Ten-Item Personality Inventory (a short measure of the 'Big Five' Personality traits; Gosling et al. 2003)
4. The Edinburgh Handedness Inventory (Oldfield, 1971)
5. A 7-item mate preference questionnaire adapted from previous methods (Little et al. 2006) – participants will be asked to rate on a scale of 1 (not at all desirable) to 5 (highly desirable) the extent to which the following traits are important to them in a romantic partner (Openness to experience, Conscientiousness, Extraversion, Agreeableness, Neuroticism, Attractiveness, Desires a long-term romantic relationship).

Procedure

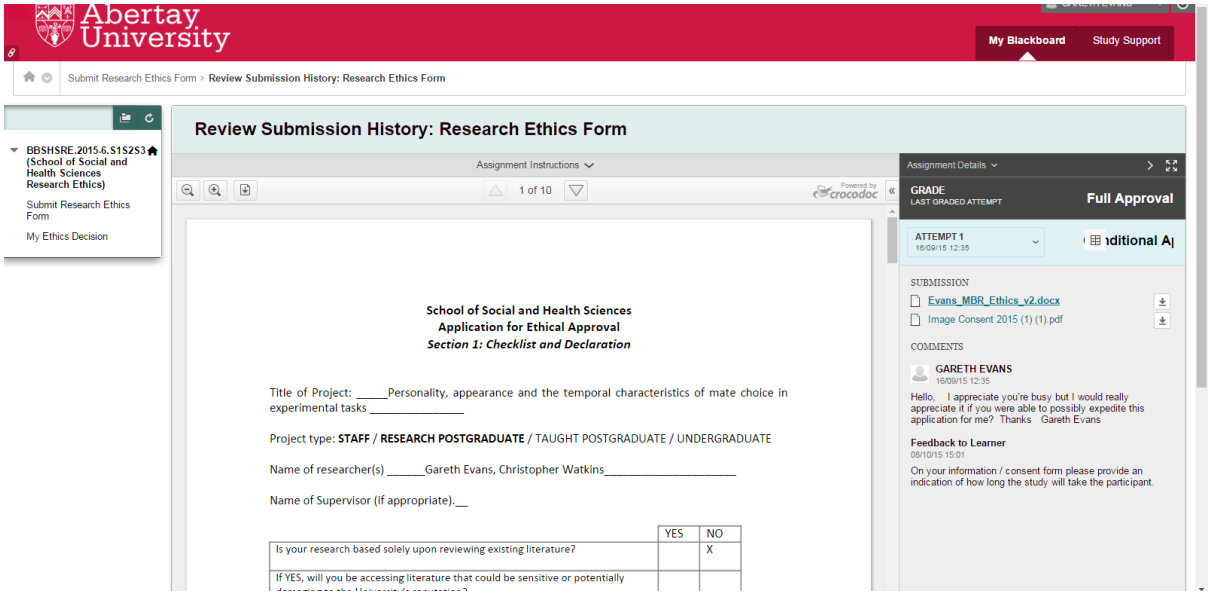
Fully describe each stage of how your proposed study will be carried out.

Consenting participants will be required to complete a 14-trail face judgement task in which they will indicate whether or not they think each sample is physically attractive. Participants will be allocated to judge facial

attractiveness in two conditions, no time constraint versus a time constraint of 1000 milliseconds. Following this task participant's will anonymously complete The Behavioural Activation Scale and The Behavioural Inhibition Scale, (Carver and White, 1994), The Ten-Item Personality Inventory (a short measure of the 'Big Five' Personality traits; Gosling et al. 2003), The Edinburgh Handedness Inventory, (Oldfield, 1971), a 7-item mate preference questionnaire adapted from previous methods, (Little et al. 2006).

Providing consent has been given participants will have two photographs taken, a neutral facial expression and a smiling facial expression. Individuals will not be identifiable from these photos as all the samples will be morphed with one another to create a facial average for the entire participant population. Once all of these stages have been completed a debrief form will be issued and participants will be informed on the purpose of the experiment.

Conditional Approval



Appendix 2

Guidance: Read this page before completing the Research Ethics Approval Application form.

This form has been designed to cover a wide variety of research studies. You may not need to complete all sections. The sections you need to complete will be determined by the type of study you are proposing. From the Table below identify which description best fits your proposed study to identify which sections of the ethics form you need to complete.

Section A: Applicant details
Section B: Project details
Section C: External projects
Section D: Studies involving animals or biological samples of any type
Section E: Studies with Human Participants
Section F: Studies not involving human or animal participants or samples
Section G: Research Proposal (if applicable)
Section H: Ethical Issues
Section I: Confirmation/Declaration

Tick which best describes your study	Type of Study	Complete Sections:								
		A	B	C	D	E	F	G	H	I
	Non-sensitive Literature Review only.	✓	✓							✓
	Potentially sensitive Literature Review only.	✓	✓				✓		✓	✓
	Study includes biological samples but **not** human participants.	✓	✓		✓			✓	✓	✓
	Study does **not** include animals or biological samples or human participants.	✓	✓				✓		✓	✓
	Study does not include animals or biological samples but **does** involve human participants.	✓	✓			✓		✓	✓	✓
	Study includes biological samples **and** human participants.	✓	✓		✓	✓		✓	✓	✓
	Study includes animals but **no** human participants.	✓	✓		✓			✓	✓	✓

	Study includes animals **and** human participants.	✓	✓		✓	✓		✓	✓	✓

Additionally, Section C may need to be completed if your study requires approval from another Ethics Committee other than the School's Research Ethics Committee.

Research Ethics Approval Application (Form Ethics 1)

Complete all sections as required and follow the instructions at the end of the form.
You must complete this form electronically – do not handwrite it.
Completed forms to be submitted via your School's Research Ethics Blackboard Page.
Important: You must submit only one document. Should you need to submit anything in addition to the information requested in this form, please paste it at the end of this form as an appendix. If you have any questions about this form, please contact your school office.

A – Applicant Details – Everyone should complete this section.

A1	Name of Project Proposer:	Gareth Evans
A2	Matriculation No. (where appropriate):	1101598
A3	Abertay email address:	1101598@live.abertay.ac.uk
A4	Name of Supervisor (where appropriate)	Dr Christopher Watkins
A5	Name of Programme (where appropriate):	MBR Psychology
A6	Module Code (where appropriate):	

B – Project Details – Everyone should complete this section

B1	Project title: Personality, appearance and the temporal characteristics of mate choice in experimental tasks	
B2	Main aim of project: The aim of this project is to test whether facial cues to physical dominance and attractiveness are a reflection of BIS and BAS scores. Then ultimately whether these judgements guide romantic attraction and how we treat people in the real world.	
B3	Proposed start date: 4th April 2016	Proposed end date: 15th May 2016

B4	Site of Research. *Where will this research take place?* This research will be collected through an online survey.

		YES	NO
B5	Is the proposed research based only upon reviewing existing literature?		X
B6	If YES, will you be accessing literature that could be deemed sensitive? If Yes, and your study **ONLY** involves Literature Review complete Section F and then progress to Section H.		
B7	If you answered NO to B6 (indicating the literature is not sensitive), would you like your ethical submission to be expedited (i.e. approved without further scrutiny)?		

If you answered YES to B7, leave sections D—H blank and go directly to Section I.

Section C External projects

If your project is conducted fully or partly outside Abertay you may require approval from other ethical approval bodies. If so, complete Section C, if not, Go to Section D.

C1	Name of external ethical approval body:	
C2	Application Status (chose one):	Approved Pending Declined
C3	Reference:	
C4	Date Submitted:	

Please note that, in the case where an application has to be made to an external ethical approval body, approval from both this body and the School's Research Ethics Committee are required.

Section D Studies involving animals or biological samples of any type.

*If your study does **not** involve animals or biological samples leave this section blank and go to Section E.*

		Yes	No
D1	Will the research involve **animals** of a type requiring a Home Office licence? *If yes, append a copy of the Home Office licence (or, in the case of a pending decision, append a copy of the Home Office application by pasting it at the end of this form. If you are yet to submit for a licence you acknowledge that you will not commence your study until you are in receipt of a licence).*		
D2	Will the research involve **genetic modification** (GM)? *If yes, append a copy of GMOC approval, (or, in the case of a pending decision, append a copy of the GMOC application by pasting it at the end of this form. If you are yet to submit for GMOC approval you acknowledge that you will not commence your study until you are in receipt of it).*		

D3	Will the research involve **stored human samples**, for example organs, tissues, cells (excluding established cell lines)? *If yes, explain in Section G how the human material will be employed and handled in accordance with the relevant legislation*		
D4	Does your study involve human participants?	Go to Section E	Go to Section G

Section E Studies with Human Participants

Only complete Section E if your study involves human participants.

Please confirm that:

		YES	NO
E1	You will describe the main experimental procedures to participants in advance, so that they are informed about what to expect?	X	
E2	You will inform participants that their participation is voluntary?	X	
E3	You will obtain explicit informed consent for participation, or assent in the case of questionnaire use?	X	
E4	If the research is observational, you will ask participants for their consent to being observed?	X	
E5	You will tell participants that they may withdraw from the research at any time and for any reason?	X	
E6	With questionnaires you will give participants the option of omitting questions they do not want to answer?	X	
E7	You will tell participants their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs unless they explicitly consent to be identified.	X	
E8	You will debrief participants at the end of their participation (i.e. give them a brief explanation of the study)?	X	
E9	You will **NOT** deliberately mislead participants in any way?	X	
E10	Your study will **NOT** involve a realistic risk of participants or researchers experiencing either physical or psychological distress or discomfort	X	

If you have ticked No to any statement you must ensure that the reasons for this are made explicit in Section G.

			Yes	No
E11	Do participants fall into any of the following groups**? If they do, refer to professional body guidelines and include some reference to these in Section G.**	Children (under 16 years of age)		X
		Schoolchildren of all ages		X
		Any person who may have difficulty understanding information provided to them		X
		Patients		X
		People in custody		X
		People engaged in illegal activities (e.g. drug taking)		X
		Other vulnerable group. Describe:		X

Section G Details of Proposed Research (if applicable)

G1	**Aims of study and Rationale:** *Provide an overview of why the research is being suggested, what the researchers aim to achieve, and what impact this may have. Write this as a summary for non-expert readers.*

This is an update of a proposal that has already been granted ethical approval. Here we are updating the committee with regard to the specific procedural details of our project.

The project aims to test whether facial cues to dominance and attractiveness are a valid guide to an individual's score on the BIS/BAS questionnaire (Carver & White, 1994). This questionnaire is a well-established measure used to gauge the extent to which individuals pursue/execute novel goals in their daily life and the extent to which they avoid situations that might involve novelty, anxiety or punishment. As it is well-established that individuals are

afforded a variety of social attributions dependent on physical characteristics such as their dominance (Ooserhof & Todorov, 2008; Puts, 2010) and/or attractiveness (Langlois et al., 2000), here we predict that learning how you are treated based on first-impressions will shape an individual's tendency to pursue or avoid specific goals more generally in their daily life. We predict this in light of sociometer theory (e.g., Leary et al., 1995; Kavanagh et al., 2010), which proposes that self-esteem is calibrated in light of experience of differential treatment by others (e.g. of acceptance or rejection).

G2	**External Partners:** *List any organisations or partner groups to be involved in the proposed project.*

G3	**Expertise:** *Where appropriate make a statement about the qualifications/expertise of the researcher (or planned training). For example, if the researcher is providing counselling, using clinical psychometrics, taking blood, working with samples, working with vulnerable groups etc.*
Both the MBR student and supervisor have sufficient expertise in research.	

	Method:
G4	***Participants*** *State the number of participants you intend to recruit. Provide a description of the participants, including recruitment methods, age, exclusion/inclusion criteria, and any other relevant demographic information.* *We will recruit a total of 100 males and 100 female raters aged 18-35. A sample of convenience will be used. Participants will be recruited via campus intranet and word of mouth. 50 men and 50 women will take part in each study through random allocation either to the dominance judgement task or attractiveness judgement task. The task will be run online via surveymonkey.com*
G5	***Materials &/or apparatus*** *Describe the materials & apparatus that you need to conduct your study. You should name any specific tests, questionnaires, etc. that you are using. If conducting interviews either an indicative list of questions or themes that will be discussed must be provided.* **All details provided in G6.**
G6	***Procedure*** *Fully describe each stage of how your proposed study will be carried out*. Remember to list your chosen methodology or methodologies. Participants will simply be asked to take part in a 4-trial study, where they will either judge dominance or attractiveness in a set of faces. Using prototype-based image transformation (Tiddeman et al., 2001) and techniques from prior research (e.g.

	Penton Voak et al., 2006; Quist et al., 2011), participants will view a facial average of men/women who score high on the BIS/BAS questionnaire (top 20% of sample approx.) and a facial average of men/women who score low on that same questionnaire. Each trial will consist of a pair of faces (Male-BIS trial, Male-BAS trial, Female-BIS trial, Female-BAS trial). On one task, participants will be asked to indicate which face looks more dominant. In the second task, participants will be asked to indicate which face looks more attractive.

Appendices

Where available, please attach all other relevant documentation required for this study as an Appendix to this form. For example: participant information sheets, informed consent forms, questionnaires, interview schedules.

Section H – Ethical Issues

What ethical issues (if any) does your project raise? How will you mitigate against these ethical issues? **Do not** leave this section blank; if you are certain that there are no ethical concerns with this research, then you must explicitly justify this here. (See "Ethics: a Quick Guide" for guidance on potential ethical concerns.)

H1	As detailed in the initial approved application, we believe this project raises no ethical concerns. Consent will be obtained from each participant before they proceed to the main task and if they tick no they will exit the survey automatically. Debrief information and contact details of the researcher will be provided at the end of the study.

Section I Confirmation/Declaration

Place an X in each box to confirm you agree with the statement.

	Yes
I am aware I need to submit a Risk Assessment and will do so before commencing the proposed study. (Note: you must follow whatever procedures your School has in place for the review and approval of risk assessment. Seek advice from your supervisor). **Note, all studies except Literature Reviews must complete an appropriate risk assessment prior to commencing the study.**	x
I have read and understood Abertay University's policy on research ethics ("Ethics: a Quick Guide"), the Abertay University Health and Safety Policy, and any equivalent School Policy.	x
For each working location (including university facilities and your home), I will identify what to do and who to contact in case of emergency, and will make yourself aware of any existing safety, First Aid or emergency procedures.	x
Any data collected from experiments will be stored securely within a week in Abertay University facilities following the guidance set out in the University's Data Storage Policy.	x
I understand that it is my responsibility to ensure compliance with any relevant regulatory or legal requirements (such as data protection legislation, stored tissue regulations, animal experimentation licensing, etc).	X
The proposed study will not discriminate against participants on the grounds of race, sex, religion or belief, sexual orientation, disability, pregnancy and maternity, gender reassignment, marriage and civil partnership, and/or age.	X
I have completed all sections of this form fully and accurately	X
I understand that should I receive a Conditional Approval, you will need to comply with the Conditions set out in the Decision email.	X
I understand that should I receive a Rejection, I will not be permitted to conduct any work on your proposed project. In such circumstances I will meet with my supervisor to discuss submitting an alternative proposal or one that addresses all the concerns raised in the review.	X
I understand that should I subsequently amend my study after approval has been given I will be required to inform the ethics committee of the change, and that changes that materially affect the study may require a further submission for ethical approval.	X

If you are an **undergraduate or postgraduate student**, please also confirm that:

	Yes
Your supervisor (as named in A4) has read and approved this completed form.	x
Your supervisor will approve any materials that you provide to human participants before use (e.g. consent forms, questionnaires, interview questions).	x

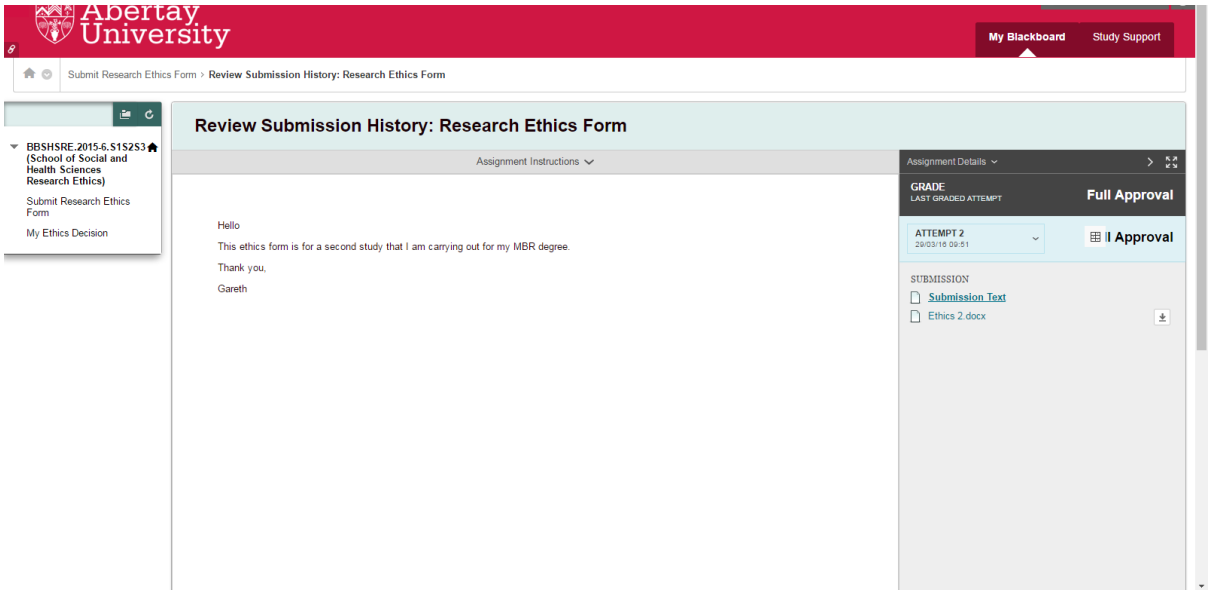
Paste any extra information here.

What to do next

Having checked that you have fully completed this form submit it in electronic form to the School Research Ethics Blackboard page.

Remember, you must submit only one document. Any information you wish to submit as part of your proposal other than that requested above can be cut and paste below.

Full Approval



Appendix 3

High BAS

Low BAS

High BIS

Low BIS

Reference List

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