There's nothing funny about the evolution of humour; the impact of sex, style, and status on humour production and appreciation.

By

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Thesis Abstract

The sense of humour is a uniquely human skill and understanding humour is an important and rewarding part of social interaction. This thesis begins by discussing the definition of humour, followed by a review of the evidence we have that humour is an evolved and adaptive behaviour. Humour may play an important role in helping individuals to bond and signal cooperation, which may be further communicated by the humour style which is used to communicate. Research has also demonstrated that humour is an attractive quality in a mate, though the precise reasons for this are currently debated (Chapter 1).

Empirical work in the first section of the thesis is consistent with evidence demonstrating that humour is attractive and sexually selected for. Chapter 2 tests the influence of modality and relationship context in an effort to further our understanding of why humour is attractive and provides evidence that more attractive people are rated as being funnier than less attractive people. Humour was also found to be more attractive for short-term relationships than long-term relationships, possibly due to the similarity between funniness and flirtatiousness. In Chapter 3, attractiveness ratings of vignettes in the style of personal advertisements, which contained either aggressive or affiliative humour, demonstrated the importance of humour style. An affiliative humour style was more attractive for long-term relationships whereas an aggressive humour style was more attractive for short-term relationships. Further testing provided evidence that humour styles were associated with personality traits which are highly relevant in a mating context, helping to explain the functions of different humour styles.

The second section of the thesis examines the relationship between humour, cooperation, and dominance as an alternative explanation for the evolution of humour. Chapter 4 contains an extended introduction to the physical, verbal, and nonverbal cues to dominance and the sex differences that exist in expressive behaviours. Chapter 5 continues this theme and elaborates further on the function of humour in group situations, before providing empirical evidence of how humour is used in the context of a competitive 'desert-island' style conversation between same-sex dyads. Chapter 6 further expands on this line of research as empirical evidence presented in this chapter demonstrates that males may be using humour as a way of communicating the desire to cooperate with other males who are of a similar level of dominance. The communication of dominance is further examined in Chapter 7, where ethological evidence showed that males who were more physically dominant tended to knock doors with greater frequency than males who were less physically dominant.

In the final chapter of the thesis (Chapter 8), the evolution of humour is discussed in light of the evidence presented in Chapters 2-7. The thesis presents evidence to suggest that humour production is an important skill for males for two reasons. Firstly, a good sense of humour is a highly attractive quality to females and may be a cue to genetic quality or good partner qualities, depending on the humour style used. Secondly, it may be important for males to use humour to signal cooperation to other males in order to form alliances. In females, the evidence presented in the thesis suggests that humour production may be a way for females to demonstrate romantic interest or flirtatiousness but the function of humour use between females remains largely inconclusive.

Chapter 1 General Introduction

1.1 What is humour?

The irresistible instinct humans have to laugh and produce humour is testament, and integral, to our nature as social animals. At every stage of life, humour is useful in not only initiating relationships but in maintaining them. The challenge of understanding humour has been ongoing since Aristotle first wrote of comedy as “dramatizing the ludicrous” (Aristotle 335 BCE/2013; Davis & Farina, 1970), though any one precise definition of humour is likely to be unable to capture its many forms and meanings (Keith-Spiegel, 1972). Yet, as a species, we excel at being inherently able to identify humour and collectively hold this quality in high esteem (Tisljar & Bereczkei, 2005). Attractive individuals and ideal social partners tend to have ‘a good sense of humour’ (Bressler& Balshine, 2006; Li et al., 2009) and, beyond personal relationships, society venerates people who make us laugh. In Britain, Honours are given to successful comedians, with Sir David Jason being one of the more recent recipients of a Knighthood for services to acting and comedy (London Gazette, 2006). Giving an honour which is normally reserved for those who have been deemed to perform substantial public service demonstrates the elevation and reverence bestowed onto very funny people. Whilst only a few individuals may excel at humour production on a world stage, the sense of humour is a relevant concept to every member of the human race.

Humour is a ubiquitous part of human interaction and, often through telling incongruous and surprising stories or jokes, it is the most common way of making others laugh (Gervais & Wilson, 2005). As such, one might assume that humour is simply a tool to be used in conversation in order to cause laughter, but it is used in a variety of contexts to elicit different effects. The simple act of saying

something funny to another person demonstrates that you have some interest in them, platonically or romantically (Li et al., 2009). Adding levels of increasing complexity to this behaviour, the type of humour we use enables us to communicate something about ourselves (Flamson & Barrett, 2008). The content of our jokes can also offer insight into our personality (Kuiper & Leite, 2010). Depending on how it is used, humour can also help to bond individuals (Keltner & Bonanno, 1997) though, conversely, it can be used to ostracize others by making them the butt of your jokes (Alexander, 1986). Humour can evidently vary in the way it is presented; humour can be physical, in the form of slapstick, or verbal, in the form of spontaneous wit or jokes (Krichtafovitch, 2006). Furthermore, many different types of jokes and wit exist and there is a long history of attempts to capture and categorise humour from a rhetorical perspective.

One of the first attempts to do this was in 55 BCE. Cicero defined all humour as being in one of two categories; funniness based on the object itself or verbal wit, which was said to contain 22 subtypes of humour, such as caricature, puns, or irony (Cicero, 55 BCE/1860; Krichtafovitch, 2006). Later, in 95 CE, Quintilian expanded on Cicero's work and spoke of the variety of humour he perceived in rhetoric. Writing his *Institutio Oratoria*, the rhetorician (95 CE/1922) described the six types of verbal humour as being *urbanitas* (refinement; educated humour), *venustus* (grace; charming humour), *salsus* (piquancy; sharp wit), *facetus* (joking in a graceful or elegant way), *iocas* (witticism in the form of jesting), and *dicacitas* (banter; the humorous form of attack). Cicero and Quintilian were perhaps the first two authors to speak at length about the variety and subtypes of humour, though several authors since have attempted similar feats which largely vary depending on individual perspectives on the use of

humour. Whilst Cicero and Quintilian viewed humour from a rhetorical perspective, other authors have been interested in the practical application of humour in everyday language. More recently, research has focused in more on individual differences in how humour is used and how humour use may be an extension of personality (Craik, Lampert, & Nelson, 1996; Martin & Lefcourt, 1984; Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003; Martin, 2001).

Depending on the interests of the researcher, humour styles can be categorised in various ways but, by contrast, many researchers have tried to find the common element between these humour styles in an attempt to distil the essence of humour from language. The element of surprise is a necessary feature of all types of humour (Gervais & Wilson, 2005; Koestler, 1969; Ramachandran, 1998) though, for verbal humour statements to be successful, jokes should largely contain both incongruity and resolution (Palmer, 1994). Incongruity in speech is unexpected, and presents the critical surprise element of humour, but without a resolution the statement would never expand beyond absurdity (Palmer, 1994). Shultz and Horibe (1974) cite the following joke in three forms to illustrate this point:

1. ‘Doctor, come at once! Our baby swallowed a fountain pen!’ ‘I’ll be right over. What are you doing in the meantime?’ ‘Using a pencil.’

2. ‘Doctor, come at once! Our baby swallowed a rubber band!’ ‘I’ll be right over. What are you doing in the meantime?’ ‘Using a pencil.’

3. ‘Doctor, come at once! Our baby swallowed a fountain pen!’ ‘I’ll be right over. What are you doing in the meantime?’ ‘We don’t know what to do.’

The first version is the only one of the three which could be defined as a joke; it has the incongruity of the doctor's question and what the parents answer, as well as the resolution in the relationship between a pen and a pencil. The second version is not a joke as it contains an incongruity but no resolution and, conversely, the last version is not a joke because it contains no incongruity. The incongruity combined with resolution is the foundation of wit, though some level of incongruity is a necessary part of all humour (Gervais & Wilson, 2005; Palmer, 1994). Tickling was once considered to be a particular humour behaviour which theorists struggled to explain (Koestler, 1969), however the incongruity involved in tickling is what makes it funny. Tickling has the appearance of a physical attack but the surprise is that (for most) it is a pleasant sensation, rather than a painful one, (Gervais & Wilson, 2005; Polimeni & Reiss, 2006; Provine, 2000). Tickling is an interesting behaviour to expand on because, rather than failing to fit in with theories of humour as some suggest (Koestler, 1969), it may provide important insights into the origins of humour (Provine, 2000).

1.2 The evolutionary origins of humour and laughter

1.2.1 Background to evolutionary theory

The universality, heritability, and innateness of laughter and humour suggest that they are evolved behaviours (Kaufman, Kozbelt, Bromley, & Miller, 2008; Provine, 2000; Rushton et al., 2009; Schermer, Martin, Martin, Lynskey, & Vernon, 2013). The survival or natural selection of certain behaviours shapes the course of evolution, therefore genetic traits which contribute towards survival will be inherited by generations to come provided those traits continue to aid survival (Trivers, 1985). But survival in an evolutionary sense refers not only to life at the

individual level; survival of our genes through the process of sexual selection ensures that successful traits are inherited by offspring. In other words, the traits which may help us to be chosen as mates and to successfully reproduce will be inherited by offspring, who will then be in a better position to be chosen as a mate. The measure of success in reproducing and passing on genes is referred to as fitness, therefore inherited traits which may help one to be selected for as a mate may increase one's fitness (Daly & Wilson, 1983).

Whilst humour does not appear to contribute to survival at the individual level, for instance in terms of escaping a potentially deadly encounter with a predator (Kaufman et al., 2008), humour could help individuals to bond and cooperate with each other (Storey, 2002). Acts of cooperation which are mutually beneficial to both parties can be very useful for individuals to engage in, provided that there is an appropriate balance between net costs and benefits (Trivers, 1985). Whilst it is clear that we should behave cooperatively towards kin, or those who are related to us and can therefore contribute towards ensuring the survival of our shared genes, there are greater risks associated with cooperating with someone we are not related to who could possibly fail to reciprocate our cost (Barrett, Dunbar, & Lycett, 2002). Humour may be a way of gauging interest in potential cooperation and so could theoretically reduce the risks associated with altruism (Chapter 6).

An additional consideration is that communicating altruism, or prosociality, through humour may be an attractive trait in a romantic or social partner (Hardy & Van Vugt, 2006; Nesse, 2007) (this will be discussed further in Chapter 6). As such, humour could have evolved through the process of sexual selection, though there are other reasons why humour may be attractive and sexually

selected for which will be discussed further in section 1.4. I will now discuss the evidence that humans have a long history of producing humour and a considerably longer history of producing laughter, which further underlines and supports the argument that the sense of humour is evolved.

1.2.2 The origins of laughter

Laughter is an innate act which tends to be one of the first vocalisations made by infants in the first year of life (Polimeni & Reiss, 2006; Rothbart, 1973). Laughter has even been observed erupting spontaneously from deaf and blind infants (Provine, 2000), further hinting at the innateness of this behaviour. Prior to the development of speech or understanding of humour, many parents use tickling to elicit laughter from their children and, later, 'peek-a-boo' games involving incongruous behaviour often make children laugh (Rothbart, 1973). However, these pre-speech interactions are not restricted to humans. Observational research has shown that some species of animals appear to laugh when they are tickled (Panksepp, 2000; Provine, 2004). Panksepp (2000) found that rats engaging in social play emit ultrasonic 'chirping' noises, which they also do when they are tickled by an experimenter, when engaged in highly arousing sexual activity (McGinnis & Vakulenko, 2003), or prior to fighting (Panksepp, 2007). Panksepp (2007) suggested that this type of vocalization may therefore be a signal of cooperation (perhaps in vain in the case of fighting rats) from these highly social animals. Other animals have been observed emitting vocalisations during social play which appear to be analogous to the 'chirp' of the rats, or the laughter of humans.

The similarities in the manifestations of playful behaviour between humans and other great apes is presented as strong evidence of the evolutionary origins

of laughter (Van Hooff, 1972; Weisfeld et al., 2011) and evolutionary researchers suggest that laughing behaviour could have begun around 10 to 16 million years ago (Davila Ross, Owren, & Zimmermann, 2009). Van Hooff (1972) wrote extensively about the phylogeny of laughter and play faces. Primates often express a relaxed open mouth display when they are engaging in boisterous social play. This type of facial display can be accompanied by staccato breathy sounds depending on the species in question (Vettin& Todt, 2005); Chimpanzees, for example, make a guttural repetitive sound panting sound when they are excited (Ruch & Ekman, 2001) and this type of behaviour may be analogous to laughing (Van Hooff, 1972). When animals are engaging in rough and tumble, it may not always be possible for them to see each other's faces, and Van Hooff (1972) argues that this is why non-hostile vocal emissions may be produced. This evidence furthers our understanding of how and why laughter may have evolved; if soft panting noises are combined with a play face during social interaction, it may be a signal for the play to continue which in turn could have positive repercussions on the socialisation and group relations of great apes (Vettin & Todt, 2005).

More recent evidence has demonstrated that not only do chimpanzees laugh but so too do bonobos, gorillas and orang-utans (Davila Ross et al., 2009). Davila Ross et al (2009) performed acoustic, then phylogenetic, analyses on the vocalisation made by great apes when they were being tickled. They concluded that the differences in human and other great ape laughter appear to have been shaped within existing variations along the evolutionary line; thus, the vocalisations which occur during play for all species of great ape can correctly be referred to as laughter. The analysis of the degrees of voiced-ness in a laugh

was particularly important in providing biological support for Provine's (2004) assertion that voiced laughter, and later talking, only became a possibility once our ancestors became bipedal.

Provine (2004) suggested that quadrapedal locomotion restricted the vocal folds to the extent that only when our ancestors stood erect were they freed from previous thoracic and vocal constraints. The reduced energy requirements for bipedal walking, relative to quadrapedal walking, enabled the development of their voices as they could better co-ordinate their breathing and speaking; this in turn allowed for more egressive laughter, rather than the ingressive laughter observed in other great apes (Davila Ross et al., 2009). Davila Ross et al (2009) propose that their observations of the differences in laughter across great apes supports this and may help to illuminate the origins of all human vocalisation and speech. Thus, a playful behaviour such as tickling may in fact hold important information about the evolution of important social behaviours. Beyond a certain age though it is no longer appropriate to tickle others, and ‘peek-a-boo’ games largely lose their appeal, which may help us to reason about how the sense of humour began.

1.2.3 The origins of humour

Darwin recognised the parallels in behaviour between non-human primates and humans and referred to humour in humans as the “tickling of the mind” (Darwin, 1872/1998, pp.197), noting that a “ludicrous idea” can tickle our minds just as we are tickled when playfully touched. Provine (2004) argues that humour enables adults to elicit laughter without over-stepping physical boundaries and, to draw further parallel between humans and other great apes, Barrett et al. (2002) suggested that humour-induced laughter may bear a similar function to grooming.

Primates often spend time grooming each other, which is considered to be useful in bonding and maintaining close relationships (Massen & Koski, 2014). Such behaviour, like laughter, is said to prompt the release of endogenous opioids, which act as a relaxant (Dunbar, 2012).

Humans do not groom each other therefore eliciting laughter might offer an alternative but analogous behaviour and could perform two functions; making others laugh could have the adaptive function of easing conflict and encouraging group bonds, as grooming does (Dunbar, 2012; Yip & Martin, 2006). But, furthermore, relying on laughter to perform this function allows us to bond in larger social groups (Dezecache & Dunbar, 2012; Storey, 2002). Dezecache and Dunbar (2012) observed groups of people engaged in conversation in bars and found that laughter tended to be shared between groups of up to four people at once. Grooming can only occur between two people (to the benefit of just one individual who experiences the release of opioids) but laughter can be shared between many people, meaning that it is more useful in expanding social groups and bonding with more people (Dezecache & Dunbar, 2012; Dunbar, 2012). This point may serve to highlight the usefulness of laughter in groups which once groomed each other in order to bond because laughter has a longer reach than grooming.

An further explanation for why laughter may be encouraged in group situations is described by the ‘false-alarm theory’ (Ramachandran, 1998). With this theory, Ramachandran (1998) suggests that laughter may have evolved as a signal that an individual was nervous about something but that they now recognise that it was a false alarm. For instance, in the case of tickling, it initially appears to be a physical attack but it feels pleasant; laughter ensues due to this

incongruity of the event. In terms of evolution, the use of laughter served to signal to the group that all was well so this may have been adaptive in easing tensions and conflict (Ramachandran, 1998).

As discussed, tickling can be used by non-human species or young children to elicit laughter but as humans age this behaviour becomes inappropriate for adults to engage in (Provine, 2000). The movement away from physical activities (grooming) towards verbal communication, may have provided the ideal environment for the evolution of the sense of humour, as our ancestors began to make each other laugh by producing jokes.

1.3 The production of humour

Whilst laughing can be phylogenetically traced back for 16 million years, language is a much more recent phenomenon which perhaps began around 200 KYA (Dunbar, 2009). Whilst there is no physical evidence to suggest when humour may have begun to evolve, Dunbar has suggested that rather than language evolving, followed by humour; humour use may have facilitated the evolution of language because it made using language more pleasurable (Dunbar, 2009). However, as there can be no physical evidence of the evolution of language and humour, it is unclear how this may have happened. Whilst humour can vary in complexity and level of sophistication, the production of humour is a cognitively expensive skill which not everyone may be able to perform well (Keith-Spiegel, 1972). Producing verbal humour requires not only highly advanced language skills, but abstract thinking, theory of mind, and an understanding of symbolism, in order to craft a suitable joke (Polimeni & Reiss, 2006). It must however be appreciated that humour does not occur in a vacuum;

it is inherently a social behaviour therefore the characteristics of both the producer and the appreciator must be considered (Gervais & Wilson, 2005). There must therefore be shared knowledge between the humour producer and the humour appreciators, in order that the audience might understand the joke (Flamson & Barrett, 2008). Furthermore, producing humour is in vain if it is not well delivered; the producer must have appropriate timing and some sensitivity to whether his or her audience might be receptive to the humour (Miller, 2000). Evidently, there are many factors to consider in successfully producing humour, though some researchers have suggested that the difficulty involved in being funny may hold the key to fully understanding how humour evolved. As such, humour may be a signal of quality due to this complexity, which will be discussed further in section 1.4.

1.3.1 The Humour Styles Questionnaire

An additional factor to consider in humour production, beyond the complexity of the joke, is the humour type used. In section 1.1, I discussed the fact that humour has previously been defined and classed in different ways. Martin et al (2003) suggested that verbal humour could be divided into four main categories and so developed the Humour Styles Questionnaire; a 32-item questionnaire which asks participants to agree with various humour statements and is designed to test how they use humour. The Humour Styles Questionnaire has gone on to become one of the most widely used forms of categorisation in humour literature due to the subsequent evidence which has shown how these humour styles relate to individual differences (Dozois, Martin, & Bieling, 2008; Dyck & Holtzman, 2013; Kuiper & Leite, 2010; Martin, Lastuk, Jeffery, Vernon, & Veselka, 2012). In Martin et al.'s (2003) categorisation of humour styles, two of the categories are classed

as positive humour styles; affiliative, referring to humour which is not directed at individuals and helps to bond individuals, e.g. “I enjoy making people laugh”; and self-enhancing, which boosts the mood of the humour producer, e.g. “If I’m by myself and I’m feeling unhappy, I make an effort to think of something funny to cheer myself up”. A positive humour style is referred to the authors as being an ‘adaptive’ humour style in terms of health as this humour style may help individuals to be resilient in coping.

Unlike previous literature which assumed humour to be positive (Cann & Calhoun, 2001; Kuiper & Leite, 2010), Martin et al.’s two remaining categories are classed as negative humour styles; aggressive, which refers to humour that is directed at individuals and may resemble jeering or teasing, e.g. “If I don’t like someone, I often use humour or teasing to put them down”; and self-deprecating, where the joke-teller makes fun at his or her own expense, e.g. “I often go overboard in putting myself down when I am making jokes or trying to be funny”. The negative humour styles are referred to as being ‘maladaptive’ humour styles, as their usage may be detrimental to social relationships (Martin et al., 2003). Research since has supported this supposition; correlational analyses have shown that negative humour styles positively relate to sub-clinical psychopathy and Machiavellianism; two of the three qualities included in the Dark Triad of anti-social personality traits (Martin et al., 2012; Veselka, Schermer, Martin, & Vernon, 2010). These humour styles are also related to being socially undesirable, though aggressive humour was shown to be more undesirable than self-deprecating humour (Kuiper & Leite, 2010).

Whilst research has demonstrated that negative humour styles may be socially undesirable, it has been shown that there may be a level of assorting for

humour style within friendships, thus people who use more negative humour styles may be more drawn to that quality in others. Curry and Dunbar (2013) recently showed that, when participants were asked to share money with other participants they did not know, they were more likely to be generous towards the participants who they were told enjoyed similar humour to them. This effect proved to be specific to humorous stimuli; participants were also asked to rate the other participant for how well they would get on with them. The type of humour used did not change how affiliative the participant felt towards the other person; it only changed how much money they were willing to share with them (Curry & Dunbar, 2013). This demonstrates that there may be something unique about humour which drives people to be more altruistic towards similar individuals. The researchers suggest that the display of altruism suggests a higher form of cooperation and that humour may be an honest signal which demonstrates shared knowledge to the extent that it may prompt others to cooperate with us. As such, we could potentially benefit from reciprocal altruism which could provide survival advantages (section 1.2.1) and so encourage further use of humour.

This may depend on the style of humour used though; Curry and Dunbar used jokes taken from a joke book and allowed participants to decide which they liked, therefore the jokes were not categorised. If the jokes had been categorised, it may have allowed for more insight into the motivation behind the ratings and altruism; recent research has demonstrated that the humour style used may impact on the perception of evolutionarily relevant personality traits, such as trustworthiness (Zeigler-Hill, Besser, & Jett, 2013).

In Zeigler-Hill et al.'s (2013) work, they were keen to test whether individuals accurately report their preferred humour style relative to how their

humour style is perceived by others, and how humour style impacts on a range of personality traits. Zeigler-Hill et al. (2013) obtained personality ratings from the friends and family members (referred to as the perceivers) of a target group of participants in order to see how humour style related to perceptions of the individual. The Humour Styles Questionnaire (Martin et al., 2003) was used to ascertain humour style in the target participant, though the perceivers received a shortened version of this to fill in. They were also asked to rate the self-esteem, entitlement, aggression, narcissism, and personality of the target participant. The results demonstrated that there was large agreement between the target participants and the perceiver about usage of humour style. Furthermore, the results demonstrated a relationship between humour style and personality perceptions. Those who used negative humour styles were perceived as being more aggressive and entitled, whereas those who used positive humour styles tended to be seen as more conscientious and emotionally stable, as well as being rated higher in self-esteem. Further tests using profiles which were based on humour types rather than referring to target participants examined how the four humour styles related to perceptions of mate value. The researchers found that more negative humour styles were associated with being less trustworthy and having overall less mate value than those with positive humour styles.

The attractiveness of different humour styles has not yet been widely tested but Zeigler-Hill et al.'s findings are still limited in the manner in which they asked participants to rate mate value. They administered a short measure which asked participants to rate the individuals described in the profile on traits relating to attractiveness, vitality, status and resources, but participants were not explicitly asked to rate the profiles for how attractive they were for short-term or long-term

relationship. A large body of evidence has contributed to showing that there are considerable differences between mate value relating to these contexts (Little, Connely, Feinberg, Jones, & Roberts, 2011; Little, Jones, Penton-Voak, Burt, & Perrett, 2002). In short-term relationships, cues to genetic quality e.g. physical attractiveness (Snyder, Kirkpatrick, & Barrett, 2008), may be prioritised over qualities which demonstrate that one would be a good partner. In a committed long-term relationship, qualities such as being trustworthy or having resources (in the case of females selecting males) are likely to be more influential in mating decisions. As such, relating negative humour styles to being less trustworthy and more aggressive does not necessarily mean that these are unattractive humour styles to use or that one's mate value is lowered in using this type of humour if these humour styles might signal genetic quality. It should first be determined whether these humour styles differ in the context that they are attractive in; whether that is for short-term or long-term relationships. Chapter 2 will provide evidence of empirical work which tested if funniness is considered more attractive for short-term or long-term relationships. Chapter 3 will further elaborate on this, testing whether humour style is relevant to attractiveness in different relationship contexts.

Up to now, I have discussed the possibility that humour may have evolved as an important part of group living for our ancestors; to encourage social bonds, and to help to indicate shared knowledge and the potential for cooperation. Some researchers have however suggested that the primary reason for the evolution of humour is because it is an honest signal of mate value which has been sexually selected for (Miller, 2000).

1.4 The attractiveness of humour

1.4.1 The Mating Mind theory

In Section 1.3, humour production was discussed as being a complex skill to develop and it was suggested that this may provide insight into the evolution of humour (Polimeni& Reiss, 2006). This theory stems from Miller's (2000) Mating Mind theory, wherein he suggests that the difficulty associated with humour production may provide evidence that humour is an honest signal of quality. In other words, the fact that humour requires sophisticated cognitive skills, e.g. theory of mind, abstract thinking, highly advanced language skills (Polimeni & Reiss, 2006), self-confidence (Meston & Buss, 2007), as well as good timing and appropriate delivery, suggests that those who can successfully produce humour are of higher value as a mate (Miller, 2000). Furthermore, Miller's theory suggests that this is the reason why humans appreciate a sense of humour; it evolved exclusively because it is a signal of quality.

Additionally, in developing the theory of Mating Intelligence, Miller (2008) suggests that all traits (in addition to humour) which do not appear to have obvious survival benefits, such as being intelligent, a talented musician, or high in sexual prowess, are signs of quality which should be highly attractive. Miller suggests that these types of signals are likely to be highly heritable and have large individual differences, but that they should also be positively associated with other tangible signals of quality, such as physical attractiveness. Miller draws a parallel between mental or psychological traits, such as intelligence and humour, and physical traits which are considered to be markers of genetic quality, for example, facial symmetry (Jones et al., 2001; Özener & Fink, 2010; Swaddle

& Cuthill, 1995), or sex hormone markers (Thornhill & Gangestad, 1999), in suggesting that both psychological and physical markers of quality should be present in genetically high quality individuals. From this perspective, humour could be considered a signal of quality to potential mates and there are lines of evidence to support this hypothesis. Following the Mating Mind theory, we would expect to find that humour is a sexually selected trait and we would also expect sex differences in humour production and appreciation in line with a pattern of evolutionary sexual selection, and there is evidence of this.

1.4.2 The sexual selection of humour

In section 1.2.1, I discussed the theory that humour may be sexually selected for, which is supported by the evidence that it is an attractive trait. Discussing the sexual selection of a trait is however more complicated due to the fact that there are unequal costs of reproduction between males and females (Bateman, 1948). Accordingly, these unequal costs may lead to a pattern wherein males, as the sex with lower reproductive costs, must demonstrate their quality to increase their chance of being chosen by females. This pattern of behaviour may be apparent in a trait such as the sense of humour, where males may tend to produce humour (perhaps in order to display quality) and females may be more inclined to evaluate and appreciate humour produced by potential male partners.

Whilst it is in both the male and the female's interest to be chosen in order to increase their genetic fitness, the costs of doing so are not equal. This has repercussions on the structure of the mating market. Biologically speaking, males must make a small contribution of sex cells in order to reproduce; this is the minimum contribution required, though it is important to note that not every male will limit his contribution to the bare minimum (Trivers, 1972). By contrast,

females are responsible for carrying the foetus, followed by a lengthy period of feeding and nurturing the infant. Furthermore, the cost of reproduction is not just biological; the potential fitness of females is restricted due to the investment they must make relative to males. Making a relatively small commitment means that males are capable of impregnating many females over a short period of time, whereas females are unable to conceive again for a much longer period (Trivers, 1972). This imbalance in the costs of reproduction creates a system wherein females should be, and are, more choosy about the partners they choose to mate with in order to ensure that their substantial biological investment produces the most genetically strong offspring possible (Bateman, 1948). As such, males must compete in order to be chosen by the choosy females, which is where having a good sense of humour may prove advantageous. If a male demonstrates to a female that he has a good sense of humour, according to the Mating Mind theory, this could suggest that he is a higher quality mate (Miller, 2000) and could mean he is more likely to be chosen.

This suggestion is supported by the pattern of evidence consistently found in humour literature demonstrating that humour is more often produced by males and appreciated by females (Bressler, Martin, & Balshine, 2006; Cowan & Little, 2013b; Wilbur & Campbell, 2011); thus, it could be concluded that humour is a sexually selected trait because there is an imbalance in how it is used. Evidence from Greengross and Miller (2011) has further provided evidence for the Mating Mind theory that humour may be associated with other positive qualities demonstrating overall genetic quality. In their experiment, Greengross and Miller (2011) found that males who produced humour well were also higher in intelligence and had a higher Sociosexuality Orientation Inventory score than less

funny men. No such relationship was present for females in the study (the SOI is a measure of attitudes and behaviours in regards to uncommitted sex; Simpson & Gangestad, 1991).

The researchers propose that this provides strong support for the Mating Mind theory, as it suggests that men who are funny may also be more attractive and more intelligent, making them of high genetic quality. However, there are flaws in the method in that the measure of humour used was asking participants to write funny cartoon captions, which were then rated by other participants. It seems likely that someone intelligent, with a higher vocabulary score,might be more able to write a funny caption on a cartoon, but the researchers have not shown that this measure necessarily equates to funniness in an interactive and social sense. As discussed, there are many important qualities involved with producing verbal humour but written humour does not require several of these, such as good timing or appropriate delivery. Furthermore, the SOI is assumed to be a marker of mating success but this may not necessarily be the case either. The SOI is a self-report questionnaire, meaning that the researchers are relying on the integrity of participants truthfully declaring number of sex partners or proclivity to have a one-night stand. Together, the evidence does not appear to be as valid or strong as Greengross and Miller (2011) suggests, however there is little other evidence supporting the Mating Mind theory in this way. Nevertheless, many experimenters have found that funniness is an attractive quality (Bressler & Balshine, 2006; Buss, 1989; Li et al., 2009; Wilbur & Campbell, 2011), which may still provide some support for the suggestion that humour is sexually-selected.

Buss (1989) has also found that both males and females thought that displaying a good sense of humour was a highly attractive trait and a successful strategy in pursuing the opposite sex. In a study where vignettes from potential, but fictional, mates were presented to participants, McGee and Shevlin (2009) found that a sense of humour made the character of the vignette significantly more attractive. Furthermore, more observational work has demonstrated that a 'good sense of humour' is one of the most sought after traits in personal advertisements (De Backer, Braekman, & Farinpour, 2008; Pawłowski & Dunbar, 1999; Wilbur & Campbell, 2011).

Studies which investigate how attractiveness relates to different types of humour should also be considered, as some humour types may offer further support for the Mating Mind theory. As Miller (2000) suggests that humour is related to intelligence and good delivery, it is likely that spontaneous wit is more indicative of the Mating Mind than a rehearsed joke. In a study about chat-up lines, Bale, Morrison, and Caryl (2006) found that the most successful chat-up lines were ones which appeared to be spontaneous and witty, compared to clichéd chat-up lines which were found to be much less successful or attractive. The authors concluded this was because a spontaneous and witty chat-up line is more indicative of the speaker's personality and intelligence, and suggested that this provided evidence for Miller's (2000) theory that humour is sexually selected (Bale et al., 2006). Research suggests that, aside from spontaneous wit, other humour styles may also reflect the personality of the humour producer (Martin et al., 2003; Zeigler-Hill et al., 2013); however different humour styles may perhaps be more or less attractive depending on the context or the intention behind the humour. For example, aggressive humour could potentially be attractive if it

enables a man to dominate a conversation (Alexander, 1986), though affiliative humour could also be attractive if it demonstrates cooperation and prosociality (Nesse, 2007). It could be further speculated that these humour styles have important functions which are relevant to different relationship contexts. Chapter 3 will test the hypothesis that aggressive humour is more attractive for short-term relationships and that affiliative humour is more attractive for long-term relationships. These hypotheses are in line with the short-term and long-term attractiveness of the personality traits associated with these humour types; if affiliative humour is more closely associated with cooperativeness, it is likely that it could be more attractive for long-term relationships. Similarly, if aggressive humour is associated with dominance, it may be more attractive for short-term relationships. Empirical evidence testing these relationships will be presented in Chapter 3.Beyond humour styles, the effort of humour production alone may be attractive if the audience considers humour to be a signal of attraction, which has been suggested by Li et al (2009).

1.4.3 The Interest Indicator model

In an effort to further define and understand the use of humour, Li et al (2009) investigated the way humour was used by males and females when attempting to initiate a relationship with someone they were attracted to. Li et al (2009) perceived certain aspects of the Mating Mind theory to be flawed in that it suggests that humour evolved to be a signal of quality to mates, yet humour is frequently used outside a mating context. Li et al also point to the fact that, despite the model of sexual selection, females do produce humour; they are not restricted to being passive appreciators, as the Mating Mind would suggest.

Li et al (2009) tested the Interest Indicator model of humour, following their suggestion humour is used as a way of demonstrating interest in someone else. In a three part study, Li et al (2009) found that both males and females were more inclined to initiate contact in a humorous way if they were physically attracted to the person they were speaking to, and that they both recognised attempts at humour from the opposite sex as being signals of interest. They suggest that humour is a risky strategy to initiate interaction because it is embarrassing if it is not well received, but if it is successful it can reap substantial rewards because it is an attractive quality. This study provides evidence which contradicts Miller's (2000) argument that humour is sexually selected because both males and females are shown to use humour; humour is used across a variety of contexts; and physical attractiveness appears to influence ratings of humorousness, rather than physical attractiveness being correlated to funniness abilities.

Other research casts doubt on the Mating Mind theory by demonstrating that humour is not always perceived to be associated with intelligence (Bressler & Balshine, 2006; Lundy, Tan, & Cunningham, 1998), contradicting what Miller would theorise. However, both of these studies still found humour to be an attractive quality despite the lack of association with intelligence. The direction of the relationship between attractiveness and humour is complicated by the fact that Miller suggests that displaying a good sense of humour will increase one's attractiveness because it is a signal of quality but, if being physically attractive makes one appear to be funnier (Li et al., 2009),it becomes difficult to quantify how humour might relate to genetic quality. Humour may be sexually selected because it signals genetic quality but it could be hypothesised that humour is attractive because it is a signal of interest and proceptivity. This discussion will

continue in Chapter 2, where the hypothesis that humour is a means to demonstrate interest in an attractive individual is empirically tested.

1.4.4 Summary of General Introduction

In this introduction, I have discussed the long history humans have of not only appreciating humour and laughter but also attempting to understand why such enjoyable but apparently superfluous traits have evolved. As Section 1.2.2 discussed, the observable similarities between human laughter and the laughter of the other great apes provides strong evidence that laughter has phylogenetic origins (Davila Ross et al., 2009) and suggests that laughter may play an important social role. In examining humour, the complexities involved in this behaviour mean that its role in human conversations and interactions can be interpreted in several ways (Li et al., 2009; Miller, 2000). Humour could potentially be a marker of genetic quality, as the Mating Mind theory would suggest. It could also be seen as a way of demonstrating interest in others, as the Interest Indicator model argues.

The variety in humour styles also adds a level of complexity, but offers much greater insight into the applications of humour as a potential expression of personality traits (Zeigler-Hill et al., 2013). Whilst research has demonstrated that spontaneous wit is attractive when speaking to a potential mate (Bale et al., 2006) perhaps due to the potential difficult of producing wit (Miller, 2000), if humour styles reflect personality they may be more or less attractive based on what specific information they provide about the producer. A negative humour style may be viewed as being aggressive (Martin et al., 2003) and associated with reduced mate value (Zeigler-Hill et al., 2013). However, if it is perceived to be a signal of status or dominance, it could potentially be attractive to females in the

context of a short-term relationship, when dominant men tend to be preferred (Snyder et al., 2008). It is plausible that aggressive humour may be socially undesirable if it involves exerting dominance through the derogation of others, but this could signal perhaps genetic quality just as spontaneous wit is argued to (Bale et al., 2006).

The context of humour use is an additional important factor to consider; whilst humour is attractive in a mating context, it has been suggested that humour may have evolved as a way of reinforcing and encouraging group living (Dezecache & Dunbar, 2012). As Li et al. (2009) highlight, humour is used in many contexts therefore it could be useful to demonstrate our interest in cooperating with others. Cooperating with those whom we can trust can be very beneficial (Trivers, 1972) and, if humour evolved as a way of building a bond of trust with others, it could provide a further important insight into the function of this ubiquitous behaviour.

Chapter 2 The attractiveness of humour use; the effects of relationship context and modality on ratings of funniness.

This chapter is based on the following published manuscript;

Cowan, M L& Little, A. C. (2013) The effects of relationship context and modality on ratings of funniness. *Personality and Individual Differences, 54*(4), 496-500.

2.1 Abstract

There is evidence to suggest that humour is an important part of mate choice and that humour may serve as an indicator of genetic quality. The current study investigated how rated funniness from a video clip was related to an individual's attractiveness as a short-term or long-term partner. I additionally tested for the presence of an attractiveness halo effect on humour ratings by comparing ratings of funniness from video clips, audio-only presentations, and photographs. I found that funniness was most strongly correlated with attractiveness for short-term relationships, especially in males. I also found that attractiveness was related to funniness ratings differently across video, audio-only clips, and photographs. Relative to their rated funniness in the audio-only condition, with no appearance cues, attractive individuals were rated as funnier in video clips than less attractive individuals. An additional study demonstrated that ratings of flirtatiousness and funniness were strongly correlated. Perceived similarity between producing humour and flirting may explain why humour is more preferable in a short-term partner as flirting may be seen to signal proceptivity. The effects of attractiveness on humour judgements may also be explained by an association with flirtation as flirting may be most enjoyable when directed by attractive individuals.

2.2 Introduction

2.2.1 The relationship between physical attractiveness and humour

Humour is a uniquely human quality and an almost ubiquitous aspect of speech (Gervais & Wilson, 2005) despite having no obvious or immediate survival benefits. It has been suggested that humour can facilitate and nurture social bonds (Yip & Martin, 2006) but, paradoxically, it has also been suggested that

humour can do the opposite, by helping individuals to exert their own dominance by making others the target of their jokes (Alexander, 1986). The social function of humour will dictate the style of humour being used, be that affiliative or aggressive for example, but, according to the Mating Mind theory, humour may also perform an important function as an indicator of genetic quality, which may enhance one's attractiveness as a mate (Miller, 2000). Li et al. (2009) also suggest that humour is an important aspect of relationships in the Interest Indicator model but, in contrast to Miller (2000), contend that individuals make the effort of producing humour when they are already attracted to a potential mate. A third theory, following the What is Beautiful is Good perspective (Dion, Berscheid, & Walster, 1972), suggests that physical attractiveness increases our ratings of perceived funniness.

Evidently, there is debate on the direction of the relationship between humour and physical attractiveness but not on whether humour is an important aspect of mate choice, for which there is much evidence. Buss (1988) found that both males and females thought displaying a good sense of humour was an effective tactic in attracting a mate; results which have been echoed in mate preference questionnaire studies (Bressler & Balshine, 2006; McGee & Shevlin, 2009). Miller (2000) suggested that a good sense of humour is so desirable because the difficulty associated with producing humour, which requires abstract thinking, theory of mind, and highly advanced language skills (Polimeni & Reiss, 2006), as well as being creative and intelligent (Miller, 2000), means that humour appears to bear the hallmarks of a costly signal. In other words, the difficulty associated with producing humour enables the humour producer to demonstrate their high genetic quality (Polemini & Reiss, 2006) although this may be

influenced by the type of humour being used as sexual humour or memorised jokes may not display genetic quality as ably as spontaneous wit (Bale et al., 2006). This argument has been further bolstered by evidence which suggested that males prefer females to be humour appreciators rather than humour producers (Bressler et al., 2006). The biological inequality of the costs of reproduction (Trivers, 1972) suggests that, generally, females should be discerning judges of male quality and this is reflected in many studies on humour. The sexually dimorphic nature of humour production and appreciation is evidenced by preference questionnaires demonstrating that males prefer females to appreciate humour while females prefer males to produce humour (Bressler et al., 2006; Lundy et al., 1998; Wilbur & Campbell, 2011)and findings from lonely hearts advertisements, where men tend to offer a good sense of humour while women tend to seek it (De Backer et al., 2008).

Li et al. (2009) have however questioned this sexual dimorphism as, in their own study on the Interest Indicator model of humour, females suggested that producing humour was an effective way to demonstrate interest in a potential mate, which was indeed correctly interpreted by males as a way of indicating interest. The Interest Indicator model and the Mating Mind theory suggest functions for humour which could potentially exist alongside each other but the theories disagree about whether humour should actively enhance attractiveness. According to the Mating Mind theory, a man's attractiveness should increase following successful humour production, but the Interest Indicator model predicts humour might be attractive only when the listener is interested in them as a mate.

An additional consideration is that humour could also be related to an attractiveness halo effect (Dion et al., 1972), whereby finding someone physically

attractive increases how funny you find them. In this way, the causality of the link between humour and attraction is reversed. Such a halo effect, however, may be complex as it is possible that physical attractiveness changes the interpretation of humour, a factor in the Interest Indicator model. Both theories suggest that funniness is an aspirational quality in a male partner but differ in how the perception of funniness interacts with physical attractiveness and gender, and the direction of this relationship forms the first research question of the current study.

2.2.2 The impact of relationship context on ratings of attractiveness

I also address different relationship contexts to determine whether humour is more attractive for short-term relationships or long-term relationships. Li et al. (2009) did not find a significant difference between short or long-term relationships for their study on humour but, if funniness is an indicator of genetic quality, it may be more attractive for short-term relationships (Miller, 2000). However, humour does facilitate social bonds (Tisljar & Bereczkei, 2005; Yip & Martin, 2006) and may indicate 'good parent traits' (Greengross & Miller, 2008; Wilbur & Campbell, 2011) therefore funniness may also be an attractive quality in a long-term mate.

2.2.3 Rationale

Previous studies on humour have generally used preference questionnaires to determine the attractiveness of humour. The current novel methodology was chosen to maximise ecological validity, by presenting clips of participants spontaneously producing humour. In the current study, I captured video clips of individuals behaving naturally to camera and had these rated for funniness and attractiveness as both a long-term and short-term partner. I additionally

presented photographs and audio-only clips which were rated for the same questions. I hypothesised that humour would be valued more in short-term partners than long-term partners (Miller, 2000), but additionally that this may be subject to a gender difference. In contrast to predicting the same direction for term, the Interest Indicator model predicts that funniness would be equally related to attractiveness in both males and females, whereas the Mating Mind theory predicts that humour production will be rated as a more attractive trait in men than in women. It was also hypothesised that there would be an attractiveness halo effect for humour for both males and females, wherein individuals who are more physically attractive would be rated as funnier than less attractive individuals in the photograph and video conditions.

Study 1

2.3 Method

2.3.1 Collecting the stimuli

2.3.1.1 Participants

Forty undergraduate psychology students from the University of Stirling participated to fulfil a course requirement (20 males and 20 females; age M = 20.5, *SD* = 4.6). These 40 participants will be referred to as the actors.

2.3.1.2 Procedure

Participants were asked to pose for a photograph looking straight into the camera with a neutral expression. The photographs were cropped to show only the top of the head to the top of the participant's shoulders. Each photograph was captured in front of a standardized grey background in a room with fluorescent lighting. Photographs were captured with a digital camera with a resolution of 2592 x 1944 pixels and with 24-bit RGB (red, green, and blue) colour encoding. After capturing the photograph, participants were asked the following question; "If you went to a desert island, and could take two out of the three objects, what would you take and what would you do with it?", with the option of choosing chocolate, hairspray, or a plastic bag. Each participant was given one minute to consider their answer and were then filmed answering the question on the same digital camera. Participants were asked to state what object they would bring with them and what they would do with it, and this was framed with the statement that this section of the study was freeform; therefore participants could answer any way they wished. Participants were not instructed to try to be funny nor did they

know that humour was the focus of the study (See Appendix One for the full script). After filming had concluded, participants were debriefed and the videos were analysed for explicit humour use to ensure it was appropriate to be used as stimuli. Nineteen of the actors appeared to intentionally use humour, which was categorised by laughing in a visible and audible way combined with/or making a surreal, sarcastic, or hyperbolic statement.

2.3.1.3 Stimuli preparation

Participants were instructed that they could speak for as long as they wanted when answering the question. The average length of the videos was 45.3 seconds (*SD* = 16.3 seconds) however all videos were edited so that they each lasted 20 seconds. This was carried out by preferentially trimming silences and the beginning and the ends of videos where the participant had yet to begin their answer or had already finished. Videos which still exceeded 20 seconds were then edited by removing the last sections of the videos, whilst still allowing for the conclusion of a final sentence so that each video still made sense to a viewer.

2.3.2 Rating stimuli

2.3.2.1 Participants

Eleven undergraduate psychology students from the University of Stirling participated to fulfil a course requirement (5 male and 6 females; age M = 21.5, *SD* = 7.4). These 11 participants are referred to as the raters. Previous research has shown that ratings of attractiveness tend to be homogenous (Saxton, Burriss, Murray, Rowland, & Roberts, 2009) therefore a total of eleven raters was chosen due to the large amounts of stimuli being presented.

2.3.2.2 Procedure

Participants were tested alone in a quiet room. The stimuli presented to raters were the audio soundtrack of the desert island videos, a photograph, and then the desert island video with both picture and sound. All stimuli were presented online on a desktop computer with headphones, with each rater using the same computer and headphones each time. Each rater listened to all 40 audio clips first, then viewed 40 photographs, and finally watched all 40 videos, however the stimuli within each medium was presented randomly. Underneath each object, raters were presented with a 7-point scale which asked them to rate each piece of the stimuli for how funny they thought it was (1 = low, 7 = high) and how attractive they thought each participant was for short-term relationships and long-term relationships (see Appendix Two). Below this was a short description detailing what was meant by short-term relationships (dates, one-night stands) and long-term relationships (living together, marriage), to ensure all participants were answering with the same understanding (see Appendix Two for the full descriptions taken from Little & Jones, 2012). Following the ratings participants were debriefed.

2.3.3 Statistical Analyses

All ratings were tested for normality and Kolmogorov-Smirnov tests demonstrated that none of the ratings significantly deviated from a normal distribution. As male and female raters had been asked to rate both male and female stimuli, the data were analysed to test whether there were sex differences in the way the stimuli had been rated. Pearson's correlations demonstrated that there were strong positive correlations between the data from male and female raters in the video and photograph conditions (all $r > .507$, all $p < .002$), though weaker correlations

were seen in the audio condition. Overall, the general pattern of significant positive correlations between men and women across sex of actor suggests sex of judge/actor did not have a large effect on our results therefore the ratings from males and females were combined.

In order to analyse the impact that physical attractiveness had on ratings of funniness, the stimuli were split into two groups based on their attractiveness rating from the photograph. Previous research has demonstrated that females are rated as being higher in attractiveness than males (Andreoni& Petrie, 2008) therefore the participants were first split by sex. The mean attractiveness rating was found to be higher for females (M = 2.86,*SD* = 0.72) than for males (M = 2.55, *SD* = 0.62) (though not significantly different, t_{38} = –1.44, p = .159). Males and females were then grouped into a high and low attractiveness group based on their sex's mean attractiveness rating. Once divided into two groups, the mean attractiveness rating for the high group was 3.07 (*SD* = 0.29) for males and 3.45 (*SD* = 0.45) for females (which was significantly higher than the males, (t_{18} = –2.24, p = .040). In the low attractiveness group, the mean rating for males was 2.03 (*SD* = 0.35) and for females was 2.27 (*SD* = 0.36). These figures were not significantly different (t_{18} = –1.46, p = .16). The difference in mean attractiveness between the high attractiveness (M = 3.26, *SD* = 0.42) and low attractiveness group (M = 2.15, *SD* = 0.37) was significant, (t_{38} = 8.94, p < .001).

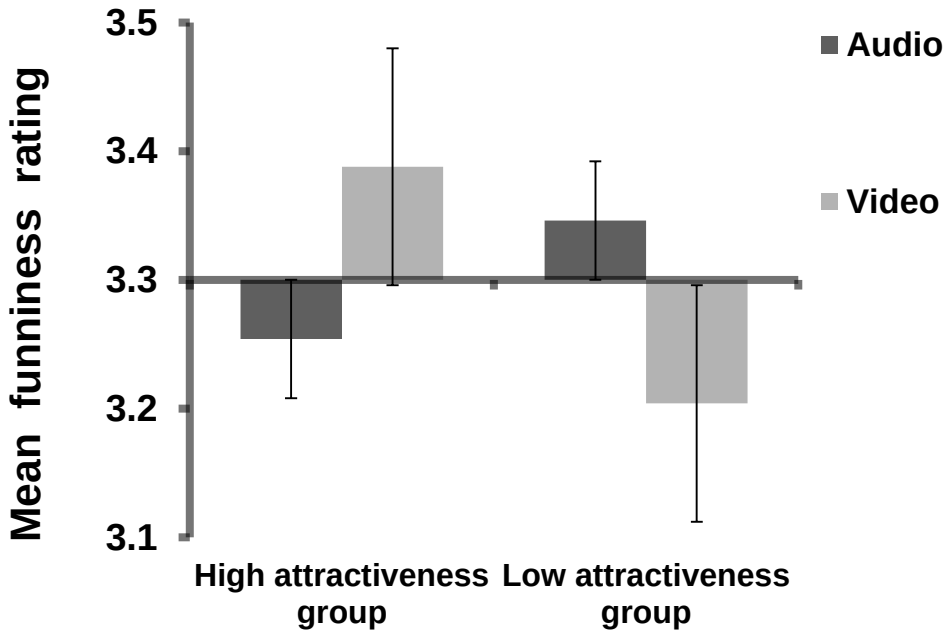
2.4 Results

2.4.1 Does physical attractiveness influence ratings of funniness?

A 2x2x2 repeated measures analysis of variance (ANOVA) was carried out with modality ("audio rating of funniness" and "video rating of funniness") as the within-

participants factors and attractiveness group and sex as the between-participants factors. This revealed that there was no significant effect of modality ($F_{1, 38} = 0.01$, $p = .947$, $\eta p^2 < .001$) or sex ($F_{1, 38} = 0.28$, $p = .598$, $\eta p^2 = .01$) but there was a significant interaction between attractiveness and modality ($F_{1, 38} = 4.94$, $p = .032$, $\eta p^2 = .12$). As Figure 1 illustrates, this suggests there is a halo effect for attractiveness on funniness ratings as being physically attractive increases ratings of funniness in the video condition compared to the audio condition.

Figure 1 Mean ratings of funniness for high and low attractiveness group in the audio and video condition (with standard error bars).



An Independent Samples t-test found that the high attractiveness group were rated as significantly more funny than the low attractiveness group in the photograph condition, ($t_{38} = 2.91$, $p = .006$), supporting the hypothesis that more attractive people would be thought of as being funnier than less attractive people.

However, as shown in Table 1, the ratings of funniness according to attractiveness were not significantly different for the audio and the video condition.

Table 1 Comparison of funniness ratings between attractiveness groups.

	Attractiveness		
	High	Low	*t*(38)
Mean Attractiveness:	3.26	2.15	8.94**
Mean Funniness: Audio	3.25	3.35	–0.47
Video	3.39	3.20	1.06
Photo	2.76	2.39	2.91*

** $p < .001$, * $p < .05$

2.4.2 Is being funny more attractive for short-term or long-term relationships?

To address whether humour was more attractive for short-term or long-term relationships, the data were split by gender of the actor instead of attractiveness group, as it was anticipated that there would be gender differences (Miller, 2000). Pearson's correlations were used to analyse the relationships between funniness across all three modalities and attractiveness for short and long-term relationships. The modality of most importance was considered to be the audio condition because these data were unlikely to have been strongly affected by the halo effect for visual attractiveness which was demonstrated in the last analysis. Pearson's correlations demonstrated that funniness in males was positively and significantly associated with both short-term attractiveness ($r = .77$, $p < .001$) and long-term attractiveness ($r = .47$, $p = .039$). In females, funniness was also positively associated with short-term attractiveness ($r = .52$, $p = .018$) but funniness was positively but not significantly associated with long-term

attractiveness (r = .26, p = .267). These data are summarised in Table 2 below for comparison.

Table 2 Comparison of the importance of funniness for short-term and long-term relationships across modalities for males and females.

	Audio		Picture		Video	
	Male	Female	Male	Female	Male	Female
Long-term Attractiveness	.47*	.26	.71**	.26	.54*	.42
Short-term Attractiveness	.74**	.52*	.74**	.35	.48*	.49*

** p < .001, * p < .05

In males, funniness was attractive for short-term and long-term relationships, however the difference in effect size prompted the next analysis to determine how much of the difference in attractiveness was due to funniness. To measure this, the ratings of short-term attractiveness were subtracted from the ratings of long-term attractiveness, creating a new variable referred to as “The relative preference as a long-term partner versus short-term partner”. This variable was then correlated with funniness ratings, which revealed a negative and significant relationship in males (r = –.56, p = .010). This demonstrated that males who were rated as funnier were also rated as being more attractive for short-term relationships relative to attractiveness for long-term relationships. In females, the correlation was also negative but was not significant (r = –.16, p = .504), demonstrating that females rated as funnier were also rated as being more attractive for short-term relationships relative to attractiveness for long-term relationships, although not significantly.

2.5 Testing the similarity between flirting and humour

2.5.1 Rationale

In order to help to interpret the findings from the main-study, a follow-up study was conducted in order to investigate whether the short-term attractiveness of humour is driven by the proposed similarity between flirtatiousness and funniness according to the Interest Indicator model. It was suggested that the short-term attractiveness of funniness may echo the perceived desire for short-term relationships which is associated with individuals using a playful flirting style, similar to funniness (Hall, Carter, Cody, & Albright, 2010). The follow-up study was designed to investigate if flirtatiousness was rated in a similar way to funniness in the same stimuli previously used and the impact that these ratings had on the attractiveness of different relationship contexts.

Study 2

2.6 Method

2.6.1.1 Participants

Raters were eleven undergraduate students from the University of Stirling, participating to fulfil a course requirement (5 males and 6 females; age M = 20.2, *SD* = 2.7).

2.6.1.2 Stimuli

The stimuli used are the same as the stimuli used in the Main study.

2.6.1.3 Procedure

The procedure follows the previous study, except that participants were asked to rate the stimuli for “flirtatiousness”.

2.7 Results

The data from the video condition were used due to the more dynamic nature of flirtatiousness (Morrison, Clark, Gralewski, Campbell, & Penton-Voak, 2010). The data was initially split by sex as it was anticipated that flirtatiousness would be rated differently between the sexes as was funniness. Pearson’s correlations demonstrated that there was a significant positive relationship between the ratings of flirtatiousness and funniness for males (r = .66, p = .002) and females (r = .47, p = .038) in the video condition, supporting the hypothesis that perceived flirtatiousness and funniness are related.

A partial correlation was then performed to determine how much of the short-term attractiveness of funniness was related to its perceived similarity to

flirtatiousness, therefore perceived flirtatiousness was controlled for in this analysis. After performing this analysis, the relationship between funniness and the relative difference between long-term and short-term attractiveness was no longer significant for males (r = –.20, p = .420) or females (r = –.11, p = .663), in the video condition. This finding lends support to the idea that the similarity between flirtatiousness may be moderating the relationship between long-term versus short-term attractiveness and funniness.

2.8 Discussion

The current study investigated whether humour is subject to a halo effect, how attractiveness relates to funniness for different relationship contexts and how this relates to sex of the producer. Firstly, the results support the hypothesis that the physical attractiveness of the producer influences the attractiveness of humour, offering support for Li et al.'s Interest Indicator model (2009) rather than Miller's Mating Mind theory (2000) which suggested that humour should enhance attractiveness. In line with Li et al.'s findings, there was an interaction between conditions suggesting that individuals who were higher in attractiveness were rated as being funnier in conditions with visual elements whilst individuals of lower attractiveness were rated as less funny than they were rated in the audio condition, although it is unclear why actors in the low attractiveness group would be less funny in the video condition. It could be speculated that the effect is similar to that in Rall, Greenspan, & Neidich's (1984) study, where they found that raters preferred unattractive people with averted gaze over direct gaze in photographs, potentially because they do not want attention from unattractive people. It follows that, if raters do not want attention from less attractive people, they may also be less likely to describe less attractive actors as funny in the video condition, as

laughter could be seen as a way to reciprocate interest (Stillman & Maner, 2009), which raters in this study may have wanted to avoid. Alternatively, it could be speculated that raters are more attentive to videos of more attractive actors which leads to higher ratings of funniness.

The halo effect of attractiveness on humour found in the current study does seem to demonstrate that humour is an aspirational and desirable quality in a mate if raters tend to ascribe this quality to more attractive individuals, however there was a demonstrable sex difference in the relationship between attractiveness and humour, which is highlighted in the results of the photograph condition. In this condition, there was a strong relationship between attractiveness for long-term and short-term relationships and funniness in males, but not in female actors. This is in line with previous work suggesting that funniness in females is not as attractive as it is in men but it could also suggest that females who are physically attractive are not expected to be funny, whereas attractive males are. This finding seems to suggest that funniness in females may not be an indicator of genetic quality but may perhaps be a cue to another quality; in this study, it was suggested that this quality was flirtatiousness.

The purposeful act of using humour to initiate contact with an attractive person has much in common with research exploring the effectiveness of chat-up lines (Bale et al., 2006; Cooper et al., 2007) and flirting (Frisby, Dillow, Gaughan, & Nordlund, 2010), which are similar to humour use in both behaviour and intention if humour is viewed from the Interest Indicator perspective. Revealing that perceived flirtatiousness and funniness are strongly related and that flirtatiousness appears to be moderating the relationship between funniness and short-term attractiveness gives insight into why humour may be less

attractive for long-term relationships. It is suggested that men's flirtatiousness will reduce their attractiveness to females because it nurtures an impression of not being serious or willing to invest in a mate (Frisby et al., 2010) and this appears to be reflected in the behaviour of those who tend to engage in a more playful flirtatious style, as Hall et al.(2010) found those individuals more likely to engage in short-term relationships. This suggests that the attractiveness of humour may be more complex than has been previously speculated as different styles of humour, such as sexual innuendo, may signal proceptivity as opposed to good genes, although (Clark, Jack, Morrison, & Penton-Voak, 2009) speculate that effective flirtatiousness may also be an honest signal of mate value due to it being difficult to produce.

However, the current study also established that funniness in females was attractive for short-term relationships, which was not hypothesised. In Bressler et al.'s (2006) study, they too found that the sexually dimorphic nature of humour was most apparent when raters judged how attractive funniness was for long-term relationships, whereas no significant difference was found for short-term relationships, which they suggest casts doubt on Miller's model. The same pattern was established in the current study, with less sexually dimorphic patterns appearing in ratings of short-term relationships, but I suggest that this is due to the association between flirtatiousness and funniness and the act of a trade-off (Scheib, 2001), rather than a shortcoming of the model. If a male perceives a funny female to be more flirtatious, it may increase her short-term attractiveness because it is more likely that she will be receptive to his advances (Clark et al., 2009; Morrison et al., 2010). Finding that more attractive females are not expected to be funny in the photograph condition but that funny females are more

attractive for short-term relationships in the other conditions seems to suggest that funniness is not an indicator of genetic quality in females as it may be in males, but rather could act as a cue to flirtatiousness or proceptivity for males. With the current study basing these findings on relatively low ratings of physical attractiveness, future studies could test the effect with highly attractive women to see if this produces the same halo effect found in males.

A limitation of the study was that I also had relatively small numbers of male and female raters. Whilst previous research has shown that ratings of attractiveness are largely homogenous (Saxton, DeBruine, Jones, Little, & Roberts, 2009), recruiting more raters may have helped to reduce the variance in the data. Additionally, the raters were asked to rate both male and female participants for attractiveness and funniness. This may have introduced variance to the data due to the potential difficulty a heterosexual sample may face in rating the short-term and long-term attractiveness of a same-sex individual. Whilst there were strong positive correlations between the ratings of male and female raters in this sample, future work could more closely examine whether there are sex differences in rating short-term and long-term attractiveness, and how this relates to ratings of funniness. Likewise, it would be interesting in future studies to examine these effects using both heterosexual and homosexual actors and raters to test the impact of sexuality on such ratings. A final limitation of the study was that multiple statistical tests were carried out, inflating the risk of Type 1 errors occurring in the data; this could potentially result in failure to reject the null hypothesis when it is true. Whilst the researchers were mindful to interpret the findings with caution, future research could address this in the analysis. For example, analyses such as linear regressions could have been used as an alternative to the analyses

presented, which may have reduced the number of tests carried out. Additionally, Bonferroni corrections could have been used in order to ensure the significance levels were interpreted in a more conservative way (Benjamini & Hochberg, 1995).

2.9 Summary

In conclusion, this research furthers our understanding of why humour may still be used by females in the context of relationship initiation and adds further support to the argument that humour is sexually dimorphic in nature and perceived to be indicative of genetic quality in males. Further research is warranted to investigate whether the type of humour used can impact on attractiveness ratings, as the current study did not account for this. Whilst it appears that funniness is not such an aspirational quality in a mate for males, it could be suggested that humorousness is a quality men think they need to trade-off for attractiveness in women, but this currently remains speculative. The context of this association may also impact on ratings meaning that, perhaps, when faced with a choice between attractiveness or funniness in different relationship contexts a good sense of humour may prove to be more important in females than has been previously estimated.

Chapter 3 The impact of humour style on the attractiveness of personal advertisements

This chapter is based on the following published manuscript;

Cowan, M L& Little, A. C. (2013) The attractiveness of humour types in personal advertisements: Affiliative and aggressive humour are differentially preferred in long-term versus short-term partners. *Journal of Evolutionary Psychology, 11*(4), 159-170.

3.1 Abstract

A good sense of humour is commonly offered in written dating advertisements demonstrating that humour is an important quality to have when attracting a mate, but not all humour is the same. This study used vignettes in the style of a personal advertisement to measure the attractiveness of affiliative and aggressive humour in different relationship contexts. The results demonstrated that affiliative humour was more attractive than aggressive humour in both relationship contexts but especially for long-term relationships. The results follow the pattern expected of affiliative humour styles being more attractive for long-term relationships due to being linked to qualities that may be important in long-term relationships such as likelihood of cooperation, and aggressive humour styles not being favoured for long-term relationships due to being linked to qualities that may be detrimental in long-term relationships. A follow-up study confirmed that different humour styles were associated with different perceived personality traits. Together these findings suggest that humour may be used to indicate an individual's personality and that the attractiveness of a good sense of humour depends on both the type of humour and the type of relationship being sought.

3.2 Introduction

3.2.1 The use of personal advertisements in mate choice research

A good sense of humour (GSOH) is commonly offered in written personal advertisements suggesting that humour is an important quality to have when attracting a mate (Buss, 1988). Generally, the presence of a 'good sense of humour' is associated with positive personality traits (Cann & Calhoun, 2001),

and is suggested to be an honest signal of gene quality (Greengross & Miller, 2011; Miller, 2000). Greengross and Miller (2011), in testing this theory, found humour ability in men to be positively associated with intelligence and their mating success, providing support for the sexual selection theory of humour. Whilst humour may indeed be an honest signal of gene quality, this is not the only function it has as evidence demonstrates that producing humour is an effective way of indicating interest to a potential mate (Li et al., 2009). This may be due to the similarity between humour and flirtatiousness (Chapter 2), which may in turn increase how attractive the humour production is. However, humour can be expressed in different ways and most theories concerning the sexual selection of humour or the Interest Indicator model are not comprehensive in specifying what type of humour is most attractive in different relationship contexts or whether different types of humour are more or less related to the advertisement of gene quality. Spontaneous wit has been suggested to demonstrate genetic quality (Bale et al., 2006; Miller, 2000) however these authors never make clear precisely what 'wit' might involve, meaning that it is unclear how positive or negative this humour style might be. Greengross and Miller (2008) have suggested that self-deprecating humour may be more attractive than other-deprecating humour because it allows high quality individuals to display their desirable attributes as well as their modesty. However, referring only to deprecating humour may be too narrow a distinction; indeed, other types of humour may be more pertinent to the discussion of the attractiveness of humour styles.

In the Humour Styles Questionnaire (Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003), there are four main humour styles which are frequently referred

to and evidenced in humour literature (Kuiper & Leite, 2010), two of which are directed at the self; self-enhancing and self-defeating, and two of which are directed at others; aggressive and affiliative. In the current study, I focussed on other-directed humour due to the deliberate influence aggressive and affiliative humour have on interpersonal relations, although perhaps in contrasting ways (Howland & Simpson, 2013). Despite evidence demonstrating the link between a 'good sense of humour' and positive personality traits, individuals who use aggressive or affiliative humour are percieved quite differently (Kuiper & Leite, 2010; Zeigler-Hill & Besser, 2011) and have largely differing personality traits (Martin et al., 2003), which may impact on the type of relationships they are most attractive for.

Aggressive humour is characterised by sarcasm, teasing, or directing ridicule at others with the intention of putting them down (Martin et al., 2003). Through questionnaire studies, Martin et al. (2003) found that individuals high in aggressive humour are more neurotic, serious, and higher in unmitigated agency and masculinity, with other studies demonstrating a link between aggressive humour and psychopathy (Martin, Lastuk, Jeffery, Vernon, & Veselka, 2012; Masui, Fujiwara, & Ura, 2013; Veselka, Schermer, Martin, & Vernon, 2010). Demonstrably, aggressive humour is associated with less socially desirable traits (Kuiper& Liete, 2010) and Zeigler-Hill, Besser and Jett (2013) have found that people who use aggressive humour are considered to be lower in mate value than those who use affiliative humour. Crucially however, Zeigler-Hill, Besser and Jett's (2013) study did not examine whether relationship type impacted on attractiveness ratings. Previous research has demonstrated the importance of temporal context when rating attractiveness (Little, Jones, Penton-Voak, Burt, &

Perrett, 2002; Little, Connely, Feinberg, Jones, & Roberts, 2011), as different qualities may be more attractive for short-term than long-term relationships. It could therefore be speculated that aggressive humour may be attractive in some contexts but that this may have been overlooked by not differentiating between short and long-term relationships.

Aggressive humour could aid a user in intrasexual competition by allowing them to protect their reputation and self-image (Galloway, 2010)and could be considered a less risky strategy than physically aggressing against a competitor (Bjorkqvist, 1994). In enabling users to derogate competition, whilst attempting to conceal their intentions under the guise of humour, aggressive humour could be considered an effective instrument of indirect aggression and may serve as an important signal of status and dominance (Greengross & Miller, 2008). Dominance is a path to high status in humans which is characterised by relatively undesirable personality traits, such as intimidation and forcefulness (Henrich & Gil-White, 2001), which could potentially manifest itself in direct (physical) aggression or indirect (verbal) aggression (Fisher, 2013). However, there may be important fitness benefits in partnering with a dominant man. Mating with a man who could offer status and a degree of protection to a potential mate (Trivers, 1972) may make dominance, and therefore aggressive humour, more appealing to women; although this is more likely to be true for short-term relationships. When seeking a mate to reproduce with, a woman should consider how good a partner and parent he would make (Little et al., 2011, 2002), meaning that those who use aggressive humour and appear more dominant may not make ideal long-term partners (Snyder et al., 2008).

Preference questionnaires demonstrate support for this notion. Kruger and Fitzgerald (2011) found that dominant personality traits (not including sense of humour) are mainly attractive for short-term relationships. The same study also found that men high in prestigiousness were more attractive for long-term relationships, suggesting men higher in socially desirable traits, such as affiliation and cooperativeness, are considered better partners. This corresponds with Zeigler-Hill, Besser and Jett's (2013) finding that those who use affiliative humour are more attractive than those who use aggressive humour. Affiliative humour is markedly different from aggressive humour because, rather than being at the expense of individuals, it is inclusive and brings groups together (Martin et al. 2003). Affiliative humour also has more desirable associations than aggressive humour as it relates positively to cheerfulness, high self-esteem, and extraversion (Martin et al. 2003) and is not related to dominance the way aggressive humour is. By contrast, affiliative humour may demonstrate cooperativeness and help to strengthen relationships, which will not help a user to gain status the way aggressive humour might, but it may help individuals reinforce the status they already have (Galloway, 2010; Keltner, Young, Heerey, Oemig, & Monarch, 1998). In such a way, humour and status may be related and, in the case of aggressive humour, humour may be a means by which one exerts status over others, although it is unclear if this may be the case for both men and women. As status and humour are differentially preferred in men and women, it is likely there would be sex differences in how attractive these humour types are perceived.

Research on both status and humour tends to focus on men as producers and women as appreciators, and it follows that there is some evidence to suggest

that both status and humour production are more important qualities in a mate to women than they are to men (Bressler et al., 2006; Brown & Lewis, 2004). Whilst women seek men who are higher in status (Trivers, 1972), and a partner who can produce humour well (Bressler et al., 2006), men place greater importance on appearance, tending to seek out cues for attractiveness and youth (Buss, 1989). As such, a potential partner producing humour well, or producing a particular type of humour, may be generally less appealing to men than it is to women. In addition to this, if humour is a way of exerting status, funnier women may be relatively less attractive to men because non-dominance is more attractive than dominance in women (Brown & Lewis, 2004), further demonstrating the potential for sex differences in appreciating affiliative and aggressive humour.

3.2.2 Rationale

Study 1 used vignettes in the style of a personal advertisement in order to measure how attractive two types of humour are in different relationship contexts. This novel methodology, created to maximize the ecological validity of the study, allowed the manipulation of humour style alone. Advertisements were created following the template of advertisements available on mysinglefriend.com; a website designed for people to write dating advertisements for their friends, which removes any possible misinterpretation that may be caused by actual use of humour as humour style was described. In Study 1, I hypothesised that the advertisements describing affiliative humour would be more attractive for long-term relationships than aggressive humour for both men and women. It was also hypothesised that for men rating women's advertisements, affiliative humour would be preferred over aggressive humour for short-term and long-term

relationships, due to the association between dominance and aggressive humour. In contrast, due to the same association, I hypothesised that aggressive humour would be preferred for short-term relationships over affiliative humour, compared to long-term relationship preferences, for women rating men's advertisements.

In order to help interpret the findings of Study 3, in Study 4, the advertisements were rated by a new set of participants for dominance and cooperativeness to determine if the humour used in the advertisements were indicating particular associated personality traits. I predicted that advertisements describing aggressive humour would be rated higher in dominance than cooperativeness and that advertisements describing affiliative humour would be rated higher in cooperativeness than dominance.

Study 3

3.3 Method

3.3.1 Creating the personal advertisements

Prior to stimuli creation, approximately 50 online dating advertisements were studied by the researchers, paying specific attention to how humour was described, in order to ensure that the advertisements created were naturalistic and contained similar content and structure to genuine adverts (followingStrassberg & Holty, 2003). Whilst it was important to maintain ecological validity, it was also important to ensure that the advertisements were relatively similar in order to reduce the possibility of an extraneous variable in the data. In order to ensure homogeneity (aside from the humour manipulation), all advertisements were of equal length and content, consistently referencing only neutral hobbies and descriptions which provided no further clues about wealth, intelligence, education, or physical appearance. Twenty adverts describing men were initially created and the pronouns were then adapted to create twenty adverts describing women, ensuring that male and female adverts were identical. Out of the twenty created, ten were designed to describe someone with an aggressive humour style, meaning someone who puts other people down with humour, e.g. Her sense of humour is cutting, scathing, deadpan, and hilarious-you'll enjoy it as long as you don't take yourself too seriously. Ten additional adverts then described a person with an affiliative humour style, someone whose humour was not aimed at others, e.g. …and he's got a great sense of humour; he'll have you and all your friends laughing at his witty observations on life! This

manipulation only concerned the sense of humour; therefore, personality was not described in the advertisements.

3.3.2 Rating the attractiveness of the advertisements

3.3.2.1 Participants

The protocol for this study was approved by the University of Stirling Psychology Ethics Committee. There were 68 participants (33 females and 35 males, age M = 21.3, *SD* = 3.6, range = 17-33) in total who were all undergraduates at the University of Stirling, participating to fulfil a course requirement.

3.3.2.2 Procedure

Advertisements were presented sequentially in an online self-paced questionnaire, with each participant rating 20 adverts describing members of the opposite sex. Participants were told they were rating genuine advertisements taken from an online dating website and were asked to rate each advertisement for how attractive it was for short-term and long-term relationships on a Likert (1-7/low-high) scale. Participants were provided with a brief definition of what each relationship entailed to ensure the definitions used were consistent. The relationship descriptors highlighted that the relationship types differed in terms of the level of commitment they required, therefore a short-term relationship may only involve a single date, or one-night stand, whereas a long-term relationship may lead to moving in together or getting married (see Little et al., 2011). These definitions were onscreen throughout the study though the advertisements were presented in a random order. Participants were debriefed following completion of the study.

3.4 Results

Data were analysed by participant, therefore, for each participant, a mean score based on ratings given to each advert was calculated separately for the affiliative humour and aggressive humour advertisements both for short-term and long-term attractiveness. This produced four scores for each participant: affiliative humour long-term attractiveness, affiliative humour short-term attractiveness, aggressive humour long-term attractiveness, and aggressive humour short-term attractiveness. A repeated measures Analysis of Variance (ANOVA) was conducted with type of relationship (short-term/long-term) and type of humour (affiliative/aggressive) as the within-participants factors and sex as the between-participants factor. This revealed a significant interaction between relationship, type of humour, and sex ($F_{1, 66} = 4.20$, $p = .044$, $\eta p^2 = .06$) prompting the next analysis.

The data were split by sex and a second repeated measures ANOVA was conducted with type of relationship (short-term/long-term) and type of humour (affiliative/aggressive) used as within-participants factors. In women rating men's advertisements, this revealed a significant interaction between the type of advertisement and relationship ($F_{1, 32} = 11.87$, $p = .002$, $\eta p^2 = .27$). It was also demonstrated that there was a main effect for type of humour ($F_{1, 32} = 11.66$, $p = .002$, $\eta p^2 = .27$), such that affiliative humour was the preferred humour type across both relationship types (see Table 3). In men, the interaction between relationship and humour type was not significant ($F_{1, 34} = 3.01$, $p = .092$, $\eta p^2 = .08$), although the pattern was in the same direction as for women. There was also a main effect for type of humour ($F_{1, 34} = 6.09$, $p = .019$, $\eta p^2 = .15$) such that affiliative humour was preferred across both relationship types.

Paired Samples t-tests were used to test the relative difference in preference between relationship type within each humour type. This demonstrated no significant differences in the advertisements rated by men for the attractiveness of aggressive humour between short-term and long-term relationships (t_{34} = 0.86, p = .396, d = 0.08) or affiliative humour (t_{34} = –1.04, p = .305, d = –0.12). In the advertisements rated by women however, Paired Samples t-tests demonstrated that aggressive humour was significantly more attractive for short-term relationships than long-term relationships (t_{32} = 2.85, p = .008, d = 0.47) and affiliative humour was marginally significantly more attractive for long-term relationships than short-term relationships (t_{32} = –2.02, p = .052, d = –0.35).

Lastly, Independent Samples t-tests were used to test if advertisements describing men were rated as being more attractive than advertisements describing women. This revealed that there were no significant differences between men and women's ratings in all four conditions (see Table 3).

Table 3 Mean attractiveness ratings of affiliative and aggressive humour style and comparisons between men and women's rating.

	Affiliative Humour			Aggressive Humour		
Relationship	Male *M(SD)*	Female *M(SD)*	t_{66} *(d)*	Male *M(SD)*	Female *M(SD)*	t_{66} *(d)*
Short-term	3.89 (1.23)	3.86 (0.98)	0.11 (0.03)	3.77 (1.22)	3.80 (0.94)	–0.10 (–0.02)
Long-term	4.03 (1.16)	4.22 (1.12)	–0.69 (–0.17)	3.68 (1.16)	3.42 (0.69)	1.12 (0.28)

Study 4

3.5 Method

In order to help interpret the results from Study 3, a follow-up study was conducted in which the advertisements were rated again for cooperativeness and dominance. This study was carried out to test the manipulation and to examine if different perceived personality traits were related to the different humour styles in the advertisements.

3.5.1 Stimuli

The stimuli used were the same stimuli presented in Study 3.

3.5.2 Rating the stimuli

3.5.2.1 Participants

There were 33 participants (17 females and 16 males, age M = 22.2, *SD* = 5.5, range = 18-37) in total. This sample was comprised of undergraduates at the University of Stirling, participating to fulfil a course requirement, and individuals contacted through social media sites.

3.5.2.2 Procedure

The procedure follows the previous study. Advertisements were presented sequentially in an online self-paced questionnaire and the order of presentation of the advertisements was randomised. Participants were told they were rating personality traits in 20 genuine opposite-sex advertisements taken from an online dating website. Participants were asked to rate each advertisement for how "dominant" and "cooperative" the person being described seemed using a Likert

scale (1-7/low-high). Following completion of the study, participants were debriefed.

3.6 Results

A repeated measures Analysis of Variance (ANOVA) was conducted with type of humour (affiliative/aggressive) and quality (dominant/cooperative) as the within-participants factors and sex as the between-participants factor. This revealed a significant main effect of quality ($F_{1, 31}$ = 6.87, p = .013, ηp^2 = .18) which was qualified by a significant interaction between quality and type of humour ($F_{1, 19}$ = 91.94, p<.001, ηp^2 = .75). Paired Samples t-tests were used to test the relative difference between dominant and cooperative ratings in the affiliative and the aggressive advertisements. In comparing dominance and cooperativeness rating in the affiliative advertisements, a Paired Samples t-test demonstrated that affiliative advertisements were rated as being significantly more cooperative (M = 5.16, *SD* = 0.51) than dominant (M = 3.55, *SD* = 0.80) (t_{32} = –9.43, p <.001, d = 2.44). A second Paired Samples t-test demonstrated that, when comparing the dominance and cooperativeness ratings for the aggressive advertisements, aggressive advertisements were rated as being significantly more dominant (M = 4.73, *SD* = 0.61) than cooperative (M = 3.84, *SD* = 0.78) (t_{32} = 4.34, p <.001, d = 1.29).

3.7 Discussion

The current studies investigated the impact of aggressive and affiliative humour styles on short-term and long-term attractiveness for men and women (Study 3) and their associated personality attributions (Study 4). Comparing the two humour types, women found affiliative humour to be more attractive than

aggressive humour in both relationship contexts. It was hypothesised that the fitness benefits of partnering with a dominant man may make aggressive humour more attractive than affiliative humour for short-term relationships. Whilst aggressive humour was not found more attractive than affiliative humour for short-term relationships, there was a relative shift in preference indicated by an interaction. Affiliative humour was more attractive than aggressive humour for long-term relationships while the two humour types were almost equally attractive for short-term relationships demonstrating that aggressive humour is a relatively more attractive humour when women rate men for short-term relationships. This pattern suggests that affiliative humour may be a cue to good long-term partner characteristics, as I hypothesised, and Study 4 demonstrated that affiliative humour was associated with cooperativeness. The results therefore support the assertion that the attractiveness of humour styles may follow the same pattern established by Kruger and Fitzgerald (2011) that dominance and cooperativeness (prestige) are differentially preferred.

In men rating women's advertisements, a pattern emerged which supported the hypothesis that affiliative humour was more attractive than aggressive humour in both relationship contexts. This was the same pattern which was found in women rating men's advertisements, though the overall effect of relationship type was not as strong, nor was it significant in men rating women's advertisements (p = .092). As Study 4 demonstrated that aggressive humour is associated with dominance, a quality which men do not find attractive in women (Brown & Lewis, 2004), the main effect for humour type and the preference for affiliative humour supports the pattern hypothesised. Humour style evidently mattered more to men's ratings of women's advertisements than

relationship type. This is in contrast with women's ratings of men's advertisements, where relationship type interacted with humour style, and this difference may reflect the fact that it is more important for a woman to ensure that she picks a cooperative partner for long-term relationships. A woman potentially faces greater costs than a man by picking an unsuitable mate due to the greater costs of reproduction faced by women (Trivers, 1972) therefore it could be speculated that this is why I observed a significant difference according to relationship type in women only.

On a similar note, as men tend not to find funniness as attractive as women do (Bressler et al., 2006; Cowan & Little, 2013b, Chapter 2), I may have expected men to find descriptions of funny women generally less appealing than women found descriptions of funny men. Therefore, it is interesting to note that there were no overall significant differences in the attractiveness ratings between men and women across the advertisements. As men did not find the advertisements less attractive than women found them, it could be speculated that funniness was signalling another quality that is attractive to men, such as flirtatiousness. Previous research has demonstrated the similarity between funniness and flirtatiousness (Cowan & Little, 2013b; Keltner, Capps, Kring, Young, & Heerey, 2001) and, to consider the manifestation of aggressive humour as teasing directed at one individual, it could be that aggressive humour appears to be flirtatious. Humour use may be a signal to men or women rating the advertisement that the subject is proceptive to advances, which make them sound more appealing.

Wilbur and Campbell (2011) suggest humour style itself is not the important consideration but rather traits associated with that humour style.

Indeed, the results do suggest that raters were using humour style as a cue to personality. Judging someone's attractiveness from something as brief as a personal advertisement may mean raters rely more on humour style to garner information about personality, though this corresponds more broadly with the sexual selection theory of humour (Miller, 2000) and the Encryption Model of humour (Flamson& Barrett, 2008). Producing humour requires many important cognitive skills, such as theory of mind, abstract thinking, and highly advanced language skills (Polimeni& Reiss, 2006), common knowledge and problem-solving abilities (Flamson & Barrett, 2008), as well as creativity and intelligence (Greengross & Miller, 2011), therefore producing humour is potentially an honest signal and a shortcut to demonstrating these valuable traits. The current study has shown that a humorous partner can be attractive to both men and women, perhaps for different reasons, but that the style of humour used is important as it communicates different personality traits. To further our understanding of how humour style interacts with attractiveness, the association between humour and high status could be explored in greater depth because understanding the association between the two factors could explain the sex differences in appreciating a humorous partner, which are found in a number of studies (Bressler et al., 2006; Cowan & Little, 2013b; Wilbur & Campbell, 2011). In addition to this, future work could investigate how men and women perceive the these humour types when they are being produced by same-sex individuals, providing insight into the role humour may play in intrasexual competition.

3.7.1 Summary

In summary, the data are consistent with the idea that sense of humour is perceived as an indicator of personality and, if considered a conduit of either

dominance or cooperativeness, may play an important role in communicating mate value to the opposite sex. Different humour styles were found differently attractive across relationship context, at least in women. The proposed relationship between humorousness and high status, in terms of either dominance and prestige, and their different impact on attractiveness across relationship context warrants further testing as this could be an additional aspect of humour being a ‘good genes’ or ‘good personality’ indicator which has yet to be explored. These associations may help us to further our understanding of the sex difference we find in the attractiveness of humour.

Chapter 4 Human conversational behaviour; cues to humour and dominance.

4.1 Communication of humour and the influence of dominance

As Chapter 3 demonstrated, there is evidence to suggest that humour style may be a way of communicating important cues to personality traits, such as cooperativeness and dominance. Whilst a written joke in isolation may have connotations to certain personality traits, I was interested in looking further at how humorous conversational content related to nonverbal and other verbal cues to cooperation or dominance. Nonverbal behaviours relating to humorous conversation are largely restricted to smiling and laughing; both of which are suggested to be signs of appreciation and submission towards the humour producer (Provine, 2000). The intentionality behind humour may vary according to the style of humour being used, for example an affiliative joke may be a sign of cooperation (Cowan & Little, 2013b; Chapter 3), but laughing at a joke made by another person can usually be interpreted as a sign of cooperation and affiliation (Vigil, 2009). Context is important to consider because laughing at a joke made at the expense of another person is more likely to be a signal of cooperation towards the humour producer, rather than the victim of the joke. Despite the fact that laughter may therefore manifest in different ways (Bachorowski, Smoski, & Owren, 2001; Keltner & Bonanno, 1997), like smiling, both are largely considered to be affiliative displays (Fridlund, 1991). Examining how smiling and laughter relate to other cues of cooperativeness or use of different types of jokes may provide important insights into the affiliative intentionality of these behaviours.

In examining nonverbal behaviour which relate to dominance, an additional consideration is a head nod. Nodding may perform a similar function to smiling and laughing in demonstrating cooperation (Grainger &Dunbar, 2009)

and the three behaviours are often observed occurring together as a show of affiliation by audiences (Greatbatch & Clark, 2003). Whilst it is not associated with appreciating or producing humour, nodding is strongly linked to the communication of status. Evidence has demonstrated the differences in nodding frequency between those higher and lower in status, such that those who are of low status are more likely to nod more (Helweg-Larsen, Cunningham, Carrico, & Pergram, 2004), just as they are also more likely to smile and laugh (Mehu & Dunbar, 2008). In this chapter, I will elaborate more on the evidence demonstrating how smiling, laughing, and nodding appear to relate closely to the expression of status, as well as how they differ between males and females.

To return to the discussion of humour styles and the communication of personality traits, I was also keen to examine additional aspects of speech which could relate to dominant and cooperative behaviours and how they might relate to humour use. Like nonverbal behaviour, there are many quantifiable variables within verbal behaviour which may relate to personality traits; however I chose to focus on three commonly and frequently observed behaviours which were hypothesised to provide the greatest insight into how humour relates to conversational behaviour. Previous research has highlighted three key aspects of speech which relate to the expression of dominance, such as time spent talking and interruptions (Johnson, 1994), as well as use of plural and other-pronouns, therefore I wanted to test how these variables related to humour use. A final variable which was of interest was the frequency of disfluencies in conversation. There is no research testing if there is a relationship between disfluencies and humour use or dominance, however disfluencies are an important and frequent part of natural speech therefore they are discussed in this Chapter and empirical

evidence concerning the use of disfluencies in a competitive conversation is presented in Chapter 5.

Capturing these behaviours occurring in the course of a conversation between two individuals may provide insight into how affiliative or aggressive humour styles are used in combination with other important cues. In the proceeding section, I will further elaborate on the importance of hierarchies within human society in order to highlight the importance and impact of dominance on social interaction. I begin by demonstrating how dominance relates to aspects of physical appearance which contribute towards making high status adaptive, before moving on to illustrate how dominance may also be communicated through verbal and nonverbal cues.

4.2 The nature of dominance and hierarchies

Regardless of one's status, the basic and adaptive urges to gain resources and increase biological fitness will involve engaging in some level of competition with others. As Henrich and Gil-White (2001) highlight, it would be an inefficient system if every time there was competition for resources a physical fight was required to decide who the victor was. Dominance hierarchies pre-empt possible conflict by presenting and maintaining a system of default-winners. Judgements of dominance are formed very quickly, even from short glances at photographs (Rule, Adams Jr, Ambady, & Freeman, 2012), because dominance as a trait is considered to be communicated in a physical way. Individuals who are judged as being high in dominance tend to be those who are viewed as being able to successfully engage in a fist fight and to beat their opponent (Puts, Hodges, Cárdenas, & Gaulin, 2007). Whilst fighting ability is likely to have been

evolutionarily very relevant to fitness (Carrier & Morgan, 2014), in most social contexts in the modern age it is inappropriate to engage physically with competitors, in addition to it being felonious. Engaging others in discussion is an alternative way of reinforcing one's status but it is also an efficient way to quantify the ways that status can be exerted and the impact that status has on conversational outcomes (Smith-Lovin & Brody, 1989). In formal contexts, where two individuals of theoretically equal social standing are introduced to a competitive situation, I questioned what strategies both individuals might use in order to win if they are unable to rely on physical prowess.

4.3 The physical communication of status

Status is an integral aspect of human interaction, influencing how we behave towards each other and the power we have in society. Research on the topic tends to focus more on how status is communicated and utilised by men, perhaps due to the fact that being dominant has a more tangible and adaptive influence on men's lives than it appears to have on women's lives (Brown & Lewis, 2004). Men who are higher in dominance typically have higher levels of testosterone than non-dominant men (Johnson, Burk, & Kirkpatrick, 2007), which is associated with higher levels of masculinity in one's appearance (Pound, Voak, & Surridge, 2009). Accordingly, more dominant men are likely to bear sex hormone markers such as a wider jaw and thicker brow, and increased strength and muscle mass (Sell et al., 2009). Dominant men also tend to be taller (Buunk, Park, Zurriaga, Klavina, & Massar, 2008), which in turn creates the perception of being more intelligent and being a good leader (Blaker et al., 2013). Men who rate themselves as being dominant also tend to have a greater facial width-to-height ratio (fWHR) (Mileva, Cowan, Cobey, Knowles, & Little, 2014), which is linked

with the perception of other dominant traits, such as aggressiveness (Trebicky, Havlícek, Roberts, Little, & Kleisner, 2013) or untrustworthiness (Stirrat & Perrett, 2010). In sum, a substantial body of literature has contributed to forming an overall impression of what a dominant man looks like, and how this relates to the qualities he is perceived to have by others. Importantly, qualities associated with being dominant are considered adaptive and generally seem to contribute to increasing the fitness of dominant men.

In terms of being adaptive for sexual selection, research has demonstrated that more dominant men are relatively more attractive for short-term relationships (Kruger & Fitzgerald, 2011; Valentine, Li, Penke, & Perrett, 2014). This could be attributed to the fact that a strong immune system is a highly desirable trait in a mate (Thornhill & Gangestad, 1999) and the high levels of testosterone associated with dominance may signal a strong immune system due to the immunosuppressant nature of testosterone (Feinberg, 2008). However, a dominant appearance could also be attractive because it suggests that a man is more able to defend his mate and their offspring (Trivers, 1972), in addition to helping him to acquire greater access to resources (von Rueden, Gurven, & Kaplan, 2011).

Von Rueden et al (2011) observed the impact that high status had on the lives of Ton'tumsi and Jinac men; an indigenous culture of Tsimane forager-horticulturalists in Bolivia. In their study, they viewed high status as being high in either dominance or prestige. Prestige is a path to high status exclusive to human culture because it is derived from earning the respect of peers who appreciate the individual's skills and knowledge (Henrich & Gil-White, 2001). In contrast to the physical nature of dominance, prestige is characterised by valued knowledge

and, accordingly, there is no evidence to suggest that those high in prestige have higher levels of testosterone than typical men (Johnson et al., 2007). Despite the differences in the manifestations of dominance and prestige, von Rueden et al's (2011) field research demonstrated that both paths to status were associated with higher levels of fitness and more surviving offspring, social support in the form of a greater number of labour partners and visitors, and generally a greater number of allies.

Whilst dominance is associated with increased attractiveness, potentially leading to increased fitness (Kruger & Fitzgerald, 2011; Valentine et al., 2014; von Rueden et al., 2011), being dominant is also associated with increased access to resources. Whilst von Rueden et al's study (2011) demonstrated that higher status men may have increased resources which are freely given by their numerous allies, dominant men may gain resources in other more forceful ways. Research has shown that men with greater facial width-to-height ratio, who appear physically dominant, are more likely to behave selfishly and exploit others in economic games (Stirrat & Perrett, 2010). Their formidability may also mean that typical people are unwilling to challenge more dominant people due to the likely costs associated with doing this (Watkins, Fraccaro, et al., 2010) therefore being more dominant could lead to 'getting your own way' more. Yet this can potentially work against a dominant person; Being more dominant could create a 'Double Bind' situation, wherein being dominant can increase your resources but impact negatively on social relationships (Diekman, 2007). In experiments involving group discussions, dominant people are often rated as being less likeable than prestigious or relatively lower status individuals (Foulsham, Cheng, Tracy, Henrich, & Kingstone, 2010; Kacewicz, Pennebaker, Davis, Jeon, &

Graesser, 2013) and Stirrat and Perret's (2010) work with economic games showed that more dominant men are also (correctly) considered less trustworthy. Experimental research by Haselhuhn, Wong, & Ormiston (2013) further illustrates the impact that a dominant appearance can have on social interaction; participants engaging in an economic game behaved less generously towards participants who looked physically dominant. This finding could be evidence of a pre-emptive attempt to 'punish' a dominant person whom one has pre-judged to be less likely to reciprocate a cooperative gesture. However, there is more to being dominant than one's physical appearance. Dominance is also characterised by the use of coercive tactics and intimidation (Henrich & Gil-White, 2001) which goes beyond the power and impact of appearance alone. According to observational research (Argyle, 1988) in a conversational context dominance is signalled through the face and the voice.

Evidence from an eye-tracking experiment has demonstrated that individuals of high status are attended to significantly more than those of medium or low status (Foulsham et al., 2010). In this study, the stimuli used were videos of a trio engaging in a 'moon' task, where the participants in the task were asked to decide which objects would be most useful to take if they were stranded on the moon (Foulsham et al., 2010). Twenty-five participants watched these video clips on an eye tracking computer to determine which individual they gazed at most often. In this study, status was defined by the ratings of members of the group participating in the moon task and these ratings of status were verified after the experiment by additional raters naïve to the experiment. Eye-tracking analyses showed that people who were regarded by their fellow group members as being high status were gazed at more (more fixations and longer fixation time) than

people of medium status, who were in turn gazed at more than people of low status. When the authors controlled for length of time speaking, likeability, and the position the individual was presented on screen (in the middle of the trio or at the side), the effects of status on eye gaze remained robust. Furthermore, their results demonstrated that even when no one in the video was speaking, the person of highest status was still gazed at most often which may suggest that some aspect of nonverbal behaviour is responsible for the difference in eye gaze attendance. Similar results in other research support this, such as the findings of an observational study by Moore (1985). Moore (1985) investigated courtship behaviour in adolescent girls in schools and malls and found that the dominant girl in each group appeared to be the one gazed at most by the other girls, and she was the one whose nonverbal behaviour was most often mimicked by her friends.

Evolutionarily it is likely to be adaptive to monitor those high in dominance who could either offer important benefits as allies or pose a serious physical or social threat (Foulsham et al., 2010), but it is possible that attractiveness may also have played a role in this. Foulsham et al (2010) failed to include information about how many males and females participated in each stage of their research, therefore it is unclear how sex impacted on these results, and they also did not ask participants to rate the actors in the videos for attractiveness. Dominant men are more attractive than non-dominant men in certain contexts (Valentine et al., 2014) and evidence has demonstrated that attractive people are observed and remembered more than less attractive people (Maner et al., 2003; Maner, Gailliot, Rouby, & Miller, 2007), therefore this could have influenced eye gaze. However Foulsham et al (2010) argue that the negative relationship between dominance

and likeability in their study may help to control for the possibility that attractiveness influenced eye gaze in some way. Additionally, much research has demonstrated that there are distinct differences in the nonverbal behaviour of high and low dominant people which may provide an explanation for these inequalities in eye gaze.

4.3.1 The sex differences of dominance

Nonverbal behaviour is an integral part of communication in human society although heavy reliance on our highly advanced verbal abilities may mean that we consciously tend to focus more on what we say with words, rather than our face and bodies (Grainger & Dunbar, 2009). There are however several distinct aspects of nonverbal behaviour which differ according to status and sex. Before elaborating on nonverbal behaviour, it is important to address the relationship between status and sex as the literature up to now has focused on how dominance relates to men. Whilst dominance in men may be more physically tangible as well as being more clearly linked to important life outcomes, status is still a highly relevant concept to women. Reviewing literature on status in women however is complicated by the fact that much work typically assumes that women have less power and are lower status than men (Hall, 2006). Whilst this may have been a valid interpretation of women's previous role in society, which may even have had led to changes in the way women acted, dominance in women is more modernly considered to perhaps have a different function and manifestation than dominance in men.

Undoubtedly, women do not have the same physical strength which men have (Sell et al., 2010) and high dominance in women is not sexually selected for due to the potential increased risk of paternity uncertainty associated with

female dominance (Brown & Lewis, 2004; Wilson & Daly, 1996). However, women may use physically aggressive strategies more appropriate to their physical prowess in order to assert their dominance, both towards their partners and same-sex competitors (Bjorkqvist, 1994). Dominance in women is also suggested to be linked to masculinity in appearance (Quist, Watkins, Smith, DeBruine, & Jones, 2011), however is it likely that attractiveness also plays a role in dominance within women (Fisher & Cox, 2009). As a high degree of femininity is associated with being higher in attractiveness, it could be argued femininity may play a role in dominance by enabling attractive women to have more influence. Fisher and Cox (2009) found that men were more likely to be influenced by the opinions of attractive women when they were asked to make judgements about the attractiveness of other women. The authors suggest that males may attend more to the opinions of attractive females because they are more desirable mates. However, influencing the opinion of another individual through attractiveness may be distinct from the type of dominance which has been previously described in this Chapter.

As suggested in section 4.2, dominance in males is largely defined by facial appearance and physique and can be characterised as an individual who uses force to gain their way; this type of dominance could be termed 'physical dominance' (Puts, Hodges, Cardenas, Gaulin, & Cárdenas, 2007). This form of dominance differs to the type of dominance gained by attractive females, which could be termed 'social dominance' because the threat of physical force is not present in the case of attractive females influencing males. Ratings studies have shown that females with relatively more feminine faces are rated as being higher in social dominance, whilst females with relatively more masculine faces are

rated as being higher in physical dominance (Watkins, Quist, Smith, DeBruine, & Jones, 2012). In research by Watkins et al., social dominance referred to someone who would be a leader, whereas physical dominance referred to someone who could win a fistfight, highlighting the contrasting nature of this constructs.

Much work is still to be done in defining these concepts, especially in regards to their relevance to males and females. Previous research has suggested that females are more likely to employ indirectly aggressive tactics in order to 'get their own way' (Vaillancourt, 2013), which is more in line with the definition of social dominance than physical dominance. As such, it could be argued that high-status females, who have social influence and engage in verbal derogation of competitors (Fisher & Cox, 2009), may be more physically attractive (high in femininity, Perrett et al., 1999) and therefore more socially dominant. By contrast, high-status males may gain influence and power through the threat of their appearance, which would most likely be highly masculine, strong, and tall (Puts, Hodges, Cardenas, et al., 2007); these factors suggest that physical dominance is a more relevant concept to males, relative to females. The contrast between these two dominant styles may account for discrepancies in the literature where females are remarked as being less dominant than males (Hall, 2006); if dominance is defined in a physical way, males will necessarily be more dominant than females. Whilst it is also important to highlight that these paths to high status are not exclusive to males and females (males may also be socially influential and females can physically agress), for the purposes of the current research the term 'dominance' will be used however it is understood that there may be sex differences in the form that dominance takes.

4.4 Sex differences in nonverbal behaviour

The manifest sex differences in nonverbal communication are perhaps to be expected given the physical, hormonal, and social variances between men and women, however the differences between dominant and non-dominant people tend to mirror the sex differences of nonverbal behaviour shown in previous literature. Generally speaking, more dominant people tend to have what is considered to be more masculine behaviour (Hall, 2006); an association which may be due to the influence of testosterone on behaviour (Zitzmann & Nieschlag, 2001). Non-dominant or 'subordinate' people by contrast are suggested to use a more feminine style, which is less aggressive and more facilitative (Helweg-Larsen et al., 2004). Importantly, males and females largely seem to employ the same nonverbal behaviour but they may differ in the frequency with which they engage in certain cues; for example, Argyle (1988) suggests that females generally tend to smile more and engage in other expressive behaviours more than males do. The combination of cues is also an important factor to account for as nonverbal cues can be interpreted differently depending on what other cues they are combined with (Ekman, Friesen, O'Sullivan, & Scherer, 1980; Grammer, Filova, & Fieder, 1997). Grammer et al (1997) illustrate this with the example of laughter; Laughter may be a sign of cooperativeness but, if a female laughs and simultaneously performs a 'hair flick' behaviour, it could be interpreted as demonstrating romantic interest. A male is not only less likely to perform this sequence of behaviours but, in this case, the action being performed could be interpreted differently if carried out by a male (Grammer et al., 1997).

Due to the physical difference between the sexes, certain gestures may also have more credibility depending on the sex producing them. For example,

gestures of dominance from males may have more credibility because men are more able to follow through on threats and inflict substantial physical damage (Ridgeway & Diekema, 1989). In addition to this, the social expectations of behaviour should be considered. Research has demonstrated that domineering behaviour is regarded as more socially desirable when enacted by men, rather than women, because it fits in with the typical view society has of gender roles (Prentice & Carranza, 2002). Prentice and Carranza (2002) go on to suggest that if women want to be perceived as displaying a typically male quality, such as competence, they need to act considerably more competent than a man would need to in order to compensate for the perceptions of their sex. However, when the disparity between males and females is accounted for, there remain differences in the frequency of certain behaviours that can be generalised between high and low status individuals. Smiling, laughing, and nodding are examples of commonly observed nonverbal behaviours which are recorded as being greater in frequency in individuals who are lower in status.

4.5 Nonverbal behaviour

4.5.1 Understanding the potential meaning behind a smile and a laugh

As previously discussed, smiling and laughing are nonverbal signals of humour appreciation, but the patterns seen in the frequency of their use suggest that these actions also play an important role in communicating cooperativeness. There are sex differences in the rate of smiling and laughing; research demonstrates that men perform lower levels of smiling and laughter than women, however high status is also associated with less smiling and laughter, as this section will demonstrate.

Evidence suggests that women tend to smile more than men (Argyle, 1988) and, furthermore, that smiling by men and women may be interpreted differently. Krumhuber, Manstead, & Kappa (2007) found that men's smiles were viewed as more flirtatious than women's, but that the manifestation of the smile matters; slower smiles were seen as being more genuine and attractive, and less dominant, than very quick smiles. As women tend to smile more than men (Argyle, 1988), it could be that a man's smile is seen as being more deliberate or purposeful. Similarly, Tracy and Beall (2011) found that happiness expression shown by females were more attractive than happiness shown by males, which they suggest might be because happiness is associated with femininity and low dominance. However there is also a strong effect of status on the degree to which an individual smiles. In a series of four studies, Ketelaar et al (2012) found that smiling was associated with lower status in terms of what the sender seems to project and what the receiver perceives. The first of these studies demonstrated that models who were featured in more prestigious product advertisements tended to have expressions which appeared to raters to be closer to anger or disgust than those in less prestigious advertisements, whose faces tended to look happier or more embarrassed. The authors suggest that the most likely explanation for this is that supressing a smile may be more symbolic of high status. Ketelaar et al (2012) also tested the effect with photographs of American footballers divided into categories of being small, medium, or large in stature. The effects echoed those found in the study of fashion models; football players larger in size (higher in status) were more likely to look as though they were angry or disgusted than small or medium sized footballers, with further testing demonstrating that smiling appeared to mediate the link between physical size

and prosociality. Overall, smiling appeared to be associated with behaving cooperatively and therefore the authors suggested that smiling is more than an expression of happiness; it is a signal of prosociality to others, which may have a positive impact on how smiling people are treated.

Research by Scharlemann, Eckel, Kacelnik, & Wilson (2001) tested the impact that smiling has on deciding whether or not to trust someone in an economic game. This experiment demonstrated that (photographs of) individuals who were smiling were more likely to be trusted, especially by men. However, it is worth noting the distinction between sincere 'Duchenne' smiles and insincere 'non-Duchenne' smiles when looking at cooperation in previous literature. These smiles differ in the features of the face which are animated when they are enacted, with non-Duchenne smiles animating only the mouth in a smiling gesture (involving activation of the *zygomatic major,* moving the corners of the lips back and up) and Duchenne smiles animating the mouth in a smiling gesture as well raising the position of the cheeks, creating "crow's feet", or wrinkles to form at the sides of the eyes (activating the *orbicularis oculi*) (Beermann & Ruch, 2011; Ekman, Davidson, & Friesen, 1990).

Mehu, Grammer, and Dunbar (2007) found that when friends were deciding how to share money they were more likely use sincere Duchenne smiles, which in turn was associated with the equal division of money. Their results suggest that sincere smiles help to regulate relationships which are more cooperative and reciprocal in nature. This is however complicated by the fact that research has demonstrated that those who are high in dominance may be more likely to use smiling to manipulate others. A questionnaire study by Burton et al (2011) demonstrated that individuals who are high in 'relational aggression',

namely males and females who are likely to be dominant and engage in indirect aggression, are more likely to purposefully use smiling to manipulate others. This relationship was also associated with having a higher 2D:4D ratio; a measure which is considered to indicate levels of testosterone. Dominance is characterised by manipulation (Henrich & Gil-White, 2001) therefore dominant people may be more likely to engage in impression management and use smiling to coerce someone into cooperating or submitting to them (Burton et al., 2011). Social smiles may not necessarily have negative connotations or manipulative intentions if they are used in the context of status expression. For example, using social smiles could be a way of reinforcing hierarchy to an individual who is higher in status.

In an ethological study of mixed age groups seated in bars and food courts, Mehu and Dunbar (2008) looked at the use of deliberate and spontaneous smiles and laughter between those of high and low status. Observation demonstrated that when younger men were seated with someone older than them (of higher status) they tended to use more deliberate smiles, which the authors suggest is evidence that smiling may be a sign of submission. This was in contrast to older females displaying more deliberate smiles than younger females. Whilst it was unclear why this was the case, higher rates of laughter were found in younger females, which was also related to spontaneous smiling, rather than deliberate smiling. It could be suggested that the laughter in younger females is an expression of social dominance within female groups, especially if it serves to give that individual more airtime. However, this could only be speculation as the topics of conversation, and who spent the most time talking, were not recorded in this particular study. The finding that spontaneous smiles

were related to laughter whilst deliberate smiles were not is supportive of Provine's (2000) assertion that most laughter is spontaneous and unplanned, making it a valid indicator of the quality of social relationships. Like smiling, there is much evidence that the frequency of laughter is sexually dimorphic but it also appears to be associated with the expression of status.

Due to the evidence that those lower in status tend to laugh more than those higher in status, laughter is suggested to be a sign of submission (Provine, 2000), however laughter could also be a sign of willingness to cooperate with others (Owren & Bachorowski, 2003). Research has demonstrated that men are less likely to laugh than women (Smoski & Bachorowski, 2003) and the evidence appears to suggest that the context of laughter may be more important for men than for women. In a study of laughter behaviour in same-sex dyads who were either strangers or friends, Smoski and Bachorowski (2003) found that when engaging in a trivial but potentially humorous task male-male pairings resulted in less laughter than female-female pairings, especially when the males were unknown to each other. The authors suggest that the pair of two males will result in an increase in competitiveness, meaning that the males are less likely to behave in submissive way, however female pairings were just as likely to laugh whether they were friends or not, despite females also experiencing intrasexual competition (Bjorkqvist, 1994). Females are perhaps more likely to use laughter as a sign of potential cooperation than males are, however changing the context to one of mate choice still demonstrates more sexually dimorphic patterns of behaviour (Provine, 2000). The animated nature of laughter could be compared to nodding, which is similarly animated and affiliative in nature.

4.5.2 The meaning of a nod

Nodding can be composed of one purposeful shake of the head, down and up, or a series of shakes (Poggi, Errico, & Vincze, 2005), and is largely considered to be a sign of cooperation, agreement, or permission (Grainger & Dunbar, 2009). Nodding is not associated with humour appreciation; although, in the case of failed humour, a nod could be viewed as a benign sign of acknowledgement that humour has been attempted (Bell, 2009). This is however suggested to be a rare response (Bell, 2009). Most often in the course of a conversation, nodding acts as a form of backchannel response to indicate that you are attending to the speaker but do not intend to interrupt them (Helweg-Larsen et al., 2004; Poggi, D'Errico, & Vincze, 2012; Poggi et al., 2005). Both sex and status differences have been documented in this behaviour, with research demonstrating that females and lower status individuals appear to nod more than males and those of higher status.

Grammer, Kruck, Juette, and Fink (2000) observed the difference in nodding between dyads engaged in conversation whilst investigating courtship behaviours. The authors monitored the verbal and nonverbal behaviour of two opposite-sex strangers in a 10 minute 'waiting room' scenario and later asked the two participants how attracted to their fellow participant they were. In this study, the authors suggest that nodding is an 'affirmative' behaviour and the results supported this; the female participant nodding appeared to reinforce the male speaker as it resulted in more talking from the male. However only female nodding was documented as the authors were interested in female signs of interest, although Grammer et al (2000) concluded that females were nodding in order gain control over the interaction. Nodding in this case appeared to reinforce

the speaker and act as a prompt for him to continue speaking. In terms of status, Grammer et al reasoned that the individual with the greatest cost in the relationship should actively nod to maintain the conversation, meaning that the person with the lowest status should use nodding to prompt their partner to continue giving them information. Other research has demonstrated support for the contention that frequency of nodding is negatively related to social status.

Mehrabian, Williams, Leffell, Usher, and Wawarzeniak (1969) found that head nodding was negatively correlated with self-rated dominance and persuasiveness in a study asking participants to give short public speeches. Similar evidence has also been found in the course of an observational study which took place in a university, where participants were not asked to rate themselves for dominance but a clear social hierarchy was already in place (Helweg-Larsen, Cunningham, Carrico, & Pergram, 2004). The research took place over the course of 15 normally scheduled classes which researchers attended in order to count the number of nods by students and teachers. The results demonstrated that female students nodded more often than male students did, but that they both nodded significantly more than the teacher. Interestingly, male and female teachers nodded at a similar rate and sex of teacher did not influence how often the students nodded. Overall, those higher in status were observed nodding less than those relatively lower in status, with female students nodding the most. In sum, nodding appears to be closely linked with the expression of status, although in Helweg-Larsen et al's (2004) study there was evidently a baseline sex difference in the amount of nodding behaviour between males and females. The same might be said of smiling and laughter behaviour.

4.5.3 Status differences in nonverbal behaviour

In looking at nodding, smiling, and laughing behaviour, the literature suggests that there are robust differences in how frequently men and women, in addition to high and low dominance individuals, engage in this behaviour. Females and lower status people are viewed as being more expressive (Argyle, 1988), however this may also mean that these groups are better at decoding nonverbal behaviour (Grammer et al., 2000). The overall characterisation of a dominant person, in looking at this evidence, appears to be one who generally engages in less expressiveness. In nodding and smiling less, more dominant individuals seem to portray their own emotion less than others. However, it is important to consider that nodding and smiling are positive behaviours, therefore it could be that more dominant people simply have an absence of positive behaviours or may be more likely to perform negative behaviours, such as eye-rolling or shrugging (Grainger & Dunbar, 2009). An additional consideration is that dominant people may rely on the formidability of their appearance and so do not perhaps need to compensate for their appearance with expressive movement, as less dominant people do (this will be discussed further in Chapter 7). However it is also important to consider that more dominant people may be engaged in impression management more than less dominant people (Burton et al., 2011), meaning that the differences we see in the previous literature cited may be less apparent in a conversation between two people for instance (Mazur & Cataldo, 1989). Dominant people may also rely more on speech to exert their status, certain aspects of which differ according to status.

4.6 Exerting status through speech

The natural use of language is an important source of information about individuals (Chung & Pennebaker, 2007). When examining speech, there are several important quantifiable aspects of speech which have sex differences and status differences such as the amount of time spent talking, frequency of disfluencies and pronouns. In addition, interruptive behaviour will also be examined in three ways to measure the frequency of interrupting, talking over others, and backchannel responses.

4.6.1 How time spent talking relates to status

To quantify dominance in a conversation, a tangible measure of who is the dominant person is to observe who speaks the most as speaking more literally allows one to dominate the conversation (Argyle, 1988). Commonly, it may be considered that the person who speaks the most in an interaction is dominant but this may not be the case, as a meta-analysis by Mast (2002) has shown. Mast (2002) investigated whether dominance was related to the amount of time spent talking in group discussions across 37 articles. The results demonstrated a difference between state and trait dominance; when participants in the studies were instructed to behave dominantly, they tended to spend more time talking. These participants evidently had the impression that more dominant people talk more but, looking at the expression of trait dominance, whilst there is a relationship between dominance and time spent talking, the effect is just moderate. The author suggests that this relationship may only be moderate because more dominant people may be engaging in more impression management, therefore they intentionally avoid speaking for much more than their fair share (Mast, 2002). This pattern may be especially prevalent in a

conversation between two people; in a dyadic situation, the balance of time spent talking between participants is likely to be noticeable, therefore if one participant dominates it would not only be apparent but may also be rude. In a conversation between two people, it is therefore less likely that there would be a difference in speaking time which indicated dominance (Mazur & Cataldo, 1989). In a competitive context, dominant individuals may still have cues to their forcefulness, such as interruptions or talking over other people (Mast, 2002), therefore these cues may offer more insight into dominance. Where one person stops talking and another starts can be indicative of status and there are three ways speech can overlap; interruption, talking over the other person, or backchannel responses.

4.6.2 Understanding speech overlaps

In discussing the overlaps which occur in conversation, it is important to acknowledge that an overlap of speech is not always intended to be an interruption. Overlapping speech with another person can be done in three ways (but can have many more meanings); successful interruptions, talking over others, and backchannel responses. Beginning to speak when someone else is talking could have one of two results; either they stop speaking, in which case it is a successful interruption, or they do not stop speaking until they are finished, meaning that they have not yielded and we have talked over them. Whilst the rudeness of interrupting someone or speaking over them is debated (Natale, Entin, & Jaffe, 1979), both actions can appear domineering and antagonistic.

It is however possible to talk over someone without the intention of taking the floor, known as a backchannel response. This form of interruption is suggested to have the less antagonistic and more well-meaning intention of

encouraging the speaker or showing your agreement with what they say (Dixon & Foster, 1998; Duncan Jr, 1975). Backchannel responses are considered more affiliative as they can demonstrate enthusiasm for what the speaker is saying or even suggest that you are following their line of thinking so closely you know how the speaker will finish their sentence (Anderson & Leaper, 1998; Dixon & Foster, 1998; Natale et al., 1979). Evidence has demonstrated that there are both sex and status differences in the frequency with which these cues are displayed (Hall, 2006). In addition to these differences, there is some debate about what the usage of these three aspects of speech mean, as they can be interpreted in different ways.

Natale et al (1979) suggested that the common assumption that interruptions are an attempt to gain conversational dominance demonstrates that interruptions are a breach of conversational 'turn-taking' norms. In their study, which observed the interruptions which took place in two conversations, Natale et al (1979) tested the hypothesis that social anxiety was negatively related to interruptive behaviour. Whilst that study did not question how dominant the participants rated themselves as, previous research has shown a negative relationship between social dominance and shyness or social anxiety (Teisl, Rogosch, Oshri, & Cicchetti, 2012). Natale et al (1979) asked opposite-sex and same-sex dyads to complete personality questionnaires individually, then to talk freely together for 30 minutes. Analyses of the conversations demonstrated that more socially anxious people (and people who rated themselves negatively as public speakers) were less likely to interrupt the other participant and more likely to yield the floor to their interruptions. Participants higher in their fear of negative evaluation were also more likely to make backchannel responses. Overall, these

results suggest that those who are more socially anxious, and perhaps less dominant, are more likely to let others interrupt and to offer backchannel responses, whilst they interrupt less. Subsequent research has found more direct evidence to suggest that dominance is associated with increased interruptions (Youngquist, 2009) however research in this area has tended to focus on the sex differences of this behaviour. Natale et al's (1979) study found that males interrupted more than females did. Much research since has supported this finding (Anderson & Leaper, 1998; Roger & Schumacher, 1983; Smith-Lovin & Brody, 1989) but there is evidence which contests it (Grob, Meyers, & Schuh, 1997). In sum, it appears evident that there is a sex difference in interruptive behaviour however it is important to consider the contexts of interruptions; the direction of the effect is unclear.

Smith-Lovin and Brody (1989) looked at interruptions more deeply by questioning whom males and females were more likely to interrupt. Mixed-sex groups of participants were tasked with finding a solution to a problem in this study and analyses of these conversations demonstrated that males were more likely to interrupt females but females were equally likely to interrupt males as females. Furthermore, males tended to interrupt other males with a positive interruption (a supportive comment or question, resembling a backchannel response), which the speaker was much more likely to yield to, compared to negative interruptions (disagreements) (Smith-Lovin & Brody, 1989). The researchers found few negative interruptions but observed that a female making a negative interruption was much less likely to be yielded to than a male. This gender imbalance seems to suggest that interruption is a way of exerting status and that yielding to interruption may be perceived as a submissive gesture.

Additionally, the authors suggest that the consistent sex differences found in interruptions suggest that men may view women as being lower in status to them, further underlining the point that being female is connected with being low status. Interestingly, similar patterns of behaviour have been found in relation to smiling and nodding, demonstrating that females distinguish less between who they nod and smile at then males do (Helweg-Larsen et al., 2004; Johnson, 1994).

A meta-analysis conducted by Anderson and Leaper (1998) further supports the evidence for sex differences in interruption as they found that men do interrupt more than women, however the effect size for this was relatively small (Cohen's *d* = .15). The researchers highlight the importance of viewing the context of an interruption; when looking at the sex differences in intrusive interruptions, the results show that males interrupt substantially more than females (*d* = *.33*) (Anderson & Leaper, 1998). Females tend to engage in more backchannel responses than do males, which tend to offer support to the speaker (Hall, 2006; Roger & Schumacher, 1983), further demonstrating why it is important to categorise interruptions. Failing to distinguish between different types of interruptions may be why Grob, Meyers, and Schuh (1997) found that women interrupted more than men in mixed-sex conversations. Grob et al (1997) also found that men interrupted less but were more successful in doing so than women were as the speaker more often yielded to them, which may offer subtle support for Smith-Lovin and Brody's (1989) contention that males may see females as being lower status; a view which is reflected in their conversational practices. The expectations of what is appropriate or typical behaviour for males and females evidently has influence on the perceptions of interruptions. This is further demonstrated by Youngquist (2009), who conducted a study where

participants were asked to listen to dyads having a conversation, featuring one person continually interrupting the other. Three conversations of two same-sex dyads and one opposite-sex dyad were used as stimuli, and participants were asked to judge how dominant each person in the conversation was. The results demonstrated that the highest interpersonal dominance rating was given to a female who interrupted another female. To the authors, this conversation was considered to display the most dominance because it is highly unexpected that a female would interrupt another, if interruptions are taken as a display of dominance. They conclude that there are social conventions for interrupting people but that women and men are not held to the same standards, which may be why these sex (or status) differences are found.

4.6.3 Um…understanding the function of speech disfluencies

Disfluencies in speech are similarly related to the sex of speaker but it is unclear how exactly they relate to the status of the speakers. A disfluency is a term to describe a disturbance in speech which can take several forms; A *pause in speech*, which includes a false start (e.g. “Whwh…what did you say?”); a *‘filler’ word* or a filled pause such as “uh…” or “um…”, which can be a form of hesitation on the speakers part (Laserna, Seih, & Pennebaker, 2014); or a *discourse marker*, such as ‘like’, or ‘I mean’. Disfluencies are common aspects of natural speech; they can be intentional or unintentional and can mean different things depending on the context and speaker using them (Corley & Stewart, 2008). Using fillers in particular may be related to the confidence one has in a statement but they can also function to help the listener to interpret what will be said or to cue them to the fact that you are experiencing a cognitive load due to the complexity of your planned speech (Corley & Stewart, 2008).

To my knowledge, there is no research to suggest that frequency of disfluency is directly related to status, however individual differences may still relate to some forms of disfluency. For instance, Laserna et al (2014) investigated the use of discourse markers by analysing data recorded with an EAR (Electronically Activated Recorder), which participants wore for 2 or 3 days. All of their conversations during that time were transcribed and analysed using LIWC software (Language Inquiry and Word Count software, Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007). Females and younger (college-aged) participants were more likely to use discourse markers, and using discourse markers was also positively related to conscientiousness. Whilst disfluencies were hypothesised to relate to anxiety or neuroticism Laserna et al (2004) found no evidence of this, therefore disfluencies may not necessarily relate to social confidence or status, however they do appear to relate to persuasiveness. In a study of the verbal and nonverbal behaviour correlates of persuasiveness, Mehrabian et al (1969) found that 'halting speech', or hesitant speech with false starts, was negatively related to persuasiveness. However, Corley and Stewart's (2008) findings might suggest that disfluencies can add to the persuasiveness of speech, cueing the listener to the importance and complexity of your words.

4.6.4 The power of pronouns

Just as there are differences in the frequency of disfluencies according to personality (Laserna et al., 2014), there are further differences in language used which appear to relate to personality in addition to dominance; for instance, pronoun usage. The use of pronouns has been of interest to researchers because they are thought to accurate in reflecting what the focus of the speaker's attention is (Chung & Pennebaker, 2007). For example, Chung and Pennebaker

(2007) suggest that those who are more self-focused will use more self-pronouns, rather than those who are group-oriented in their pronouns, who are more concerned with others and leading a group. This effect is also apparent in the field of dominance.

Kacewicz et al (2013) argue that the social nature of pronouns means that they should reflect the focus of an individual's thoughts. In a series of five studies, Kacewicz et al (2013)found that those lower in status tended to use more self-pronouns whilst higher status people used more plural and other-pronouns, which they suggest shows how group-oriented the individual is. However, the researchers in this study referred only to status and did not differentiate between dominance and prestige, which could have implications for how self- or other-oriented an individual is. There is little information in these studies to suggest whether they refer more to dominant or prestigious strategies. However one of the studies Kacewicz et al (2013) present is an analysis of letters sent by men who were members of Saddam Hussein's military regime. Members of his military were arguably more dominant than prestigious, given that prestige is considered to be freely conferred power (Henrich & Gil-White, 2001), and the same pattern of results was found wherein those of higher status within the regime used more other and plural pronouns.

Unlike the other research which has demonstrated clear differences in verbal and nonverbal behaviour between men and women, often suggesting that men follow typically high status patterns of behaviour whilst females follow low status patterns, research into the usage of personal pronouns by men and women is mixed. A meta-analysis by Mulac, Bradac, and Gibbons (2006) found that there was no sex difference in using pronouns however, as Pennebaker,

Mehl, and Niederhoffer (2003) highlight, work which was not included in the analysis did find that females tend to use more self-pronouns than males (e.g. Pennebaker & King, 1999). It has been argued that pronoun usage may relate to levels of testosterone and Pennebaker, Groom, Loew, and Dabbs (2004) cite evidence of this in the form of a case study. Two individuals were featured in this case study; an older man taking testosterone injections to restore upper body strength, and a younger woman taking testosterone injections as part of a transgender operation to become a man. The language used in diary entries and outgoing email recorded during their treatments was analysed using LIWC software (Pennebaker et al., 2007). The analysis showed that increased levels of testosterone were associated with reduced levels of social language, which included pronouns referring to others, however there was no changes in the number of references to the self. The author suggest that this may mean that testosterone steers individuals away from thinking about emotions and relationships, although it remains unclear how this might relate to sex differences or dominance.

In a meta-analysis, although they did not find evidence of sex differences in pronoun usage, Mulac et al (2006) suggested that the language strategies women use might differ from men in their degree of directness. Asking indirect questions or avoiding referring to people with other-pronouns (less other-oriented speech) may be a form of politeness. Social language and the use of pronouns is also related to a number of other factors which could provide an alternative explanation for the finding that there is no sex difference in pronoun usage (Mulac et al., 2006). Personality research has shown that extroverts use more abstract and people-oriented language whilst introverts use more concrete language

(Beukeboom, Tanis, & Vermeulen, 2012; Pennebaker & King, 1999; Pennebaker et al., 2003). In Beukeboom et al.'s (2012) study, participants were asked to describe a scenario from a photograph. Abstract language was associated with reading more deeply into the scenario (e.g. Jack flirts with Sue) whereas concrete language stated what could clearly be seen (e.g. Jack talks to Sue), therefore more extroverted people were imagining what kind of relationship was occurring between the two people rather than what the introverts did, which was to only state the facts of the photograph.

Pronoun use may also be an insight into how much social integration an individual feels (Pennebaker et al., 2003) and Zimmermann, Wolf, Bock, Peham, and Benecke (2013) have also found that high use of self-pronouns was associated with elevated levels of interpersonal distress whereas plural pronouns were associated with lower levels of interpersonal distress, paralleling findings previously shown in depressed individuals (Rude, Gortner, & Pennebaker, 2004). This breadth of work demonstrates the influences both personality traits and state can have on pronoun usage.

4.7 Summary

In this chapter, I highlighted the most prevalent and observable cues to dominance which are present in males and females. In terms of nonverbal communication, research demonstrates distinct differences between higher and lower status individuals, as well as males and females, in terms of nodding, smiling, and laughing behaviour. The sex differences in humour behaviour will be discussed further in Chapter 5 but evidently, both females and lower status individuals are more expressive in their nonverbal behaviour. Such patterns are

however less clear in verbal behaviour. The evidence presented suggests that interruptions are largely considered to truly reflect perceptions of hierarchy within conversation, which may be based on sex, however the evidence relating to disfluencies is less clear cut than this. Disfluency may relate to persuasiveness but not status; evidently, further work is required on this topic. Pronoun usage does appear to be related to status in a clearer way in demonstrating what the focus of an individual's mind is but again it is unclear how pronoun usage specifically relates to dominance, rather than status which could also refer to prestige. In considering this evidence it is important to bear in mind, as Burton et al's (2011) work demonstrated, that more aggressive or dominant people may be more likely to intentionally manipulate others. Evidence demonstrating a relationship between aspects of verbal and nonverbal behaviour and status does not necessarily mean that high status people are compelled to behave in a certain way or limited in their behaviour. If dominant individuals do appear more 'other-oriented', it could be that they are better at presenting themselves in such a way that they will be more persuasive to their intended audience (Mehrabian et al., 1969).

Chapter 5 Testing the impact of humour use and appearance in a competitive ‘desert island’ conversation.

5.1 Abstract

In a verbal task, where someone cannot rely on physical prowess, a dominant person may appear to be a more formidable opponent but individuals who are judged as being funnier may be more persuasive in their attempts to win. I created a competitive task for dyads of participants to engage in in order to test the impact that humour and dominance have on the outcome of the task. Dominance was measured by ratings of facial photographs and a self-rated dominance questionnaire. Humour was measured by ratings of 'desert-island' style videos, in addition to the conversation being coded for instances of explicit humour use (categorised as positive or negative humour). In addition to noting who the winner of the competitive task was, I attempted to capture and measure potential differences which might exist within each dyad in terms of physical appearance and verbal and nonverbal behaviour, and how these factors relate to the outcome of the task. The results demonstrated that men who were rated as being physically more dominant and who were taller, and men and women who rated themselves as being higher in attractiveness, were more likely to 'win' the task. Humour-use was negatively associated with winning the task, which may be related to the finding that more dominant people are less likely to use humour. There was no difference found between the use of (positive or negative) jokes in each dyad, which may suggest that humour is used at a similar rate within each conversation. Overall, the results suggest that physical appearance is a stronger predictor of winning a competitive verbal task than what participants actually say in the conversation.

5.2 Introduction

In the previous chapter, five behaviours were highlighted as being important and observable cues to status; smiling, laughing, nodding, pronoun usage, and interruptions. Additionally, disfluencies were highlighted as an aspect of speech which could relate to persuasiveness. Whilst smiling and laughing are typical reactions to humorous conversation, it is presently unclear how nodding, pronoun usage, interruptions, and disfluencies might relate to humour use. In Chapter 2, humour was discussed as having an important function as a signal of interest in a mating context and Chapter 3 described how humour could be a way of signalling evolutionarily relevant personality traits. In this chapter, I will talk about an additional function of humour; to either assert dominance or to signal cooperation towards others. I will elaborate further on the use of humour in relation to conversation, before describing empirical work which tested this.

5.2.1 Humour use in cooperative contexts

Whilst humour evidently has an important role in a mating context, which may help us to understand the evolution of humour as a sexually selected trait, this does not mean humour use is restricted to mating contexts. Humour is a ubiquitous feature of many social situations involving platonic or professional interactions, which can impact positively or negatively depending on how it is used (Robinson & Smith-Lovin, 2001). Like laughter, humour can also be contagious in that it continues through the course of a conversation, often regardless of the skill with which it is delivered (Crystal, 1998). This may be because it is enjoyable to produce humour but it could also suggest that humour use has further benefits; for instance, building cohesion in groups (Romero & Pescosolido, 2008). Humour can help individuals share their common interests

(Gervais & Wilson, 2005), which may help to reduce levels of inhibition (Provine, 2000); helping them to speak up and be included in social situations (Romero & Pescosolido, 2008). Indeed, research has shown that humour use is related to increased Emotional Intelligence (Yip & Martin, 2006) which can help improve the quality of interpersonal relationships. It is however likely that this is not the case for all humour styles and all contexts. Specifically, affiliative humour use is also associated with being more empathetic and supportive (Howland & Simpson, 2013) and cooperative (Cowan & Little, 2013a; Chapter 3), but aggressive humour is used and perceived very differently.

Argyle's (1969) conversation analysis suggested that jokes are more likely to be used to create a cohesive atmosphere or informal tone, as opposed to be persuasive or conducive to problem-solving. This may mean that humour is often employed to help individuals relax in group situations; something which may be highly adaptive in encouraging and maintaining good group relations (Dezecache & Dunbar, 2012; Dunbar, 2002). However, if the context is competitive rather than cooperative and accordingly more hostile humour is used, humour may not play the same role in creating cohesiveness (Argyle, 1969). Humour can be very useful in creating cohesive bonds but it also has the power to ostracize others, which Alexander (1986) highlights as being adaptive for the joke-teller. Despite aggressive humour being less socially desirable (Cann & Matson, 2014), Chapter 3 presented empirical research demonstrating that aggressive humour produced by males was attractive for short-term relationships. In using more aggressive humour, a male could be signalling the dominance of his personality and furthermore his ability to ostracize and verbally compete with other males (Greengross & Miller, 2008).

5.2.2 Humour use in competitive contexts

Humour can also be used to exert and maintain status (Galloway, 2010; Keltner et al., 1998), which has been observed in group discussions. In analysing the humour use in groups of six people who were tasked with creating a problem for another group to solve, Robinson and Smith-Lovin (2001) found that humour was more often used to reinforce the hierarchy, rather than to build cohesion. This study suggested that those who were higher in status (judged as those who were high participators in the group task) were more likely to use humour, especially humour which was directed at other people (aggressive humour), and were also more likely to interrupt others. This pattern of interaction was also more likely to be seen in males. Other research has found that males are more likely to produce humour than females (Greengross & Miller, 2011; Wilbur & Campbell, 2011) but it is important to consider the context and the definition of humour in such work, as there may be sex differences in humour styles most frequently used (Palmer, 1994). Males are more likely to use and enjoy aggressive humour than females (Martin et al., 2003).

Robinson and Smith-Lovin's (2001) study found that men used more jokes than women in mixed-sex groups, however women made more jokes when there were no men present. This is supportive of previous research which has suggested that producing humour regularly is expected of males whereas groups of females might be more likely to employ humour when necessary as a tool to create cohesion (Hay, 2000). The topics women joke about also provide insight into the function of humour in women-only groups. Qualitative research by Gouin (2004) has shown women might use humour to discuss particularly more serious subjects, such as feeling marginalised and their perception of living in a male-

dominated society, suggesting that humour might be a way of coping and bonding over shared problems (Gouin, 2004) or helping them to define the issues they face (Robinson & Smith-Lovin, 2001). Women may therefore be more likely to use humour to more easily broach serious subjects when they are speaking to other women. Within close friendships, however, women may be more comfortable using humour with men although they may perceive the need to adopt a more aggressive humour style in order to be included in 'banter' (Lampert & Ervin-Tripp, 2006). Whilst males are relatively more dominant than females and may be more likely to use aggressive humour, this does not necessarily mean that aggressive humour is only used to ostracize others. Research by Palmer (1993) demonstrated that field hockey players may use aggressive humour with the intention of bonding with other men. Such humour was found to be closely related to smiling behaviours, which may appear to be a mixed signal unless aggressive humour is a way of affiliating with close friends, perhaps as a way of demonstrating shared knowledge (Palmer, 1993).

5.2.3 The persuasiveness of humour

Whilst Robinson and Smith-Lovin (2001) found that humour was used by higher status men to reinforce hierarchy, using humour can also help to increase the persuasiveness of one's argument (Lyttle, 2001), which is a factor of the group discussion Robinson and Smith-Lovin did not analyse. Lyttle (2001) found that using humour in an ethical dilemma game helped to persuade employees to take the 'correct' course of action when faced with an ethical business dilemma, however they highlighted that more self-effacing or ironic humour (negative humour styles) were most successful at doing this. Further research on the persuasiveness of humour has also found that the individual differences of the

audience may matter in how persuasive the message is (Conway & Dube, 2002). In a between-participant study investigating the persuasiveness of health advertisements about sunscreen, Conway and Dube (2002) found that highly masculine men and women were more likely to be persuaded to use sunscreen when advertisements had humorous content rather than when there was no humour present. The same effect was found in a second study using AIDs-awareness advertisements about condom usage. The authors suggested that highly masculine individuals might be engaged in more experiential processing than the participants lower in masculinity, meaning that they can relate more to advertisements because of past experience rather than a difference in rational processing. It is unclear why there was no difference in how the lower masculine participants perceived the humorous and non-humorous advertisements, but the evidence suggests that the individual differences of the audience of the humorous statement is an important factor to consider.

Intelligence may also be a factor to consider because not only does the joke-teller require the intelligence to produce humour but the audience requires the intelligence to interpret the humour (Byrne, 1956). Research by Greengross and Miller (2008) has demonstrated that males who are better at producing humour had higher IQs than less funny males. In such a way, in the current study, those with higher IQs may be more funny and able to affiliate with their conversation partner. The method used by Greengross and Miller (2008) to capture humour may not be indicative of how able an individual is to spontaneously produce verbal wit, and deliver it in an appropriate and successful way, as participants in their study were asked to complete captions on cartoons taken from a magazine. Those who are higher in intelligence may be more able

to provide funny captions, but it is unclear how well this relates to their ability to verbally spar with others. Furthermore, the research referred to in this chapter largely discusses humour designed for television audiences (Conway & Dube, 2002) or observed in larger groups of people (Hay, 2000; Robinson & Smith-Lovin, 2001)but humour used in these ways may not be predictive of how humour will be used in dyads. In Robinson and Smith-Lovin's (2001) study, humour appeared to be used almost as a way of 'showing off' and flaunting status in a group situation.In a conversation with just two participants of the same-sex, it seems less likely that such patterns of behaviour might be seen or that a hierarchy might need to be maintained by using hostile methods or aggressive humour. In their meta-analysis of interruptive behaviour, Anderson and Leaper (1998) observed differences in the patterns of behaviour which occurred in groups versus dyads, with fewer interruptions occurring in dyads. Conversations which take place within dyads may not reflectasocial hierarchy in the same way, though it is likely that humour may be used still as a cohesion-building tool or dominance could be asserted in verbal or nonverbal ways. Previous research has demonstrated the usefulness of analysing competitive conversations which take place between dyads.

5.2.4 The use and design of competitive conversations

Competitive conversations have previously been used for insight in different contexts. Research has looked into mating contexts and how opposite-sex dyads might behave towards each other depending on their relative interest (Grammer et al., 2000). Other work has examined how individuals behave in more competitive contexts to investigate the differences in how status, competition, or cooperation are expressed. Mazur and Cataldo's (1989) work suggested that,

regardless of how equal participants may seem, a hierarchy is always evident in the behaviour in dyad conversations. This was evident in their work analysing the conversations which they observed in a lab setting between male-male pairings of two students, and one lecturer and one student. In a more ecologically valid study analysing naturalistic conversations Grainger and Dunbar (2009) observed the verbal and nonverbal behaviour of same-sex dyads. This work found that both same-sex pairings exhibited some element of hierarchy, with one speaker displaying more nonverbal competitive behaviour than the other, however male-male pairings appeared to have the greatest amount of competitive behaviour whereas female-female pairings tended to be more cooperative. Even in a study designed to force students to compete with each other, Roger and Schumacher (1983) found patterns of behaviour wherein females tended to engage in more supportive backchannel responses whereas males interrupted more, supporting Grainger and Dunbar's (2009) work. Stiles et al (1997) suggest that, whilst males may be more competitive and females more cooperative, it is likely that behaviour also depends on the relationship between the individuals present. Whilst participants can be put in a situation where they are asked to compete for something, these sexually dimorphic patterns may persist but it is likely that, in line with other findings (Grainger & Dunbar, 2009; Mazur & Cataldo, 1989; Roger & Schumacher, 1983), hierarchies are still present in same-sex pairings of males and females and will be evident in the verbal and nonverbal behaviour of participants.

5.2.5 Rationale

In an effort to determine which factors are influential in deciding the outcome of a competitive conversation, I designed a 'desert island' scenario for same-sex

participants to engage in. Previous research into verbal and nonverbal behaviour has found evidence of the differences between high and low status people, and males and females. In the current study, I was tested how humour behaviour and indices of dominance in both men and women related to the outcome of the task in same-sex dyads. Funniness was measured following the procedure detailed in Chapter 2; participants were filmed answering a ‘desert island’ style question, which was then rated for humour by other participants. The conversation was also coded for instances of positive or negative humour usage. Intelligence was also measured using a shortened version of the WAIS III to test how Verbal IQ related to winning.

In the current study, I also wanted to measure the differences in verbal and nonverbal behaviour and speech between the ‘winner’ and the ‘loser’ of the task in order to better understand why or how certain outcomes occurred. The videos of both participants engaging in the competitive conversation was analysed for nonverbal (smiling, laughing, and nodding) and verbal behaviour (interruptions, disfluencies, pronouns, positive or negative words, or positive or negative jokes). In the current study, it was hypothesised that more dominant individuals may be more likely to win the conversation and that their language styles would include less self-pronoun use, as well as less smiling, laughing and nodding than less dominant participants. It was also hypothesised, in line with previous research, that more dominant participants would interrupt the other participant more, as well as producing less backchannel responses to less dominant participants. Prior to experimentation, it was expected that there would be differences in smiling and laughing behaviours however it was unclear how humour might be used by high and low dominance participants. As aggressive

humour is associated with dominance (Chapter 3), it could be hypothesised that more dominant people would use humour to derogate their competitor. However, it could also be suggested that humour use is an alternative strategy to winning the conversation because it allows a non-dominant person to affiliate with their competitor (Chapter 3), which could make their argument more persuasive. As such, the direction of the hypothesis for humour use in relation to dominance was unclear, though it was expected that, even in a short conversation between strangers, humour would be used and it may make the humour user more likely to win the conversation.

Study 5

5.3 Method

5.3.1 Stimuli collection

5.3.1.1 Participants

There were 40 participants (20 males and 20 females; M age = 20.8, *SD* = 3.6, Range = 18 - 38) who were all undergraduates in the University of Stirling, participating either to fulfil a course requirement or for financial reimbursement.

5.3.1.2 Materials and procedure

Participants were tested in dyads by two researchers. Participants were scheduled to attend a lab session in pairs by the arrangement of the researcher to ensure that participants were unknown to each other. Upon arrival, participants gave informed consent to take part in parallel sessions and were made aware that they would undergo the same tests separately, until the last section of the session when they would engage in a task together. Following this introduction, one of the participants was escorted to another lab with one of the researchers while the second researcher obtained physical measurements of the remaining participant. Participants were weighed then the researcher measured their height. The circumference of their waist and hips was then measured in order to calculate waist-to-hip ratio (WHR). The researcher then administered two sub-tests of the WAIS III in accordance with the procedure outlined by Wechsler (1997). Verbal IQ was measured using a vocabulary test of 40 words and Performance IQ was measured in a task which gave participants 90 seconds to repeat as many symbols in a pattern as they could. After this, participants were

then seated in front of a video camera, which was positioned to capture participants from the shoulders to the top of their head, and told that they were going to be asked a question which I would like them to answer in a natural way on camera. Participants were then asked which two items they would take to a desert island, from a choice of hairspray, chocolate, or a plastic bag, and what they would do with it (Cowan & Little, 2013b; Chapter 2; see Appendix One). After having a moment to consider the question, participants were filmed giving their answer without a time limit.

For the next section of the session, participants moved between testing rooms and so the participant who had been physically measured, had their IQ tested, and been videoed was brought to the other room. Here the participant was escorted to a quiet and private testing cubicle and asked to complete personality questionnaires which were presented to them in a self-paced online format. Participants were asked to complete a Dominance questionnaire (modified from the IPIP, Goldberg et al., 2006, and previously published, Mileva et al., 2014) and to rate themselves for attractiveness (on a scale of 1 to 7-low to high). The participant was then brought to a room with controlled lighting and asked to pose with a neutral expression for one photograph of their face.

When both participants and both researchers were reunited in the original room, participants received a sheet of paper giving them the instructions for the dyad task. Both sheets provided identical instructions, advising the students that they would be engaged in a conversation with the other participant regarding what items they should take to a desert island, but that they both had different items. Participants received a list of five items each (a total of ten in the dyad) and were instructed that they must now discuss which five items in total they

should both take to a desert island, but that the purpose of the task was to take as many from your own list and that they must now discuss this with their partner. The items they had to choose from were specifically selected as basic but useful items to take to a survival situation, but each list attempted to be relatively equal to the other therefore they contained parallel items which performed similar tasks. For example, where one participant had a fishing net, the other had a fishing rod, and where one participant had a lighter, the other had a box of matches. Once participants had read the instructions and agreed that they understood the procedure and that they would be filmed taking part in the conversation, they were seated side-by-side approximately five feet away from a video camera, which was fixed onto a tripod. The chairs and camera were positioned in an identical manner for each dyad, with the camera zoomed out so the video recording captured from the participant's knees to the top of their head, sitting down. When participants were positioned, the camera was switched on and the researchers were seated at the back of the lab, facing away from the participants, in order to reduce the impact of their presence but also to ensure that help was on hand should a problem arise. Once participants had finished their discussion, they were asked to list the items they had decided on for the camera, which was the researcher's cue to switch the camera off. Participants were fully debriefed and excused from the lab.

5.3.2 Qualitative analysis

5.3.2.1 Coding speech

The conversations were transcribed and detailed exactly what each participant said. The transcripts were then uploaded to NVivo, qualitative data management software, to be coded. Within NVivo, the transcripts were coded for every

instance of laughter, disfluency, and interruptive behaviour (see Table 4 for full details of coding terms). The transcripts were then coded for specific use of language which included positive small words, negative small words, singular pronouns referring to one's self, singular pronouns referring to one's opponent, plural pronouns referring to the dyad or others (not including a reference to objects), positive jokes and negative jokes. Joking behaviour was coded with the same procedure used in Chapter 2 (Cowan & Little, 2013b); if a participant made a surreal, sarcastic or hyperbolic statement which resulted laughter in a visible and/or audible way from either participant, it was considered to be a joke. In recording humour behaviours, jokes were categorised according to whether their content appeared to be positive or negative; A positive joke constituted a participant making a funny reference to the situation or something beyond the current conversation, or making a hyperbolic statement about their own skills. A negative joke was classed as a joke which was aimed at either participant; this could be a self-deprecating joke or a joke about the other person, or a joke which was sarcastic or appeared to put the other participant's argument down.

Talking over others and backchannel responses were differentiated by the forcefulness of the interjection. Participants were judged as making a backchannel response if they offered encouragement or agreement rather than presenting a new idea.

Table 4 Coding categories used to analyse the language of the competitive dyad conversation.

	Categories within each coding variable		
Variables	1	2	3
Disfluency	Filler words Variants on 'um'	Incoherence Mumbling (purposeful)	False starts
Interruption	Talking over each other Talking which begins when the other person is already speaking, which is louder than the original speaker and does not stop the original speaker.	Backchannel responses Talking which begins when the other person is already speaking, which is quieter than the original speaker and does not stop the original speaker.	Interrupting Talking which begins when the other person is already speaking which causes the original speaker to cease talking.
Pronoun	Self-pronoun I, me, mine	Other pronoun You, your	Plural We, our
Small words	Positive words Yes, yeah, aye, right, ok, good, true, sure	Negative Words No, nah, nope, no way.	
Jokes	Positive joke Making a joke directed at yourself which builds you up or making a joke which is not aimed at either person but rather an observation about the conversation.	Negative joke Making a joke directed at yourself which puts you down or making a joke directed at the other person which aims to put them, or their argument, down.	
Laughter	This was coded according to the audible noise of laughter, with or without the addition of smiling.		
Smiling	A single smile or a smiling sequence.		
Nodding	A single nod which has the appearance of a meaningful gesture or a sequence of nodding.		

When each transcript was coded, a table was created using NVivo software illustrating how many times each participant was coded engaging in target behaviour. This data was then entered in to SPSS to be analysed.

5.3.2.2 Coding physical behaviour

In order to code physical behaviour, each video was coded sequentially one behaviour at a time, therefore every participant was coded for nodding one after the other, then smiling. This was carried out in order to ensure that the same coding technique could be maintained throughout the analysis. While physical behaviour was being coded, the video was muted and only the target participant was shown on screen in order to reduce the effect of other information. If there was any ambiguous behaviour, the meaningfulness of the action was taken into consideration. For example, motioning with the head may resemble a nod but an isolated instance of moving the head without the appearance of signalling agreement, understanding, or encouragement would not have been counted as a nod. Similarly, instances which involved the same behaviour being repeated in quick succession, such as nodding several times within a very short space of time, would have been coded as one instance of nodding. Smiles were not categorised as being deliberate or spontaneous due to the limitations on the resolution of the videos and the camera angle. Once all the videos had been coded for each behaviour, the total count of each behaviour by each participant was inputted to SPSS for quantitative analysis.

5.3.3 Stimuli ratings

5.3.3.1 Participants and procedure

Undergraduate students (13 participants, 6 males and 7 females; age Mean = 18.7, *SD* = 0.8, Range = 18-20) were recruited to rate the solo desert island videos the participants had recorded. Participants were tested alone in quiet cubicles with a desktop computer. In a self-paced questionnaire format, participants answered demographic questions (only age, sex, nationality, and ethnicity), then sequentially viewed the 40 facial photographs, which they were asked to rate for dominance, and 40 solo desert island videos, which they rated for funniness. Both ratings were carried out on a 1-7 (low-high) scale. The results were collated to create an overall mean rating of funniness for each video.

5.3.4 Data analysis

The mean length of time for the videos was 4.22 minutes (*SD* = 2.81) but, as the conversations were allowed to continue for as long as necessary, the videos varied in length. Due to this variation, the frequencies of each behaviour were generated for use in quantitative analysis by dividing the total count of each behaviour by the length of video. In the following analyses, the phrase ‘winners’ refers to the participants who had three or more items from their allocated list included as part of the final desert island list. The phrase ‘losers’ refers to the participants who had two or less of their items on the final desert island list.

The data were tested for normality; Shapiro-Wilk’s tests demonstrated that six of the key variables presented did not deviate significantly from normality, however the remaining 11 key variables deviated significantly from a normal distribution. As such, Spearman’s Rho correlations have been used in the following section.

5.4 Results

5.4.1 Individual differences predicting who won in the dyad conversation

Independent Samples t-tests were used to determine if there were significant differences in the physical measurements and personality attributes of winners and losers. The data were split by sex due to the expected differences in physical measures. The Independent Samples t-tests demonstrated that the winning male participants were rated as being significantly less funny than the losing male participants according to their video-rated funniness (t_{18} = –2.60, p = .018), however the same effect was not found in females (t_{18} = –0.42, p = .677). In females, the winning participant's self-rated attractiveness was significantly higher than the losing participant's rating (t_{18} = 2.74, p = .013). WHR was found to be significantly different in between the male winners and losers (t_{18} = –2.18, p = .042); an effect which was approaching significance in females (t_{18} = –1.97, p = .065), demonstrating that male and female winners tended to have lower WHRs than losers. The analysis is detailed in full in Table 5.

Table 5 Differences between winners and losers for physical and personality measures.

	Men					Women				
	Winner	Loser				Winner	Loser			
	M (*SD*)	M (*SD*)	t_{18}	*p*	*d, r*	M (*SD*)	M (*SD*)	t_{18}	*p*	*d, r*
Height (cm)	185.25 (9.31)	177.90 (5.94)	2.11	.050**+**	0.94, 0.43	164.20 (5.18)	164.75 (4.66)	–0.25	.806	0.11, 0.06
Weight (kg)	81.14 (15.06)	81.45 (17.03)	–0.04	.966	0.02, 0.01	64.60 (17.33)	63.83 (9.27)	0.12	.903	0.06, 0.03
WHR	.82 (.04)	.86 (.04)	–2.18	.042*	1.00, 0.45	.73 (.04)	.78 (.06)	–1.97	.065**+**	0.98, 0.44
Self-rated attractiveness	4.70 (1.34)	3.80 (1.32)	1.52	.147	0.68, 0.32	4.70 (0.95)	3.60 (0.84)	2.74	.013*	1.23, 0.52
Self-rated dominance	–0.10 (6.33)	1.30 (6.45)	0.49	.630	0.22, 0.11	–2.90 (5.80)	–1.90 (2.56)	–0.50	.624	0.22, 0.11
Photo-rated dominance	4.11 (0.66)	3.57 (0.79)	1.63	.120	0.74, 0.35	3.38 (0.44)	3.64 (0.83)	–0.89	.385	0.39, 0.19
Video-rated funniness	2.91 (1.17)	4.02 (0.69)	–2.60	.018*	1.16, 0.50	3.81 (0.50)	3.71 (0.48)	0.42	.677	0.20, 0.10
Verbal IQ	120.70 (17.96)	123.30 (9.50)	–0.41	.690	0.18, 0.09	107.40 (17.83)	116.80 (12.56)	–1.36	.190	0.61, 0.29

* $p < .05$, **+** $p < .10$

Due to the binary nature of the dependent variable (win or lose) logisitic regressions were used to determine what measures could predict which participant was more likely to 'win' the conversation. Preliminary Chi Square analyses demonstrated that there was a bias with the list, with participants who were randomly allocated List 1 being more likely to 'win' the conversation (X^2 = 6.40, *p* = .011). In the following regression analyses, the allocated list (referred to as 'list number') was included in each of the models in order to control for the effect of the list. In the analyses, losers were coded as '0' and winners were coded as '1', therefore positive values in the statistics demonstrate that the direction of the effect was in favour of the winner whereas a negative value denotes that the direction of the effect was in favour of the loser. Due to the expected sex differences in physical attributes, the data were split by sex for the regression analyses.

5.4.1.1 Physical traits

5.4.1.2 Size

Logistic regression revealed that, in men, the model was significant (X^2 = 8.88, d.f. = 3, *p* = .031, r^2 = .48). List number was not a significant predictor (Wald X^2 = 0.88, exp B = 4.15, p = .329), however weight was found to be a marginally significant predictor (Wald X^2 = 3.29, exp B = 0.91, *p* = .070) as was height (Wald X^2 = 2.82, exp B = 1.24, *p* = .093), demonstrating that taller and less heavy men were more likely to win.

In women, the logistic regression model was not significant (X^2 = 3.40, d.f. = 3, *p* = .335, r^2 = .21). List number was a marginally significant predictor (Wald X^2 =

3.00, exp B = 5.62, *p* = .084), but both height (Wald X^2 = 0.07, exp B = 0.97, *p* = .794) and weight (Wald X^2 = 0.01, exp B = 1.00, *p* = .906) were non-significant.

5.4.1.3 Shape and self-perception

In a logistic regression, winning the dyad task was entered as the variable to be predicted, with list number and waist-to-hip ratio (WHR) and self-rated attractiveness as the predictor variables.

In men, the logistic regression model was significant (X^2 =15.92, d.f. = 3, *p* = .001, r^2 = .73). List number was a marginally significant predictor (Wald X^2 = 3.75, exp B = 118.74, *p* = .053). Self-rated attractiveness was not a significant predictor (Wald X^2 = 2.25, exp B = 2.59, *p* = .134), however WHR was a significant predictor (Wald X^2 = 3.96, exp B = 0.00, *p* = .047), suggesting that males with lower WHR's were more likely to win the conversation. In females, the logistic regression model was significant (X^2 = 18.16, d.f. = 3, *p* < .001, r^2 = .80). List number was a marginally significant predictor (Wald X^2 = 2.80, exp B = 174.00, *p* = .095), as was self-rated attractiveness (Wald X^2 = 2.84, exp B = 60.93, *p* = .092) and WHR (Wald X^2 = 3.15, exp B = 0.00, *p* = .076), demonstrating that women who rated themselves as being higher in attractiveness, and who had lower WHR's, were more likely to win the conversation.

5.4.1.4 Rated dominance

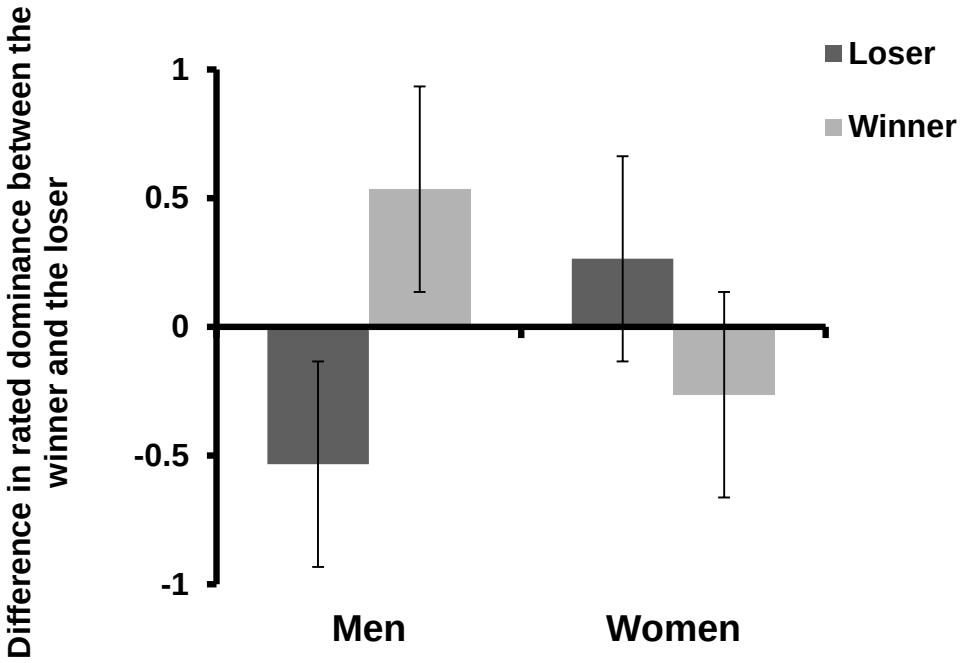
The Independent Samples t-test demonstrated that there was no significant difference between winners and losers in terms of photo-rated dominance but, given the interactional nature of the competitive conversation, I tested to see if the relative difference in dominance between each dyad was related to winning. Each participant's mean rating of photo-rated dominance was

subtracted from their partner's mean rating of photo-dominance. The data were split by sex and a logistic regression was used to test if this predicted winning, with the outcome of the task as the variable to be predicted and list number and relative difference in facial dominance as the predictor variables.

The logisitic regression revealed that, in men, the model was significant (X^2 = 11.92, d.f. = 2, *p* = .003, r^2 = .60). List number was a not a significant predictor (Wald X^2 = 2.42, exp B = 7.93, *p* = .120) but the difference in rated dominance was a marginally significant predictor (Wald X^2 = 3.36, exp B = 14.00, *p* = .071) demonstrating that men who were relatively more dominant than their conversation partners were more likely to win the conversation. In females, the model was significant (X^2 = 10.02, d.f. = 2, *p* = .007, r^2 = .53). List number was a significant predictor (Wald X^2 = 4.02, exp B = 16.10, *p* = .045). The relative difference in rated facial dominance between conversation partners was also significant (Wald X^2 = 4.35, exp B = 0.07, p = .037), although this effect was in the opposite direction of the effect found in the male data such that females were rated as being relatively lower in dominance were more likely to win the conversation.

These results are illustrated in Figure 2 below.

Figure 2 The mean difference in other-rated dominance from the facial photograph (with standard error bars).



5.4.1.5 Personality and intelligence

In a logistic regression on personality variables, winning the dyad task was entered as the variable to be predicted, with list number, funniness rating from the solo desert island video, self-rated dominance, and verbal IQ entered as the predictor variables. In a logistic regression on personality variables, winning the dyad task was entered as the variable to be predicted, with list number, funniness rating from the solo desert island video, self-rated dominance, and verbal IQ entered as the predictor variables. In males, the model was significant (X^2 = 14.87, d.f. = 4, p = .005, r^2 = .70). List number was a marginally significant predictor (Wald X^2 = 3.04, exp B = 25.10, p = .081). Self-rated dominance was also a marginally significant predictor (Wald X^2 = 3.06, exp B = 0.75, p = .080),

as was rated funniness based on the solo desert island (Wald X^2 = 3.73, exp B = 0.92, *p* = .054), demonstrating that men who were rated as being less funny in the solo desert island video, and those who rated themselves as being higher in dominance were more likely to win the conversation. Verbal IQ was however not a significant predictor (Wald X^2 = 1.10, exp B = 0.92, *p* = .294).

In females, the model was not significant (X^2 = 5.00, d.f. = 4, *p* = .291, r^2 = .29). None of the variables entered into the model were significant predictors of who would win the conversation; list number (Wald X^2 = 2.17, exp B = 5.20, *p* = .141); self-rated dominance (Wald X^2 = 0.42, exp B = 0.93, *p* = .515); Verbal IQ (Wald X^2 = 1.24, exp B = 0.96, *p* = .266); funniness rating from the solo desert island video (Wald X^2 = 0.01, exp B = 0.90, *p* = .929).

5.4.2 How do winners and losers differ in communication?

In the next analysis, differences in verbal and nonverbal communication between the winners and the losers were tested. Independent Samples t-tests were used to tests if there were significant differences between the aspects of speech used by winners and losers. Independent Samples t-tests demonstrated that there were no significant differences between males and females in terms of jokes, disfluencies, pronoun usage or word frequency (all *t* < 1.24, *p* < .223) therefore male and female data were analysed together. The analyses, which are presented in the table below in full (Table 6), demonstrated that there were no significant differences between winners and losers in terms of jokes, disfluencies, pronoun usage, or word frequency (all *t* < 1.31, *p* > .203).

Table 6 The differences between winners and losers in terms of speech

	Winner	Loser				
	M (*SD*)	M (*SD*)	t_{38}	*p*	*d*	*r*
Negative jokes	0.36 (0.40)	0.37 (0.63)	–0.06	.952	0.02	0.01
Positive jokes	0.33 (0.37)	0.27 (0.34)	0.54	.593	0.17	0.08
Disfluency	2.02 (1.36)	1.63 (1.28)	0.93	.358	0.30	0.15
Self-pronoun	4.43 (1.69)	4.84 (2.34)	–0.64	.526	0.20	0.10
Plural and other pronoun	5.48 (2.42)	5.00 (2.95)	0.56	.576	0.18	0.09
Word frequency	97.19 (33.01)	85.35 (23.91)	1.30	.203	0.41	0.20

5.4.3 Competition and cooperation in the conversation

In order to understand how cooperative and competitive behaviours may differ between winners and loser, three new variables were created based on the measures taken during the content analysis. The new behaviour variables created were Verbal Cooperative (Backchannel responses and positive words); Nonverbal Cooperative (Nodding, smiling, and laughing); and Verbal Competitive (Interruptions, talking over others, and negative words), which were based on the categories established in Grainger and Dunbar (2009).

Independent Samples t-tests were used to test the differences between winners and losers in the three behavioural variables. This analysis demonstrated that there were no significant differences between winners and losers for Verbal Cooperative, Nonverbal Cooperative, or Verbal Competitive behaviour (all $t < 1.50$, all $p > .143$). Due to the small numbers of participants, Spearman's Rho correlational analyses were used to determine how these factors related to other aspects of speech which were of interest; word frequency, disfluencies, pronoun usage, and jokes. These analyses demonstrated differences in the use of positive

and negative jokes such that, in the winners' data, there was a significant relationship found between nonverbal cooperative behaviour and negative jokes (r_s = .52, p = .020) as well as positive jokes approaching significance (r_s = .42, p = .065). There was no significant relationship between positive jokes and nonverbal cooperative behaviour for losers (r_s = .21, p = .369), however the frequency of negative jokes was significantly positively correlated to nonverbal cooperative behaviour (r_s = .74, p < .001). These findings could suggest that negative humour is more likely to be accompanied by cooperative behaviour (smiling and laughing) by both winners and losers, but winners were more likely to combine positive jokes with cooperative behaviour. However, the frequency of negative jokes was found to be significantly positively related to Verbal Competitive behaviour in losers only (r_s = .58, p = .008); the same effect was not found in winners (r_s = .24, p = .308). The analyses also showed that self-pronoun usage was associated with verbal cooperative behaviour in losers (r_s = .53, p = .016), though the same relationship was not found in winners (r_s = –.02, p = .935). In winners, verbal cooperative behaviour was found to be associated with disfluencies (r_s = .73, p< .001), whilst the same relationship was not significant in losers (r_s = .30, p = .195). The full analysis is presented in the table below (Table 7).

Table 7 The correlates of verbal and nonverbal behaviour for winners and losers.

	Verbal Cooperative				Nonverbal Cooperative				Verbal Competitive			
	Winners		Losers		Winners		Losers		Winners		Losers	
	r	*p*	*r*	*p*	*r*	*p*	*r*	*p*	*r*	*p*	*r*	*p*
Word Frequency	–.13	.600	.21	.387	.01	.985	–.04	.613	.15	.535	.09	.717
Disfluency	.73	<.001**	.30	.195	.02	.950	.10	.677	.08	.748	–.31	.186
Self-pronoun	–.02	.935	.53	.016*	.02	.950	–.01	.980	.05	.835	–.12	.618
Other pronouns	–.26	.277	–.06	.811	–.10	.677	.11	.640	.20	.394	.38	.097**+**
Positive Jokes	–.30	.197	–.10	.688	.42	.065**+**	.21	.369	–.02	.923	.06	.809
Negative Jokes	–.01	.974	–.15	.528	.52	.020*	.74	<.001**	.24	.308	.58	.008*

(Df = 19) ** $p < .001$ * $p < .05$, **+** $p < .10$

As several physical and personality variables of interest were found to relate to winning, Spearman's rho correlational analyses were used to test how height, WHR, self-rated attractiveness, and video rated funniness related to the behaviour measures. Correlational analyses demonstrated that none of these variables related to Verbal Cooperativeness though, in the winning participants, height (r_S = –.48, p = .032) and WHR (r_S = –.61, p = .005) were significantly negatively related to Nonverbal Cooperative behaviour, demonstrating that winners who were taller and who had more masculine WHRs were less likely to display cooperative nonverbal behaviours. Additionally, self-rated dominance was negatively related to Nonverbal Cooperative behaviour in winners, though this relationship was not significant (r_S = –.33, p = .153). These variables were not significantly related to Verbal Competitive behaviour. Self-rated attractiveness was however positively related to Verbal Competitive behaviour, though this was not significant (r_S = .33, p = .157).

In the losing participants, none of the physical or personality variables significantly related to Nonverbal Cooperative behaviour, however WHR was significantly negatively related to Verbal Cooperative behaviour (r_S = –.67, p = .001) demonstrating that those with more feminine WHRs displayed more Verbal Cooperative behaviours. Regarding the Verbal Competitive behaviours, height was significantly and positively related to competitive behaviours (r_S = .48, p = .033), therefore taller participants engaged in more competitive behaviours, and video rated funniness was also positively related to competitive verbal behaviour, though this was just approaching significance (r_S = .42, p = .063). The other physical and personality variables remaining, weight and IQ, were not significantly related to any of these behaviours.

5.5 Discussion

The purpose of the dyadic conversation study was threefold; to test how winners and losers differed physically and in their personality; to test how the winners and losers differed in the language they used; and lastly to test how these verbal and nonverbal behaviours related to physical and personality qualities.

5.5.1 Variables predicting who will win

In testing how the winners and losers differed in terms of physical and personality traits, it was thought that those high in qualities relating to dominance would be associated with winning. The results somewhat support this: men who were taller and rated as having more dominant faces than their conversation partners were (marginally) more likely to win. In women, the effect of facial dominance was in the opposite direction; women who had less dominant faces were more likely to win. This finding could potentially be related to attractiveness. Dominance in females has been shown to relate to facial masculinity (Quist et al., 2011); women in the current study who were higher in femininity (and therefore attractiveness (Perrett et al., 1998), may therefore have been rated as being lower in dominance. Additionally, women with more feminine WHRs , and who rated themselves as being higher in attractiveness, were more likely to win the conversation. Together, these findings could suggest females who are physically attractive may hold more power or persuasiveness in the conversation than women who are less physically attractive. Self-rated attractiveness was also a predictor of winning in men, with men who rated themselves as being higher in attractiveness, and those who have a lower WHR (more feminine), being more likely to win. Overall, the results for the influence of appearance on winning seem

to suggest that more physically dominant men are more likely to win the conversation whilst more physically attractive women are more likely to win.

The study also investigated the impact of personality variables to test how these related to winning. In terms of personality, self-rated dominance was not related to winning. Previous research has demonstrated that more dominant individuals may be less sensitive to dominance cues (Watkins, Jones, & DeBruine, 2010; Watkins, Fraccaro, et al., 2010) therefore, in the current study, this may help to explain why self-rated dominance did not differ between winners and losers but other cues to dominance (facial appearance and height) did. The findings demonstrated that verbal IQ was not a predictor of winning for males or females. It was unclear how humour might relate to winning the competition, as funniness could increase persuasiveness or it could signal cooperativeness; however, the results showed that males who were rated in their solo desert island video as being less funny were more likely to win. It could be that men who are more dominant are less likely to produce humour in the solo desert island video, especially if this type of humour is more associated with being cooperative. More dominant men may therefore win the competitive conversation based on the formidability of their appearance, in both looking dominant in the face and in being taller. Humorousness in females did not relate to winning. This is interesting because it may suggest that both women in the dyad used humour equally but that it did not relate to being more persuasive.

5.5.2 The differences between winners and losers

Previous research has shown that males are more likely to use negative humour styles than females and that females may use humour as an affiliative tool (Martin et al., 2003) but it was unclear which humour style might be more successful in

winning the conversation. The results demonstrated that there were no significant differences between winners and losers in frequency of producing positive or negative jokes providing evidence that winning and losing participants tended to use both humour types at a similar rate. This may support the suggestion by Crystal (1998) that humour can be contagious in conversation, as participants may increasingly enjoy appreciating and producing humour together. It is interesting to contrast this finding with the previously discussed point that male participants who were rated as being funny in their solo desert island videos were less likely to win the conversation. There may be an imbalance between inclination or ability to be funny for the individuals in the dyads but the two participants together do not appear to differ in their usage of jokes when they interact.

Further analysis demonstrated that there were no differences between winners and losers in terms of disfluencies, pronoun usage, word frequency, or the three nonverbal behaviour measures; smiling, nodding, and laughing, nor were there sex differences in these behaviours. Whilst it was expected that there would be such differences, it could be suggested that the number of participants has not provided adequate power to detect these effects. It is likely that in the course of a five minute conversation, all of these behaviours will arise but the differences between the individuals in the dyads may be too subtle and the effects may be too small to seen in a study of 40 participants.

In order to look at the patterns of nonverbal and verbal behaviour, three variables were created to capture verbal cooperativeness and competitiveness and nonverbal cooperativeness. No differences were found between winners and losers in these variables, perhaps for the same reason described above.

Further analysis did show that there was variance in the way these three variables related to other measures of interest, such as joking behaviour. The analysis showed that winners tended to use both positive and negative jokes in combination with nonverbal cooperative behaviour, a variable which was composed of frequency of smiling, laughing, and nodding. In losers, this relationship was found only in negative joke usage. These results suggest that despite the type of humour being used, joking is combined with cooperative, affiliative behaviours, therefore joking itself could be an extension of this signal of cooperation. Although, a further related finding, that losers tended to use more verbally competitive behaviour with negative jokes, suggests that humour was not only used to signal cooperation and that a more aggressive humour style may have been used in a dominant attempt to gain control of the conversation. It is surprising that this behaviour was seen only in the losing participants, and also that it was combined with a higher usage of self-pronouns. A higher use of self-pronouns is associated with being lower status (Kacewicz et al., 2013), so it is unclear how this might relate to also displaying more competitive, dominating behaviours, though evidently those participants were more focused on themselves.

Research has demonstrated that when an individual behaves in an overtly dominant way, it can work against them (Diekman, 2007). As previously discussed, behaving dominantly by interrupting people can make you less likeable and it can even encourage people to stop you from getting your own way. In an analysis of a conversation which took place between a group of four people (two of whom were confederates), Ridgeway and Diekema (1989) found that a confederate purposefully behaving in a dominant way was unable to generate

any more influence over the outcome of the group task possibly because the naïve participants, in finding the dominant confederate less likeable and less group-oriented, were inclined to overrule the confederate in order to reduce their decision-making power. This could provide some insight into the pattern of results found. The results also showed that winners combined more disfluencies with verbal cooperative behaviour, which could indicate that they were smiling and laughing at their own speech disturbances.

5.5.3 Appearance, personality and verbal and nonverbal behaviour

Analyses were also carried out to test how appearance and personality variables related to verbally cooperative and competitive behaviours and nonverbal cooperative behaviour. Overall, the results seem to suggest that those with higher, and therefore more masculine, WHRs were less likely to use verbal and nonverbal cooperative behaviours and were also less likely to win the conversation. This appears to correspond with recent evidence that women with higher WHRs are less cooperative (Muñoz-Reyes, Pita, Arjona, Sanchez-Pages, & Turiegano, 2014). In a study using the Prisoner's Dilemma Game to test how attractiveness relates to cooperative behaviour, Muñoz-Reyes et al (2014) found that women with more feminine WHRs were more likely to cooperate whereas the women more masculine WHRs were more likely to defect (considered the most dominant strategy), meaning that these women were less cooperative. The reserachers suggest that this may be because the women with higher WHRs are less likely to trust the person they are playing against, which may be due to the fact that having a high WHRs can mean reduced mate value which could lead to lower status and being distrustful of others (Adler, Epel, Castellazzo, & Ickovics, 2000; Muñoz-Reyes et al., 2014). Interestingly, Muñoz-Reyes et al (2014) did not

find that self-rated attractiveness related to cooperativeness. Self-rated attractiveness was not related to verbal cooperative behaviour in the current study, though it was postively related to winning.

5.5.4 Review of findings

In drawing together the main findings of how appearance related to winning or cooperative or competitive behaviours, the analyses present a mixed pattern of results. The female data demonstrate that those who rate themselves as being physically attractive and who have a less dominant (potentially more feminine) appearance are more likely to win, and that those who have more feminine WHRs are more likely to win as well as being more nonverbally cooperative. In sum, this pattern of evidence demonstrates that attractive women are more likely to win the conversational task. The results also demonstrate that men who have a relatively more dominant face than their competitor and are taller, have less masculine WHRsare more likely to win. Looking at the differences between winners and losers, there are differences in the patterns of behaviour seen but it is unclear how they might have contributed to winning, especially in considering the strength of the relationship between appearance variables and winning. The results demonstrate some differences in regards to appearance and behaviour; as discussed, those with more feminine WHRs displayed more verbally cooperative behaviours. Additionally verbally competitive behaviour was positively related to height, which we might have expected given the relationship between dominance and height (Buunk et al., 2008).

There were no further differences found between how winners and losers used other aspects of speech, which may suggest that appearance was the most important factor in deciding the outcome. This may be due to impact that

appearance had on behaviour, but the current analyses cannot shed further light on the matter. It was however postulated in previous research that having information on appearance alone is enough for participants to accurately judge a person as being dominant (Mileva et al., 2014) or untrustworthy (Stirrat & Perrett, 2010) and to pre-emptively punish them (Haselhuhn et al., 2013). In women, it has been suggested that attractiveness and dominance in women may be related such that more attractive women may appear to be more formidable or powerful opponents than women who are more typical of dominance perceptions (Fisher & Cox, 2009), e.g. more masculine (Quist et al., 2011). These findings together may suggest that very dominant males or more attractive females are more formidable. It could therefore be that their conversation partner is less willing to challenge them, which can be a risky strategy (Watkins, Fraccaro, et al., 2010). Furthermore, more dominant people may be more motivated to win than less dominant people therefore, instead of adopting a domineering conversation strategy where they interrupt a great deal or talk over the other person, they may simply be unrelenting in their desire to win, refusing to end the conversation until the other participant submits (Gambacorta & Ketelaar, 2013). Perhaps with a lengthier task and a greater sample, the strategies associated with being dominant or attractive would have been more apparent but it remains unclear in the current study how verbal or nonverbal conversational strategies contributed to winning.

In regards to humour, one of the more interesting findings was that there was no signficant differences between humour usage, in either positive or negative jokes, between winners and losers. As discussed, this could be suggestive of the fact that humour is used equally across a dyad, though it can

only be speculated why this is the case. It could be that using humour is acting as a signal of interest (Li et al., 2009), therefore demonstrating affiliative intent. Humour use could also be a sign of competitiveness, where both participants feel pressured to maintain the 'banter' of the conversation (Alexander, 1986). Furthermore, whether this back and forth is composed of positive or negative humour, or both, it could be considered to be a sign of cooperation or friendliness (Palmer, 1993). Consideration must also be given to the fact that, whilst there were no observable differences in humour use between winners and losers, use of humour appeared relatively infrequently across the study. Previous research has consistently found low effect sizes and low frequency of use of humour in laboratory settings (Argyle, 1969; Greengross & Miller, 2011), therefore this perhaps could have been expected. Then again, the task given to participants in the current study did not involve humour and participants were not informed of the hypotheses. The fact that humour was evidently used regardless of the instructions does further evidence the contention that humour is a ubiquitous aspect of conversation, in addition to highlighting the potential importance of humour as a signal of cooperation in same-sex dyads.

5.5.5 Summary

In reviewing the evidence, the pattern of results demonstrates that physical appearance was the greatest predictor of who would win the desert island task. In males, the results demonstrated that the more dominant physically dominant individual was more likely to win, as measured by ratings of facial dominance and height. In females, the individual who was rated as being least dominant was more likely to win, though this was suggested to be a potential indicator of attractiveness (if dominance was rated according to how masculine each female

was, as previous research has suggested). This is supported by the further finding that both males and female participants who had smaller WHR's were more likely to win.

Whilst these results may suggest that the more dominant individual, or the more attractive individual, was more likely to win it is unclear whether these individuals had more subtle dominant strategies in the conversation or whether they were viewed as more formidable opponents based on their appearance alone. As a result, the opposing participant may have been less likely to challenge the perceived dominant partner, but the results of the verbal and nonverbal analyses do not provide insight into this. It could be that, with such a limited time to interact, participants relied on each other's appearance to gauge whether they could influence the outcome of the conversation because appearance was the most tangible piece of information these stranger pairs had about each other. Future work where participants were unable to see each other during a longer task may provide greater insight into the verbal cues and strategies which might be used to win a competitive conversation.

Chapter 6 It's the way he tells them…and who is listening; men's dominance is positively correlated with preference for jokes being told by dominant-sounding men.

This chapter is based on the following manuscript, which is currently under review;

Cowan, M L, Watkins, C. D, Fraccaro, P. J., Feinberg, D. R & Little, A. C. It's the way he tells them (and who is listening): Men's dominance is positively correlated with their preference for jokes told by dominant-sounding men.

6.1 Abstract

Evidence has demonstrated that the physical characteristics of a joke-teller impact on how funny that joke is rated (Chapter 2). It is likely that one's own condition may be a moderating factor in appreciating the humour produced by others. In the current study, we tested this effect in voices to determine whether the dominance of one's own appearance influences the kind of individuals he or she finds most funny. Participants completed physical and psychometric measures of dominance were then asked to decide whether they preferred either a lower-pitched or higher-pitched voice telling eight one-liner jokes. The results found that men who were higher in measures of dominance preferred jokes told by more masculine sounding voices. In women, there was no relationship found between dominance and the voices preferred. The results demonstrate support for the homophily hypothesis, which suggests that individuals prefer those who are most similar to them. Humour use may be a mechanism for testing openness to cooperation with potential allies, therefore appreciating the humour of those most similar to oneself may be a relatively low-risk way of reciprocating the signal of cooperation.

6.2 Introduction

In Chapter 5, the use of humour between same-sex participants was suggested to play a role in demonstrating cooperation or competitiveness. Whilst the previous study demonstrated that dyads may use humour at a similar rate, I was interested in testing how appreciation of humour differed according to self-perceived dominance. This chapter describes empirical research carried out to test how the perception of one's own dominance might relate to the appreciation of humour produced by others of varying degrees of dominance. This chapter

begins by describing the importance of humour before elaborating more on how it may be adaptive to use humour to form alliances with people similar to us.

6.2.1 The use of humour in monitoring relationships

Humour is a ubiquitous feature of human interaction and communication (Gervais & Wilson, 2005). Extensive research into the role of humour in mate choice (Bressler & Balshine, 2006; Bressler et al., 2006; Lundy et al., 1998; McGee & Shevlin, 2009; Wilbur & Campbell, 2011) suggests that a good sense of humour primarily functions as a signal of 'mate quality' and thus may be desirable in a romantic partner (Miller, 2000). However, the production and appreciation of humour may function to signal interest in the initiation and maintenance of social partnerships more generally (Li et al., 2009). Using humour can signal romantic interest but, in other contexts, humorous conversation can help to defuse conflict or demonstrate shared knowledge and attitudes (Flamson & Barrett, 2008; Gervais & Wilson, 2005). Having a good sense of humour is also associated with having more socially desirable traits, such as friendliness and cooperativeness (Cann & Calhoun, 2001). Accordingly, experimental evidence has shown that humorous exchange has positive effects on cooperative behaviour within dyads (Curry & Dunbar, 2013). Collectively, while sexual selection based theories of humour propose that humorous individuals, particularly men, will be judged as more desirable than their less humorous peers (e.g. Miller, 2000), the Interest Indicator model proposes that attractive individuals may be considered to be more funny than perhaps less desirable peers (Li et al., 2009).

Despite humour being a (at a basic level) verbal interaction, the physical appearance of humour participants remains an important moderating factor when considering ratings of humour. Experimental evidence has shown that both men

and women rate more physically attractive men as funnier than their relatively less attractive peers (Cowan & Little, 2013b) demonstrating that humour produced by attractive men is appreciated more, or perhaps attended to more, than humour produced by less attractive men. The physical condition of potential mates or social allies may be important in terms of the benefits we might anticipate from a partnership with them as, from an evolutionary perspective, it may be wise to ensure we align ourselves with healthy individuals (Kirkpatrick & Ryan, 1991; Krupp, DeBruine, & Jones, 2011; Sell et al., 2009). There is also evidence to suggest that, in humans and non-human primates, aligning with high-status individuals can be beneficial (Apicella, Marlowe, Fowler, & Christakis, 2012). More dominant individuals have better access to resources, which could be due to their ability to 'rush' at prey, as in chimpanzees, or their ability to benefit from the generosity of others, as in humans (Apicella et al., 2012). Implicit in this assertion is the element of cooperation which must be present in successful alliance formation. It would be pertinent to form an alliance with individuals who disposed to cooperate with us, which may highlight an important function of humour; to gauge cooperativeness and warmth in a social partner.

6.2.2 Homophily and dominance

Social alliances have many benefits in terms of competitive ability and reproductive success for males, as well as having positive effects on female health in terms of longevity and low stress (Seyfarth & Cheney, 2012). The positive effects of strong social support are so much so that they are comparable to that of smoking cessation (Holt-Lunstad, Smith, & Layton, 2010; House, Landis, & Umberson, 1988). It may therefore be the case that, due to the advantages of cooperative partnerships, it is adaptive to attend to the cues of

others that they are willing to cooperate and demonstrating appreciation for the humour used by others may be an important signal in this process.

There is considerable evidence that similarity (i.e. 'homophily') between social partners is important in the initiation and maintenance of such partnerships (Massen & Koski, 2014; McPherson, Smith-Lovin, & Cook, 2001; Nelson, Thorne, & Shapiro, 2011), and homophily between social partners may have encouraged the evolution of more cooperative behaviours (Riolo, Cohen, & Axelrod, 2001). For example, similarity in social boldness is a correlate of friendships among non-kin in Chimpanzees (Massen & Koski, 2014). In humans, hand grip strength predicts social connections among the Hadza tribe (Apicella et al., 2012) while western adolescents appear to form social partnerships according to their level of extraversion (Nelson et al., 2011).Similar individuals may therefore be particularly likely to use humorous exchange as a means toward monitoring interest within dyads or groups of similar individuals.This strategy may be particularly beneficial; For example, while attractive and/or dominant individuals might be particularly desirable as social partners because of their high social status (Hume & Montgomerie, 2001; Little & Roberts, 2012; von Rueden et al., 2011). High status individuals are proposed to be in a relatively better bargaining position in social conflicts and as such can 'afford' to disregard the welfare of others in comparison to their relatively less attractive and/or dominant peers (Sell et al., 2009). Consistent with this suggestion, attractiveness and/or dominance are positively correlated with self-report measures of anger and aggression in past and hypothetical conflicts (Sell et al., 2009). Complementing this work, physically-dominant men are more likely to exploit others in economic exchanges (Stirrat & Perrett, 2012) and are less likely to distribute resources evenly among

their peers (Price, Kang, Dunn, & Hopkins, 2011). Collectively, while there may be a premium placed on cues of interest signalled by desirable social partners (Li et al., 2009), these cues of interest may be particularly salient to individuals who are better-placed to acquire and retain such partners. In other words, humorous exchange may be a particularly beneficial low-cost strategy for individuals *within* high status partnerships to monitor and maintain the quality of their relationships.

6.2.3 Rationale

Given that humour appreciation and production are valuable cues for signalling interest in the initiation and maintenance of social partnerships (Curry & Dunbar, 2013; Li et al., 2009), and that similarity among social partners predicts partnership formation (Apicella et al., 2012; Massen & Koski, 2014; McPherson et al., 2001; Nelson et al., 2011), I wanted to test whether humour appreciation is contingent on the characteristics of both the signaller and receiver. In order to measure this, men and women completed physical and psychometric measures of attractiveness and dominance (i.e. their 'condition'), and were tested to see if their preference for 'one-liner' jokes varied according to the speaker's own vocal attractiveness and dominance. Previous research using computer-manipulations of voice pitch has established that low-pitch versions of men's and women's voices are perceived as more dominant than high-pitch versions (Fraccaro et al., 2013; Puts, Apicella, & Cárdenas, 2012). Moreover, while low-pitch versions of men's voices are perceived as more attractive than high-pitched versions, raised-pitch versions of women's voices are perceived as relatively more attractive than low-pitch versions (Fraccaro et al., 2013; Puts, Apicella, & Cárdenas, 2012). Thus, I investigated whether attractive and dominant listeners reported a stronger

preference for jokes told by relatively attractive and dominant speakers respectively. Specifically, given that cohesion and cooperation within groups is thought have greater net benefits on male than female fitness (Benenson, Markovits, Fitzgerald, et al., 2009), I predicted that dominant men would express a stronger preference for jokes told by their dominant peers, as such a strategy would be particularly beneficial for monitoring interest within high-status partnerships with formidable allies. However, given that denigration and exclusion of attractive rivals are important components of competition among women and that vocal femininity is an attractive cue that has negative connotations among other women (Fisher & Cox, 2009) I did not predict that the effect of men's own condition on their appreciation of other men's humour would necessarily generalize to women's appreciation of other women's humour.

Study 6

6.3 Method

6.3.1 Creating the joke stimuli

Four male (mean age = 22.8 years, SD = 3.6) and four female (mean age = 19.5 years, SD = 1.9) Canadian participants with similar accents were asked to read a subset of eight 'one-liner' jokes taken from a larger set of joke stimuli (used in Bressler and Balshine, 2006) in their natural voice as if they were telling a joke to someone. Participants were given the opportunity to read the jokes before they made the recording. Recordings were made using a Sennheiser MKH 800 P48 microphone using the cardioid pickup pattern in a sound-attenuated booth. Recordings were made in mono, using Adobe Soundbooth, at a sampling rate of 96 kHz and with 32-bit amplitude quantization and saved as uncompressed wav files.

Masculinized and feminized versions of each recording were then manufactured by raising and lowering pitch using the pitch-synchronous overlap add (PSOLA) algorithm in Praat (Boersma & Weeink, 2011)by 0.5 equivalent rectangular bandwidths (ERBs) of the original frequency. This PSOLA method has been used successfully in other studies of human voice perception (e.g. Feinberg, Jones, Little, Burt, & Perrett, 2005; Puts, Gaulin, & Verdolini, 2006). Whereas the PSOLA method alters voice pitch, other aspects of the voice are perceptually unaffected (Feinberg et al., 2005). The manipulation performed here is roughly equivalent to a 20% change in Hz for women's speech and a 13% change in Hz for men's speech in this particular sample, which are above established JND's for detection, attractiveness, and masculinity perception (Re

et al., 2012), and takes into account the fact that pitch perception is on a log-linear scale in comparison to the natural frequencies (i.e. Hertz). After manipulation, amplitudes were scaled to a consistent presentation amplitude (70dB SPL) using the root-mean-squared method.

This process created 8 pairs of voice recordings in total for each participant who had their voice recorded (each pair consisting of a raised-pitch and lowered-pitch version of the same recording). From these, we selected clean recordings of masculinized and feminized versions of four men and four women telling two jokes each (i.e. 16 voice pairs, with each voice pair consisting of a masculinized and feminized version of an identical joke from an identical speaker). Within the final stimulus set, the mean fundamental frequency of the feminized versions was 154.84 Hz (*SD* = 24.44 Hz) for the men's recordings and 278.40 Hz (*SD* = 12.58 Hz) for the women's recordings. The mean fundamental frequency of the masculinized versions was 115.41 Hz (*SD* = 23.79 Hz) for the men's recordings and 227.73 Hz (*SD* = 31.45 Hz) for the women's recordings.

6.4 Manipulation check for humour style

6.4.1.1 Participants

Twenty-three Psychology undergraduate students from the University of Stirling participated to fulfil a course requirement (8 males and 15 females, M age = 22.4, *SD* = 8.2, Range = 18-53).

6.4.1.2 Procedure

After answering basic demographic questions concerning only age, sex, nationality, ethnicity, relationship status, and handedness, participants were asked to listen to all 32 voice clips (with each joke being spoken by 4 voices; both

the masculinised and feminised versions of the male and female joke-teller) in a self-paced online questionnaire on a computer in a quiet lab setting. The manipulation check was carried out to ensure that aggressive jokes were not included as this could introduce personality associations which may interfere with the perception of voices (Cowan & Little, 2013a; Zeigler-Hill et al., 2013). Thus, participants were asked to rate the jokes on a 7 point scale (ranging from 1 '*high in affiliation'*, to 4 '*neutral*', to 7 '*high in aggression*') to identify if any of the jokes could be classed as aggressive.

6.5 Results

To analyse these data, a mean style rating was created from all four voice ratings of each joke. One sample t-tests were used to determine if any of the jokes were significantly greater than 'neutral'. One joke (Joke number 4; see Table 8) was significantly greater than 'neutral' and thus could be classed as 'aggressive' in style (M = 4.61, *SD* = 0.96, t_{22} = 3.05, *p* = .006). Subsequent analyses were therefore completed using the seven remaining jokes though excluding Joke number 4 did not alter any of the overall conclusions derived from the findings within the data.

Table 8 Mean style rating for jokes used

Stimuli of eight 'one-liner' style jokes	M (*SD*)	*t*(22)	95% CI
1. Why do toasters have a setting that burns the toast to a horrible crisp that no one would eat?	4.04 (0.76)	0.27	–0.29, 0.37
2. I was thinking about life the other day, and a frightening idea occurred to me: what if the Hokey Pokey really is what it's all about?	3.47 (0.48)	–5.34**	–0.74, –0.33
3. My computer broke over the weekend. Without email, I have no idea what's happening with my friends or family. Can anyone remind me how a phone works?	3.98 (1.14)	–0.09	–0.51, 0.47
4. I like the lottery because it's basically a tax on people who are bad at math.	4.61 (0.96)	3.05*	0.20, 1.02
5. My grandfather had a saying that I think describes most of life: Some days you are the pigeon. Some days you are the statue.	3.92 (0.65)	–0.57	–0.36, 0.20
6. I have a deep fear of clowns. I've thought a lot about this and I think it goes back to my childhood when we went to the circus and a clown killed my dad.	3.61 (0.76)	–2.47*	–0.72, –0.06
7. Birthday cake is the only food you can blow on and spit on and everybody rushes to get a piece.	3.46 (0.96)	–2.71*	–0.96, –0.13
8. The high school I went to was so rough, we had our own coroner. We use to write essays like "What I Want to Be *If* I Grow Up".	3.23 (1.04)	–3.25*	–1.16, –0.26

* $p < .05$, ** $p < .01$(1 = 'affiliative', 7= 'aggressive').

Study 7

6.6 Testing the preference for voices in joke-telling

6.6.1.1 Participants

One hundred undergraduate students from the University of Stirling participated to fulfil a course requirement (44 males; M age = 20.4, *SD* = 5.2, Range = 16-56). Two female participants were excluded from the analyses; one for not consenting to participate in the full study and one for being unable to complete the experiment due to a failure in the electricity supply to the lab.

6.6.1.2 Procedure

Participants were tested alone in a quiet lab setting. The stimuli were presented online using the same computer and headphones each time. Participants completed the joke-rating task at their own pace. On the first page, participants completed basic demographic questions (only age, sex, nationality, ethnicity, relationship status, and handedness) and were asked to rate their own attractiveness and their own masculinity on a 1 (not very attractive/masculine) to 7 (very attractive/masculine) scale.

Participants were told that, across a number of trials, they would listen to the same joke being spoken by two different voices. On each trial they were instructed to choose the funnier joke and indicate how much funnier they thought that joke was relative to the other joke in the pair using a –4 to 4 scale (–4 to 0: feminized joke rated as ‘a lot more funny,’ ‘more funny,’ ‘just more funny,’ and ‘guess more funny’ than the masculinized joke. 1 to 4: masculinized joke rated

as ‘guess more funny’, ‘just more funny’, ‘more funny’ and ‘a lot more funny’ than the feminized joke).

Across trials, a participant would listen to an identical joke-pair twice; once read by a masculinized versus feminized version of a male speaker, and once read by a masculinized versus feminized version of a female speaker. The order of the jokes and the sex of speaker were randomised across all 16 trials. Following on from the joke preference task, participants completed the dominance subscale of the International Personality Items Pool (Goldberg et al., 2006). Scores on this questionnaire (males M = 32.39, *SD* = 5.61; females M score = 28.39, *SD* = 6.19) were similar to previous research that have used this questionnaire (Quist et al., 2011).

Following the ratings and questionnaires, the experimenter measured each participant’s flexed bicep circumference (males M = 30.83cm, *SD* = 3.11; females M = 27.48cm, *SD* = 3.06) (following a method described by Sell et al., 2009), in addition to their height, weight, hip and waist circumference. Body Mass Index (BMI) was calculated using each participants’ height and weight (males M = 23.09 kg/m2, *SD* = 3.68; females M = 23.23 kg/m2, *SD* = 3.56) and waist to hip ratio (WHR) was calculated using participants’ waist and hip circumference (males M = 0.90,*SD* = 0.60; females M = 0.77, *SD* = 0.64). Participants’ handgrip strength was also measured using a dynamometer (Jamar Hydraulic Hand Dynamometer, Model 5030J1), three times with each (alternating) hand. Given that handgrip strength on dominant and non-dominant arms were very highly correlated (r = .91, p< .001), we calculated participants’ mean handgrip strength (males M = 38.19 kg, *SD* = 7.31; females M = 25.40 kg, *SD* = 4.49). Following

the joke preference task, dominance questionnaire, and anthropometric measures, participants were debriefed.

6.6.2 Initial processing of data

Following data collection, the voice preference data were coded such that a 0 value denoted a preference for the feminised voice and a 1 value denoted a preference for the masculinised voice. Two variables were created; one for male joke-tellers, and one for female-joke tellers, across all seven jokes. In both variables, values closer to 1 indicate a preference for masculinity in the joke-teller's voice. Positive values in these data demonstrate a preference for masculinity therefore the first variable shows the preference for masculinity in the male stimuli voices and the second shows the preference for masculinity in the female voices.

6.7 Results

6.7.1 Initial analyses

Independent Samples t-tests revealed that there was no significant difference between men and women in their overall preference for masculinized versus feminized versions of male joke-tellers (t_{96} = 0.09, p = .932, 95% CI –0.08 - 0.07, r = 0.03) or in their overall preference for masculinized versus feminized versions of female joke-tellers (t_{96} = –1.61, p = .112, 95% CI –0.13 - 0.01, r = 0.16). Given that men and women differed significantly on all measures of physical condition (except BMI), psychometric dominance, and self-rated masculinity (all t_{96} > 3.32, all p < .05 see Table 9), subsequent analyses on the relationship between condition and preference for masculinized versus feminized joke-tellers were split by sex of rater.

Table 9 Differences between men and women on the anthropometric and personality measures, and preference for masculine versus feminine voice-pitch.

	M (SD)		*t*(96)	95% CI	*r*
	Men	Women			
Masculinity preference in male voices	0.45 (0.19)	0.46 (0.17)	0.09	–0.07, 0.08	.03
Masculinity preference in female voices	0.47 (0.19)	0.53 (0.17)	1.61	–0.14, 0.13	.16
Age	19.86 (2.72)	20.93 (6.63)	1.00	–1.05, 3.18	.10
Height (cm)	183.34 (7.17)	167.09 (6.85)	–11.44**	–19.07, –13.43	.76
Weight (kg)	65.16 (12.57)	77.41 (11.96)	–4.84**	–17.28, –7.22	.44
BMI	23.09 (3.68)	23.23 (3.56)	0.19	–1.31, 1.60	.02
WHR	0.90 (0.60)	0.77 (0.64)	–10.35**	–0.16, –0.11	.73
Bicep (cm)	30.83 (3.11)	27.48 (3.06)	–5.34**	–4.59, –2.10	.48
Mean grip strength (kg)	38.19 (7.31)	25.40 (4.49)	–10.63**	–15.18, –10.40	.74
Psychometric dominance	32.39 (5.61)	28.39 (6.19)	–3.32*	–6.39, –1.60	.32
Self-rated attractiveness ++	4.14 (0.92)	4.11 (0.98)	–0.16	–0.42, 0.36	.02
Self-rated masculinity++	4.50 (1.04)	2.44 (1.24)	–8.63**	-2.52, –1.59	.66

** $p < .01$, * $p < .05$ ++ Two male participants did not complete this question therefore the df=94

6.7.2 Correlational analyses: Subjective and objective indices of male and female condition as a predictor of their preference for masculinized versus feminized joke-tellers

Pearson's correlations were first used to test for the relationship between indices of masculinity and preference for masculinity in male and female joke-tellers. In women, there were no significant relationships between measures of their own condition and their preference for masculine versus feminine joke-tellers (all r between –.11 and .24, all $p > .076$, see Table 10).

Table 10 Pearson's correlations testing the relationship between measures of men's and women's own condition and their preference for masculinity.

	Female Participants (*df* = 52)		Male Participants (*df* = 42)	
	Female Voice	Male Voice	Female Voice	Male Voice
Age	–.06	–.07	.01	.16
	[–.30, .14]	[–.26, .25]	[–.16,.25]	[–.17, .39]
Height	–.02	.24+	.07	–.12
	[–.28, .23]	[–.003, .49]	[–.20, .33]	[–.43, .18]
Weight	–.01	.11	–.06	.21
	[–.30, .26]	[–.13, .40]	[–.30, .18]	[–.12, .53]
BMI	.01	.01	–.08	.28+
	[–.28, .25]	[–.22, .25]	[–.31, .13]	[–.05, .54]
WHR	.12	.12	.10	–.08
	[–.15, .35]	[–.13, .38]	[–.18, .37]	[–.34, .20]
Bicep circumference	.05	.03	.02	.44*
	[–.18, .29]	[–.23, .30]	[–.21, .24]	[.14, .67]
Mean hand grip strength	–.03	.05	.03	.22
	[–.26, .20]	[–.18, .29]	[–.35, .39]	[–.09, .50]
Psychometric dominance	.05	–.11	–.06	.37*
	[–.17, .29]	[–.41, .20]	[–.35, .27]	[.02, .62]
Self-rated attractiveness	–.09	.19	.01	.32*
	[–.15, .31]	[–.04, .41]	[–.29, .34]	[.01, .57]
Self-rated masculinity	.17	–.08	.08	–.02
	[–.01, .32]	[–.28, .13]	[–.30, .39]	[–.28, .28]

*p < .05, **+** p < .10 (Correlation coefficients and 95% confidence intervals, which were determined through bootstrapping with 1000 samples)

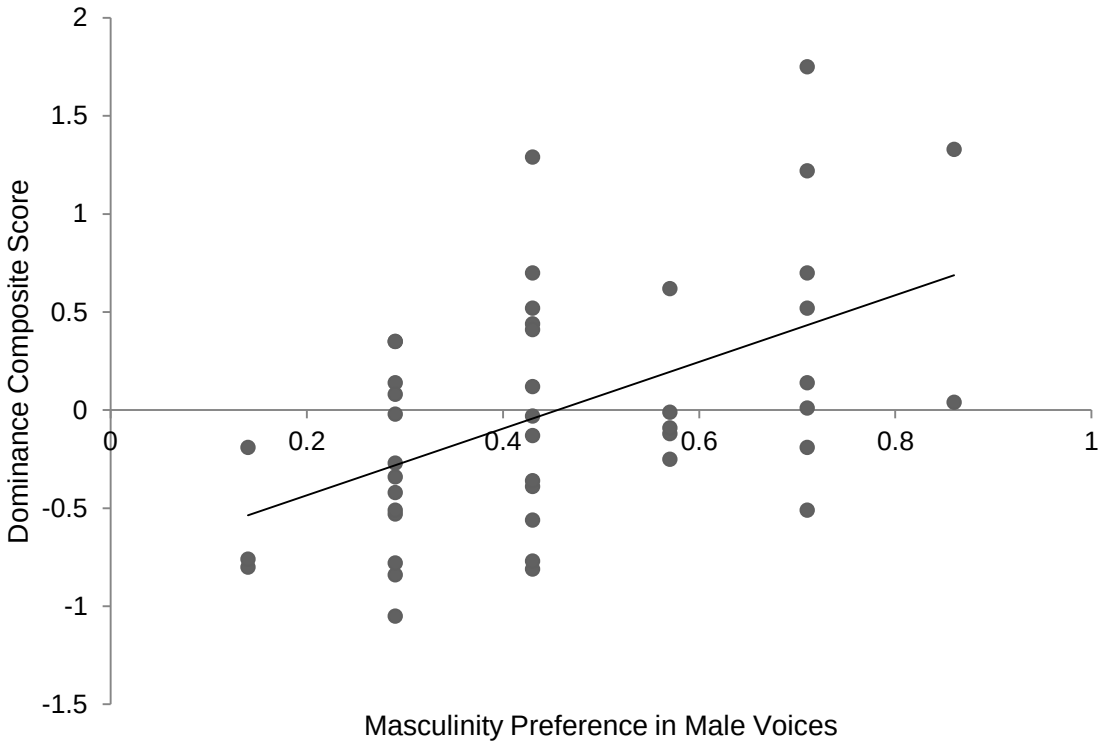
Among male raters, their preference for masculinized male joke-tellers was positively correlated with their flexed bicep circumference, self-rated attractiveness, and their dominance score on the international personality items pool (all $r > .32$, all $p < .05$). The relationship between men's BMI and preference for masculinity in male joke-tellers was close to significance ($p = .066$). None of the measures predicted men's preference for masculinized versus feminized versions of jokes spoken by women (all unsigned $r < .10$, all $p > .529$). In light of these findings, we further explored the relationship between indices of men's dominance and their preference for vocal pitch in male joke-tellers. In order to do this, I converted the measures of men's dominance (Flexed bicep circumference, mean handgrip strength, BMI and psychometric dominance) into standardized z scores and calculated the average of these four scores to create a composite measure of dominance for each male. These measures have been used as indices of dominance in prior work within the literature (Sell et al., 2009), with measures such as grip strength and bicep circumference correlating highly with perceived fighting ability (Sell et al., 2010).

6.7.3 Linear Regression Analyses: Male dominance as a predictor of their preference for voice pitch in male joke-tellers

A linear regression analysis was performed to test for a positive relationship between the composite measure of male dominance and men's preference for jokes told by other men with high vocal dominance (i.e. masculinized voice pitch). The overall model was significant ($F_{1,42} = 14.77$, $p < .001$) and accounted for 26%

of the variance in men's joke ratings of other men. The analysis revealed that men's dominance composite score was positively correlated with their preference for jokes told by males with lower-pitched voices (t = 3.84, standardized beta = .51, $p < .001$, R^2 = .26, see Figure 3).

Figure 3 The relationship between the dominance composite score and masculinity preference in male voices for male raters.



6.8 Discussion

The results demonstrate that men who were higher in indices of dominance had a stronger preference for the masculinised voices of joke-tellers. These findings support the hypothesis that men higher in status may preferentially demonstrate appreciation for the humour of other high-status men. By contrast to the findings for men, women did not demonstrate a preference for either the masculinised or feminised voices of joke-tellers. Given that women may be more likely to

derogate an attractive competitor (Fisher, 2004), it was anticipated that the more attractive (feminine) voices may not be preferred. The results support this and show that indices of female condition did not predict vocal preferences.

The positive linear relationship found between the dominance composite measure and masculinity preference for male voices demonstrates that less dominant males had a stronger preference for the less dominant voices whilst more dominant men had a stronger preference for more dominant voices. In our evolutionary history, it is likely that forming alliances with other men lead to increased fitness benefits and individuals who are higher in dominance will have the benefit of increased access to resources (Von Rueden, Gurven, & Kaplan, 2008). From such a perspective, it is clear that forming an alliance with an individual high in dominance might increase the fitness benefits an individual low in dominance could potentially obtain alone, perhaps leading to the assumption that all men should aim to align themselves with men who have cues to dominance (Benenson, Markovits, Emery Thompson, & Wrangham, 2009). If we expected this urge to submit to a dominant male to be universal, we might have found that all men preferred the more dominant sounding joke-tellers but this was not the case. The results demonstrated that lower dominant men preferred the voices associated with low dominance. Previous research has shown the importance of homophily in initiating mutually-beneficial relationships (Massen & Koski, 2014; McPherson et al., 2001; Nelson et al., 2011). Demonstrably, the importance of homophily in dominance outweighs the benefits which may be associated with taking the risk to form an alliance with a male relatively higher in dominance.

Similar patterns of homophilous alliances are seen in the behaviour of wild chimpanzees. As a high ranking animal, it seems adaptive to seek alliances with other high ranking animals because they are able to pool resources and maximise the payoffs associated with their dominant behaviour. Massen and Koski (2014) suggests that if a high ranking chimpanzee is effective at 'mobbing' behaviour to trap prey, two high ranking chimpanzees together will be much more formidable than one high ranking and one low ranking chimpanzee. Whilst it would be adaptive for a low ranking chimpanzee to 'mob' with a high ranking chimpanzee, whose boldness is likely to garner more rewards, field research has shown that chimpanzees of a similar status tend to spend more time engaged in equitable grooming (Mitani, 2009), demonstrating that the preference for those of a similar status is stronger than the preference for alliances with high ranking individuals (Seyfarth & Cheney, 2012).

For the men in the current study, demonstrating appreciation for equally dominant-sounding joke-tellers may represent part of a strategy for monitoring and maintaining cooperation with homophilous allies. Individuals with similar attitudes and ideals are more likely to be able to maintain a cooperative and mutually beneficial alliance and demonstrating a preference for similar men may be a low-risk strategy to demonstrate openness to cooperation.

In terms of the data from females, there was no pattern of homophily found; Females in the study did not express a preference for high or low dominance voices. Whilst alliances also provide women with important fitness benefits (Benenson, 2013) it could be suggested that perhaps humour is not an optimum way to test dominance preferences in women. Much research has shown that women find a 'good sense of humour' in a man attractive and prefer

men who are humour producers, rather than humour appreciators (Bressler et al., 2006). Due to this preference, women have been shown to strategically appreciate the humour of more attractive men (Chapter 2), perhaps as a sign of 'submission', as Provine would suggest laughter is (2000). Similarly, in intersexual group conversations, females are less likely to use humour (Smith-Lovin & Brody, 1989) and, in intrasexual conversations, women appear to use humour to bond with each other (Gouin, 2004). If females tend to use humour in a more cooperative sense, using funny stimuli in a forced choice task such as this may not be appropriate. It could be that alternative stimuli may be more appropriate in gauging which women other women want to align with more closely.

Drawing a parallel from the behaviour of our ancestors to modern humans, Dunbar (2002) suggested that, instead of spending time grooming each other as our ancestors did, modern humans might engage in gossiping. The threat of illicit gossip could act as a potential sanction to those who have broken social rules and, at the same time, it may help individuals exposed to the gossip to bond; especially if it requires the reciprocation of knowledge. If stimuli more closely matching that of gossip had been used, it may have served to highlight the potential for cooperative alliances with female groups and may have demonstrated that females have also have a preference for homophilous allies.

An additional insight which has been gained with the current study is into the use of humour for men. As mentioned, previous literature has shown the importance of humour for females in a mate choice context but there is little research on male's preferences for humour producers. It could be suggested that humour production might signal male genetic quality of men to both male and

female audiences.The results support this assertion because there is strategic appreciation in males for other males' humour, but not for the humour produced by females. The humour produced by men may be more important for other men to attend to in the same way that female attractiveness may be attended to more by females (Fisher, 2004); in order to monitor potential homophilous allies or competitors. It is unclear why females did not demonstrate a preference for male voices but the complex nature of the relationship between dominance, attractiveness, and humour may help in some way to explain the current findings.

6.8.1 Summary

To summarise, the current study provides novel evidence that men vary systematically in the way they appreciate other men's humour. The results demonstrated that there was a positive linear relationship between men's dominance and their preference for the voices of dominant joke-tellers, demonstrating that more dominant men had a stronger preference by the jokes told by dominant-sounding men. The same effect was not found in women, suggesting that they do not have a strong preference for dominance in the voice of joke-tellers. The study suggests that dominant men appear to attend closely to the dominance of other men when they are telling jokes. It could be suggested that humorous stimuli was not an optimum measure of preference for dominance in females, but further work is needed to test this idea. In sum, the results shed light on the potential function of intrasexual humour use in men and provide evidence which may suggest that forming alliances with homophilous individuals takes precedence over aligning one's self with a relatively higher status individual.

Chapter 7 Knock knock…who's there? The loudness of a door knock is related to dominance in men but not women.

This chapter is based on the following manuscript, which has recently been invited for resubmission;

Cowan M L, Cobey, K. D., Mileva, V. R., Leongomez, J D, &Little, A. C. Knock knock…who's there? The loudness of a door knock is related to dominance in men but not women.

7.1 Abstract

Status is an important quality, influencing human interactions and impacting on many important life outcomes. In the current study, we tested how dominance may be communicated through one of the first impressions individuals are able to make; through how loudly and how many times they knock on a door. Using facial ratings to determine visual dominance, the results show that men who look more dominant tend to knock on doors a greater number of times than less dominant men. Less dominant men however tended to knock on doors more loudly than more dominant men. The same relationships were not found in women, where dominance did not appear to relate to the manner of door knock. The results suggest that men who appear physically dominant knock less loudly while less dominant-looking men may knock more loudly in order to compensate for their appearance and establish their presence in a more forceful way.

7.2 Introduction

Knock, knock. Who's there? The manner of greeting that someone engages in may provide important and immediate insights into their personality (Riggio, Friedman, & DiMatteo, 1981). In meeting someone for the first time, we tend to rely heavily on non-verbal or 'expressive behaviour' for cues to personality, which include facial expressions, body language, or interaction style (Riggio & Friedman, 1986). Expressive behaviour can vary greatly according to sex and status, meaning that men and women, and those higher and lower in status, may greet others differently (Riggio & Friedman, 1986; Tiedens & Fragale, 2003). In real world conditions, however, we may be exposed to an additional potential cue to personality prior to greeting; the manner in which an individual knocks on the door of the room they seek to enter. In this study, we tested whether there are

differences in door knocking behaviour between men and women and whether there are cues available from how an individual knocks on a door in relation to measures of dominance.

Status plays a pivotal role in human interaction because it frames communication and is an important factor in determining the influence an individual has (von Rueden et al., 2011). Dominance is characterised by antagonistic behaviour and using force to gain power and get one's own way (Henrich & Gil-White, 2001) and there has been much research examining how dominance is communicated, physically and behaviourally. Physically, dominant individuals tend to be taller (Buunk et al., 2008), as well as larger in size (Fessler, Holbrook, & Snyder, 2012; Marsh, Yu, Schechter, & Blair, 2009). Dominance is also associated with having a more masculine face (Kruger & Fitzgerald, 2011; Mueller & Mazur, 1997; Quist et al., 2011) and dominant men have greater facial width-to-height ratio (Valentine et al., 2014). Furthermore, research suggests that cues of posture and interpersonal stance from photographs of dyad interactions also accurately convey status (Mast & Hall, 2004). Behaviourally, dominant people tend to be more controlling in group situations (Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013).

Though dominance is reliably evinced in numerous ways, there is evidence to suggest that men and women exert their dominance in different ways behaviourally, just as they differ in their manner of other forms of nonverbal communication (Riggio & Friedman, 1986). Men are more likely to exert their dominance in a manipulative effort to get their own way whilst women use dominance within group situations to facilitate progress and cohesion (Buss, 1981). Additionally, dominant women tend to gossip more than dominant men

(de Bruyn, Cillessen, & Weisfeld, 2012), seemingly employing more indirect means to achieve status (Bjorkqvist, 1994). Men may use more direct methods to communicate their dominance, which could be adaptive if signalling dominance quickly allows one to benefit from the advantages that high status brings. Theoretically, it also could be beneficial to be able to quickly identify high status individuals to enable one to attempt to affiliate with them (Ambady & Rosenthal, 1992; Mast & Hall, 2004). Accordingly, evidence suggests that these impressions of dominance can be accurately formed very quickly, from as little exposure as a 40ms viewing of face and body photographs (Rule et al., 2012). However, selected situations may not lend themselves to communicating status physically or behaviourally, for example if the person in question is out of sight as is the case when a person finds himself or herself behind a door.

One possible solution to communicating status when visibility is restricted is through vocal calls. Research into non-human animals has demonstrated the usefulness of vocal calls in not only identifying the individuals in close proximity but in providing alarm calls (e.g. six species of monkeys; Zuberbühler, Jenny, & Redouan, 1999), and signalling rank (e.g. baboons *Papio cynocephalus*; (Kitchen, Seyfarth, Fischer, & Cheney, 2003). Field observation of baboons has shown that they engage in pre-dawn contests of 'wahoo' calls, and that the length and the rate of these 'wahoo's are positively related to rank (Kitchen et al., 2003). The authors suggest that the length of their 'wahoo' calls may also act as an honest signal of quality, due to the energetic costs of producing them (Kitchen et al., 2003).

Research into the human voice demonstrates parallel effects in terms of voice pitch. Having a low-pitch voice is associated with dominance (Puts,

Hodges, Cardenas, et al., 2007) but it is also considered an honest signal of quality due to the immuno-compromising nature of the increased testosterone required to produce a low-pitch voice (Apicella, Feinberg, & Marlowe, 2007; Feinberg, 2008). A low-pitch voice may also suggest that a man is larger in size, and therefore more able to protect a woman (Morton, 1977; Xu, Lee, Wu, Liu, & Birkholz, 2013). However, louder voices also act as a cue for dominance (Aronovitch, 1976; Tusing & Dillard, 2000), perhaps due to the physical effort required to produce sounds higher in intensity (Fischer, Kitchen, Seyfarth, & Cheney, 2004) and the associations we have between loud voices and conflict. Audiences already have an expectation that men will have louder speaking-voices than women (Kramer, 1977), therefore there could be an implicit association between louder noises and masculinity, as well as dominance. In situations where one seeks to signal dominance prior to visual and vocal contact being made, making a noise higher in intensity to demonstrate your status may be a useful behaviour and, as such, may suggest that loudly knocking on a door is a meaningful behaviour.

7.2.1 Rationale

In many human cultures, knocking represents a norm with respect to seeking permission to enter a room. In this context people knock to alert others of their presence. Knocking is thus perceived prior to any opportunity to access physical or vocal cues to dominance. With this in mind, in the current study, we tested whether there were sex differences in the manner in which males and females knock on a door and whether knocking related to other-perceptions of dominance. Evidence from human voice and non-human animal voice calls research would suggest that dominance may be signalled by longer and louder

bouts of noise (Kitchen et al., 2003). Taking these findings into consideration, in the current study it was hypothesised that males who appear dominant (as assessed by their face and their size), and rate their own behaviour as being dominant, would knock more loudly in addition to knocking more times than less dominant males. We also predicted that men would knock on the door more loudly than women would. This hypothesis was based on the idea that door knocking would relate to dominance in men, but not in women, given that men may have more to gain from indicating their dominance overtly.

Study 8

7.3 Method

7.3.1 Stimuli collection

7.3.1.1 Participants

The study was approved by the University of Stirling Psychology Ethics Committee. Participants were 50 undergraduate students at the University of Stirling (29 females and 21 males, Mean age = 20.5, *SD* = 5.8, Range = 18-53) who participated to fulfil a course requirement or for financial reimbursement.

7.3.1.2 Procedure

Due to the importance in maintaining ecological validity, participants were not informed of the central hypothesis regarding dominance but instead were recruited to take part in a questionnaire study. Prior to each participant's arrival, a microphone, and the adjoining amplifier and laptop, were placed in immediate proximity to the main door on the inside of the lab (the microphone was angled towards the door and sat approximately 40cm away from the door handle). The position of this equipment was held constant. When participants arrived to the lab, their knock on the door was recorded with the microphone (Audio-technica, Model AT4041) using Audacity software (Version 2.0.3) with a sampling frequency of 44.1 kHz, and they were then brought to a quiet testing cubicle which contained a desktop computer. After giving consent to complete a questionnaire study, and answering basic demographic questions (only age, sex, nationality, and ethnicity), participants were asked to complete self-paced online questionnaires, including the Prestige and Dominance questionnaire which was

used to test self-perceived dominance (Cheng, Tracy, & Henrich, 2010). The questionnaires, except the Prestige and Dominance questionnaire, were collected for use in a separate study. Following this, participants were asked to pose for a facial photograph with a neutral expression, which was taken in a room with controlled lighting. They then had their handgrip strength measured (using a Jamar Hydraulic Hand Dynamometer, Model 5030J1), along with their height and weight. Participants were then fully debriefed and asked to provide consent for the researchers to use the recording of their door knock and to have their facial photograph rated for dominance, which all participants consented to.

7.3.2 Audio analysis of door knocks

The audio clips of the door knocks were analysed to count the number of knocks they each contained. Praat© audio analysis software Version 5.2 (Boersma & Weeink, 2011; www.praat.org) was then used to determine the mean intensity in decibels (dB) of the knocks recorded for each participant, using the standard parameters of the programme and mean energy as the averaging method.

7.3.3 Stimuli rating

7.3.3.1 Participants

Participants recruited to rate the stimuli were 47 undergraduate students at the University of Stirling (40 females and 7 males, Mean age = 19.1, *SD* = 2.1, Range = 17-30), participating to fulfil a course requirement.

7.3.3.2 Procedure

Participants completed an online self-paced survey which presented them with the stimuli to rate. The survey presented participants with demographic questions (only age, sex, nationality, and ethnicity), then 50 audio clips of the knocks were

presented in a randomised order, with participants being asked to rate how dominant each knock was on a Likert 1-7 scale (low dominance to high dominance). In the second part of the study, participants were presented with 50 facial photographs (in a random order) of the first sample of participants and were asked to rate each of them for how dominant they appeared, again on a Likert scale of 1-7. Following completion of the ratings, participants were debriefed.

7.3.4 Data analysis

A mean dominance score for each door knock (based on the audio clip) and each facial photograph was generated and used in subsequent analyses. The data were analysed using IBM SPSS statistics (Version 19.0 for Windows) software. The data were tested for normality and Shapiro-Wilk tests demonstrated that all variables were normally distributed with the exception of two. BMI significantly deviated from normal ($p < .001$) in the female data due to one outlier and, in both the male and female data, the number of door knocks deviated significantly from normal ($p < .013$). The results of non-parametric statistical tests presented an identical pattern of results therefore parametric two-tailed tests were used and these results were presented to maximise the power of the analyses.

7.4 Results

Independent Samples t-tests were used to test the differences between males and females for their anthropometric measures, ratings of dominance, and door knock. These analyses demonstrated that males had significantly stronger grip strength ($t_{48} = 5.97$, $p < .001$) and higher facial dominance as rated by others ($t_{48} = 4.02$, $p < .001$) than females (see Table 11).

Table 11 The physical and knocking differences between males and females.

Measures	Female		Male			95% CI		
	M	*SD*	M	*SD*	*t*(48)	*LL*	*UL*	*r*
BMI	23.10	4.22	22.92	3.74	–0.15	–2.50	2.15	.02
Handgrip strength (kg)	26.89	5.71	40.01	9.79	5.97**	8.70	17.55	.65
Facial dominance rated by others	3.57	1.21	4.20	0.58	4.02**	0.32	0.95	.50
Rated dominance of knocks	3.26	1.21	4.03	0.58	4.02*	0.06	1.49	.50
Mean intensity of knocks (dB)++	48.25	5.52	52.46	5.50	2.65*	1.01	7.41	.36
Number of knocks	3.56	0.83	3.33	0.97	0.86	–0.29	0.73	.12

*Note. ++For one participant, intensity of knock could not be calculated as the knocks were not adequately distinct from each other, therefore the df=47 for this analysis. *p* < .05, ***p* < .001

The analyses also demonstrated sex differences in knocking behaviour, in terms of the mean intensity of all knocks (t_{47} = 2.65, p = .011) and dominance ratings for knocks (t_{48} = 4.02, p = .034), such that males had higher mean intensity knocks as well as their knocks being rated as sounding more dominant. In order to rule out the possibility that the difference in handgrip strength was responsible for the sex differences in knocking style, Pearson's correlations were used to test the relationship between handgrip strength and the mean intensity of the knocking. This demonstrated that mean handgrip strength was positively but not significantly related to mean intensity of door knocks (r_{49} = .23, p = .109).

Preliminary analysis using Pearson's correlation demonstrated that age was significantly related to facial dominance rated by others (r_{49} = .41, p = .003) and BMI (r_{49} = .50, p < .001), therefore age was controlled for in subsequent analyses and the data were split by sex due to the sex differences documented. Partial correlations, controlling for age, were used to analyse the relationships between the manner of door knock (number of knocks, mean intensity, and rated dominance of the audio clip) and physical appearance (facial dominance as rated by others and BMI).

Partial correlations showed that, in men, the number of times the door was knocked was related to appearance; BMI was significantly positively associated with number of door knocks (r_{18} = .52, p = .019) and facial dominance was positively related to number of door knocks, though this was only close to significance (r_{18} = .38, p = .099). Partial correlations also showed that, in men, the mean intensity of the knocks was significantly negatively related to facial dominance (r_{18} = –.45, p = .045), in addition to there being a close to significant negative relationship between mean intensity and BMI (r_{18} = –.40, p = .078). None

of the same relationships were found in women (all $r < .30$, all $p > .125$) and the mean rating of dominance from each knock did not significantly relate to BMI or facial dominance in men or women (all $r < –.37$, all $p > .106$).

In terms of dominance ratings and appearance, partial correlations demonstrated that larger men were rated as being more dominant, as there was a significant positive relationship between BMI and facial dominance in men ($r_{18} = .71$, $p < .001$), but not in women ($r_{25} = .18$, $p = .371$). However partial correlations demonstrated that there was no relationship between scores on the dominance scale from the self-perceived prestige and dominance questionnaire (Cheng et al., 2010) and the measurements of the door knocks (all $r < –.29$, all $p > .149$).

Lastly, all 50 knocks were analysed together to test the relationship between the audio analysis of the knocks and how dominant they were rated as being. Pearson's correlations showed that the knocks rated as being high in dominance had a higher mean intensity than less dominant knocks ($r_{49} = .90$, $p< .001$), therefore loudness appeared to signal dominance in a door knock. The number of times the door was knocked did not significantly relate to how dominant the knock was rated ($r_{50} = –.15$, $p = .305$) though there was a significant negative relationship between the number of door knocks and the mean intensity of the door knocks ($r_{49} = –.30$, $p = .034$), demonstrating that participants who knocked more tended to knock more quietly.

7.5 Discussion

The results demonstrated partial support for the hypotheses; the manner in which the door was knocked related to size and facial dominance in men, but not in

women, providing support for the hypothesis that men and women exert their dominance differently. Furthermore, the results showed that men with higher BMIs knocked on the door more frequently than men with lower BMIs. Additionally, there was a trend for men who were rated as looking more dominant to knock on the door a greater number of times. Diverging from the hypotheses however; men who were rated as looking less dominant knocked on the door more loudly than men who were rated as looking more dominant. There was also a trend for men with lower BMIs to knock on the door more loudly than men who had higher BMIs.

The hypothesis that men who looked high in dominance would knock on the door a greater number of times was supported by the data, perhaps echoing the findings of Kitchen et al. (2003) that higher ranking adult male baboons would engage in longer bouts of 'wahoo' calls each morning. However, it was not anticipated that men who were lower in dominance and in BMI would knock on the door more loudly, as previous research suggests that high intensity cues, such as louder voices, are associated with increased dominance (Aronovitch, 1976), leading us to hypothesise that a loud door knock might signal high dominance.

This pattern of results could provide support to the 'self-defeating hypothesis', which suggests that men who are less masculine in appearance behave more boldly to compensate for perceptions of physical weakness (Zebrowitz, Andreoletfi, Collins, Lee, & Blumenthal, 1998). Young men with more youthful appearances have a greater tendency to commit criminal acts, which may be because they feel they need to compensate for their 'weak' appearance (Zebrowitz et al., 1998). Furthermore, research by Andreoletti, Zebrowitz, &

Lachman (2001) demonstrated that men who looked youthful in appearance perceived themselves as having less control over their environment and their relationships than men who were relatively more mature-faced. It could be speculated that in generally feeling less control over their environment, or perhaps feeling as though they are underestimated or that they appear weak, men who look less dominant knocked on the door more loudly to establish their presence in a more forceful way.

Additionally, experimental eye-tracking research has shown that participants may attend more to dominant individuals (Foulsham et al., 2010) therefore it could be speculated that less dominant men may do more to gain attention and make their presence known. Those appearing lower in dominance may feel the need to exert themselves where and when they can, but this is perhaps unnecessary for dominant individuals. In the context of knocking on a door, men who are low in dominance might then be expected to knock more loudly in order to convey and pre-empt opinions of high dominance to the occupant before any other salient cues (i.e. verbal or physical) become available. Conversely, dominant men might be expected to feel, either consciously or subconsciously, that knocking loudly is unnecessary as other cues would signal their dominance to the occupant once communication between the two was established (i.e. once the door was opened).

That women's knocks were less intense than men's knocks supports previous research suggesting that women may be more likely to exert their dominance in group situations, rather than dominance influencing their behaviour in all aspects of social interactions, as it does in men (Buss, 1981). It could be speculated that, as women's dominance is utilised more in group settings, it is

unnecessary for women to be forceful or demand attention when engaging in more benign, or ‘unseen’ activities, such as door knocking. Additionally, there is no evidence to suggest that there is a self-defeating effect in women (Zebrowitz et al., 1998) meaning that, with little to compensate for, women’s behaviour outside group situations may not reflect the perceived dominance of their appearance as men’s does.

In the current study, we might have expected that individuals who rate highly on the self-perceived dominance questionnaire would have a similar knocking pattern to those who look physically dominant, but there is no evidence for this relationship. One possible explanation for the findings could be that more dominant people are less sensitive to their own cues of dominance, therefore their scores on the self-perceived dominance questionnaire may not be an accurate reflection of how others view them. It is likely to be adaptive for less dominant individuals to be sensitive to cues of dominance in themselves and others in order to avoid aggressing those high in dominance who could inflict substantial costs (Watkins, Fraccaro, et al., 2010). A dominant individual may not have the same concerns or vulnerabilities, meaning that it is less important that they perceive or interpret those cues in the same way a less dominant individual might. Indeed, previous research has shown that dominant people do not access dominance in others as readily (Watkins, Jones, et al., 2010). It could also be speculated that the self-perceived dominance questionnaire was not adequately sensitive to highlight the relationship between personality and door knocking, as a more subtle aspect of dominance may be responsible, but future work is needed to provide insight in to this idea.

Whilst the current study has provided ethological evidence of the relationship between a dominant appearance and knocking behaviour, future research could attempt to further explain why differences in behaviour as ubiquitous as knocking on a door may exist. It is important to address the point of whether individuals behave dominantly because they are biologically predisposed to or because of the social feedback they receive from others which enables them to carve out a more dominant path (Haselhuhn et al., 2013). In investigating the origin of dominant behaviour—or the inheritance of a dominant appearance—as well as the reactions we have to dominant individuals, we may begin to better understand the relationship between genetic quality, status, and behaviour.

7.5.1 Summary

In summary, by testing the relationship between dominance and door knocking behaviour, we found that there are differences between the manner in which males and females knock on a door. Males tended to knock the door more loudly, though males and females knocked on the door a similar number of times. Within male participants, we found that men with higher BMIs, who appeared to be more physically dominant, were knocking on the door a greater number of times but more quietly than men who had lower BMIs and were not rated as being physically dominant. The results suggest that males may exert their dominance outside of group situations more than females, but that males who possess a relatively less dominant face may knock more loudly in order to compensate for perceptions of physical weakness and to make their presence known in a more forceful way.

Chapter 8 General Discussion

8.1 Summary of thesis

In the Introduction, I highlighted the fact that much empirical work has found that funniness is an attractive quality in a mate, though it was debated whether this was due to the effect of humour being a signal of quality, or an interest indicator (section 1.4.3). In Chapter 2, Study 1 utilised a novel method relatively high in ecological validity in order to test the relationship between ratings of humour and attractiveness. The results of this empirical work demonstrated that there are sexually dimorphic patterns present in perceptions of humour; attractive males were rated as being funny in two visual modalities, video and photograph, perhaps demonstrating that humour is an aspirational quality for a mate. The same relationship was not present in females in ratings of their photographs, suggesting that the raters did not associate attractiveness with funniness positively (or negatively) in female actors.

Further analysis in Chapter 2 demonstrated that both males and females who were rated as being funny were more attractive for short-term relationships. This may have implied that humour is being sexually selected for short-term relationships, further suggesting that it might be considered a signal of genetic quality. However, the follow-up study demonstrated that flirtatiousness mediated this effect; participants rated as being attractive for short-term relationships and funny appeared to be relatively higher in flirtatiousness. This does not rule out the possibility that humour has been sexually selected for, as there is skill involved with the production of flirtation which may be akin to funniness, but it may suggest that humour is a signal of interest or proceptivity which perhaps contributed towards the actor being more attractive for a short-term relationship.

In Chapter 3, further empirical work in Study 3 demonstrated the importance of relationship context in considering the attractiveness of humour. Ratings of vignettes in the style of personal advertisements which contained aggressive or affiliative humour showed that both males and females found affiliative humour more attractive for long-term relationships (though the effect was significant only in females). Affiliative humour is characterised as humour which is not aimed at individuals but rather helps groups to bond and, accordingly, Study 4 demonstrated that those who used affiliative humour were considered to be more cooperative; a trait which would be highly beneficial in a group living situation. This evidence together suggests that a positive style of humour can suggest good long-term partner characteristics and it is easy to see how this style of humour would fit well with the hypothesis that humour may be selected for because it helps to encourage and reinforce group living, potentially generating fitness benefits to those who contributed to the society (Dezecache & Dunbar, 2012; Storey, 2002; Trivers, 1985).

Also presented in Study 3 was the finding that aggressive humour was attractive for short-term relationships. This was an intriguing finding because other research has demonstrated that aggressive humour is socially undesirable (Kuiper & Leite, 2010), yet participants rated it as being attractive for short relationships. This may be explained by the findings of Study 4, which demonstrated that aggressive humour was associated with a dominant personality. As I discussed in Chapter 4, dominance is a path to status that may provide clear benefits to the female partners of dominant men in terms of resources and formidability against other males (Geary, Vigil, & Byrd-Craven, 2004). Additionally, empirical work has demonstrated that dominant men are

more attractive for short-term relationships (Snyder et al., 2008), which could be related to the suggestion that dominance in men is a signal of quality. As such, using aggressive humour may be considered a conduit for dominance as a personality trait, but it could be speculated that raters could be also perceive aggressive humour as a signal of genetic quality due to the association with dominance. Male raters in the study rated female use of aggressive humour as attractive for short-term relationships, which could be related to the finding that males tend to use more aggressive humour in same-sex groups (Palmer, 1993). If males can use aggressive humour in order to bond with each other, they may also appreciate the opportunity to 'banter' with a female who also uses aggressive humour, at least for a short-term relationship. One limitation in Study 3 and 4 was that the preferred humour styles of the raters was not measured, which may have provided more insight to this speculation. For example, as evidence suggests that participants may be more altruistic towards others who have a similar sense of humour, males who typically tend to use aggressive humour may also look for that in a mate.

Chapter 4 provided evidence demonstrating the nonverbal and verbal cues of dominance, which also highlighted the sex differences which exist in many important behaviours, such as smiling and laughter. In Chapter 5, I presented a novel task which engaged participants in a competitive conversation. Recording participants competing in the task provided quantifiable evidence of the verbal and nonverbal cues which each member of the dyad used, but physical measurements and ratings of dominance were also used. The results of this study demonstrated that the dominance of one's appearance appeared to have the greatest effect on winning; men who were rated as looking significantly more

dominant than their conversation partner were more likely to win than less dominant males. The opposite effect was found in females; females who were rated as looking lower in dominance were more likely to win the conversation. It was suggested that appearing low in dominance could suggest that a female appears more physically feminine (Quist et al., 2011), and thus more attractive (Perrett et al., 1998), and further results support this; females (and males) who rated themselves as being more attractive were more likely to win.

Few differences were found in the verbal and nonverbal behaviour of the competitors, which could suggest a number of points. In a situation where participants were being filmed a laboratory situation, it could be that they were keen to cooperate because behaving very aggressive or dominantly could have been a violation of social norms in such a setting. It could also be considered, however, that participants, in wanting to be cooperative, were mimicking each other's verbal and nonverbal cues in some way. This may be why there are discernible differences in the patterns of behaviour within each participant, e.g. Verbal Cooperativeness relating negatively to height, but not within the dyads. In order to capture the level of mimicry involved, future work could use software to capture the time delay between certain behaviours in order to test how antiphonal these cues were (e.g. Smoski & Bachorowski, 2003). In particular, examining the use of humour in such a way would shed light on how reciprocal the exchange of jokes was. There were no differences found between winners and losers in how the participants used jokes, suggesting that they produced jokes at a similar rate. This kind of exchange suggests that the participants who used humour may have been expressing cooperation, though it would be interesting to combine this task with other tasks designed to test altruistic tendencies. For example, as in Curry

and Dunbar's (2013) study where they asked participants how much money they would like to donate to another participants who had a similar or dissimilar sense of humour to them; including a task such as this may provide further insight into the effects of humour use in a competitive conversation, as well as the perhaps if the humour use signalled a genuinely cooperative intention.

An additional consideration is the inconsistencies which may be observed between the data of Study 3, Study 4, and Study 5. In Study 3 and 4, empirical research demonstrated that aggressive humour was associated with dominance, and that this trait was attractive for short-term relationships. This finding was consistent with previous research demonstrating that dominant characteristics are more appealing for short-term relationships, however this study found that dominance was associated with aggressive humour despite the fact that Study 5 demonstrated that the men more likely to win the conversation were also rated as being less funny in their solo desert-island videos. There may be a paradox wherein dominant men have been shown to be less expressive (Helweg-Larsen et al., 2004) and may engage in humour behaviours less, however evidently participants associated dominance with aggressive humour. It is unclear why this is the case, but it could be speculated that dominant people may be less likely to produce humour but the humour they do produce tends to be relatively more aggressive in nature. Future research could investigate this point further to determine which types of humour are more frequently used. If the main function of humour is to demonstrate cooperation, one might assume that affiliative humour is more commonly used than aggressive humour, but it is likely that non-dominant people are more likely to use an affiliative humour style. As such, there

could be an imbalance between dominant and non-dominant individuals wherein they each tend to use different humour styles at different rates.

Another point to consider which was not tested in the thesis is the impact of self-deprecating humour on status. Previous research (Greengross & Miller, 2008; Lundy et al., 1998). has demonstrated that it can be damaging in terms of status if one is not already in an optimal position. In other words, only individuals of higher quality can 'afford' to use self-deprecating humour because it is unlikely to inflict damaging costs on them. An individual of relatively lower status however may not be able to successfully use this style of humour due to the costs it would inflict on them by highlighting their weaknesses (Greengross & Miller, 2008; Lundy et al., 1998). If this type of humour is utilised by those of higher status, it could increase their overall humour use however it could be serving to (consciously or otherwise) reduce their status in the eyes of others. In Study 5, jokes during the conversation were divided into positive and negative humour styles; self-deprecating humour would be classed as negative humour, which there were few instances of. If the study was to be repeated, it would be interesting to see whether (in perhaps a longer conversation than just five minutes) under what circumstances self-deprecating humour occurs. If this type of humour is more likely to be used when there is a greater discrepancy in dominance between the conversation partners, it may suggest that self-deprecating humour could be used to demonstrate cooperation, but this is a matter which must be tested in future work. To return to discussing why many of the effects in Study 5 were not found to be significant, one alternative explanation of the results could be that such subtle verbal and nonverbal cues may have required a longer task to fully express the differences between participants. The

competitive ‘desert-island’ style conversation developed for Study 5 is a paradigm which offers great potential and scope for further work on the topic of the factors which contribute towards ‘winning’ or dominating a conversation. As physical appearance was revealed to be the strongest predictor of who would win the conversation, future work could investigate which factors become more influential in a situation where participants are unable to see each other. Judging by the evidence found in Study 7 regarding the importance of voice pitch in joke appreciation, it could be that participants are cued to dominance by the voice of their conversation partner.

0 presented experimental evidence that men preferentially appreciate the humour of men who sound as though they are equal to them in dominance. Voices telling one-liner jokes were manipulated to sound more dominant (lower pitch in males) or less dominant (high pitch in males) and the analyses demonstrated that there was a positive linear relationship between a dominance composite score of the participants and the dominance of the voice they preferred listening to when given the choice to hear a voice high or low in dominance. The results demonstrated that there were no differences in preference for female voices, and further that female participants did not demonstrate a preference for high or low dominance in male voices. As demonstrated in Chapter 3, female preferences for dominance in humour vary according to relationship context. Additionally, stages of the menstrual cycle have an important bearing on the preferences females have for cues to dominance (Havlícek, Roberts, & Flegr, 2005). Future work investigating this further could prove insightful and, taking into consideration the findings from Chapter 3, there are several ways this research could be extended. As Study 3 and Study 4 demonstrated, females find

aggressive humour attractive for short-term relationships and is associated with dominance, which may suggest that it is indicative of genetic quality. If Study 7 was recreated using a mixture of humour styles, for example affiliative humour and aggressive humour, and participants were asked to choose between a high or low dominance voice telling an affiliative or aggressive joke, it could provide insight into whether an audible cue to dominance, combined with a dominant joke, was preferred by females. This could perhaps test which cue was more influential; dominance in the voice, or cues to dominance in humour style. Furthermore, females could be asked to choose between the voices for short-term and long-term relationships, rather than just asking which voice they prefer which I did in Study 7.

Whilst cues to dominance in the voice in males appear to be relatively robust (Fraccaro et al., 2013; Puts, Apicella, & Cárdenas, 2012), Study 8 investigated whether there were other audible cues to dominance; namely, whether the manner in which a door is knocked reflects the dominance of the person who knocks. To my knowledge, this is the first study which has looked at this question despite there being a number of parallels between door knocking behaviour in humans and the calls which various species give in the wild (Fischer et al., 2004; Kitchen et al., 2003; Zuberbühler et al., 1999). In a similar way to research which demonstrates that more dominant baboons have longer voice calls than less dominant baboons (Kitchen et al., 2003), I found that males rated as being more dominant, and who had higher BMIs, tended to knock the door a greater number of times than males who looked less dominant. However, males who looked less dominant, and had lower BMIs, were more likely to knock on the door more loudly than more dominant males. These results suggest males of

lower dominance may compensate for their appearance by knocking loudly and making their presence known in a more forceful way. These results provide an intriguing insight into the kinds of unseen or ubiquitous behaviours which can communicate dominance, though the same patterns of results were not found in females. The analyses found that there was no relationship between door knocking and the dominance of a female's appearance.

Whilst Chapter 4 presented evidence from published literature to suggest that females are more expressive than males in their verbal and nonverbal behaviour, it could be suggested that a behaviour such as knocking is not interactive enough in order for it to be a cue of dominance in females. Additionally, dominance in females appears to be a great deal more complex than dominance in males (Brown & Lewis, 2004) as it may interact with attractiveness (Fisher & Cox, 2009). Further research will be crucial in helping to define how dominance is communicated in females, especially work which creates a characterisation of dominance within a framework of more typically female behaviours. For instance, if females are less likely to interrupt others, this may not always be an appropriate way of measuring dominance in females. As females may be more likely to use gossip in an indirectly aggressive attempt to derogate a competitor, it could be that the words females use, or how they use them, may be a more important factor to consider.

8.2 Sex differences in humour

Previous research has demonstrated that males tend to produce humour, whilst females tend to appreciate it (Bressler et al., 2006; Wilbur & Campbell, 2011) however the Interest Indicator model does suggest that males and females produce and appreciate humour in the same way, with the same intentions.

Despite this, there was evidence of sex differences in humour use throughout the thesis. One particular result which highlights the inconsistencies found in humour research was in Study 1, where the results showed that there was no relationship between perceived funniness and attractiveness in a photograph of a woman. Prior to this, we might have expected that attractive females may be considered funnier in the photograph due to the halo effect I found evidence of. Alternatively, a negative relationship between funniness and attractiveness could have indicated that the raters perceived there to be a trade-off between the two traits. There was however no relationship found. Whilst it is unwise to attempt to interpret null findings such as this, it at least highlights an area where more research should be carried out.

It could however be suggested that humour is a tool or a social lubricant that females use when necessary, therefore it is more of a state characteristic than a trait characteristic which is why it is not readily associated with attractiveness. The results of Study 7 may further support this as I found no evidence that females preferentially appreciated the humour of high or low dominant individuals. Outside of a mating context, females may generally be less choosey about what humour they visibly appreciate; evidence demonstrates that women laugh more than men and make more jokes when they are in same-sex groups, therefore humour behaviours may be a more general sign of cooperation from females.

By contrast, males did demonstrate a preference for humour from other males who were equivalent to them in dominance. Males tend to laugh and smile less than females, therefore it could be argued that they are generally more discriminating about the humour they appreciate. From the evidence presented,

status appears to play an important role in this. If males prefer the humour of more dominant males (Study 7), and are more appreciate of the humour produced by women who appear to be flirtatious or proceptive to their advances (Study 1), the findings could paint an overall picture of very strategic humour appreciation by males. There appeared to be little difference between humour production within the competitive conversation dyads in Study 5, though those interactions lasted only five minutes and occurred in a formal setting which may not have been entirely conducive to natural humour behaviours.

8.3 Limitations of the thesis

This thesis attempted to utilise innovative methodologies which were high in ecological validity to investigate the evolution of humour. Whilst many novel findings have been presented, there are several limitations which are apparent. The first of these to highlight in the weakness of the sample sizes used. The nature of the methods used were, on occasion, restrictive in terms of participant recruitment. This was especially apparent in Study 5, where 40 participants took part in the competitive ‘desert-island’ task. The procedure in this study involved pairing participants who had not met each other before to be tested at the same time, which carried with it many practical difficulties. It would have been ideal for more participants to have been recruited to this study but, with the logistical difficulties associated with the design of the study, and the time restrictions of the PhD process, it was not possible to increase participant numbers. It would however be advisable for future researchers to increase the sample size and, in so doing, they may more adequately power the study to increase the chance of finding further effects in the data.

Increased participant recruitment of a similar study in the future may be made possible by decreasing the number of variables which are measured in order to focus the scope of the study. There would also be value in doing this in terms of the statistical analyses which were used. Due to the high volume of variables measured in Study 5, extensive analyses were carried. This may have had negative repercussions in terms of increasing the risk of Type 1 errors in the data which future research should take into account. Carrying out multiple statistical tests can lead to failing to reject the null hypothesis when it is true. One option for handling the data may be to use Bonferroni corrections (Benjamini & Hochberg, 1995) but it may also be advisable to measure and analyses fewer variables in order to maximise the focus on the variables which are key to the competitive conversation. Furthermore, whilst I created three factors based on verbal and non-verbal behaviour, future work of a similar design could attempt to create more factors from correlated variables in order to further reduce the number of tests carried out.

Limitations with the sample size and running multiple analyses are also apparent in Study 1, where there was a small number of raters recruited to rate the stimuli. With a high volume of stimuli to be rated and a significant interaction found in the data, among other findings, the study appeared to be adequately powered. However, it could be speculated that five males and six females are not enough to get a gain a reliable or valid rating of the stimuli. This matter should be addressed in future research, when it could also be determined whether there are significant differences in the way males and females rate funniness and attractiveness in stimuli in a larger sample. Whilst Study 1 found a high rate of agreement in the way males and females rated the stimuli, increasing the sample

size of the raters may provide further insight into the reliability and validity of the data.

An additional related consideration is the potential problems associated with asking heterosexual males and females to rate the short-term attractiveness of same-sex individuals. The results from Study 1 do not suggest that there was difficulty associated with this task as there were high rates of agreement in the data, but it could be speculated that short-term attractiveness could only be reliably related by a heterosexual member of opposite-sex. Rating long-term attractiveness requires one to judge whether the target individual would have good partner characteristics, which may be relatively easier than judging short-term attractiveness due to the overlap in the qualities that both males and females seek in long-term partners (Buss & Schmitt, 1993). There are however large discrepancies between the qualities which males and females value in a short-term partner, highlighting the reason why it may have been more appropriate for Study 1 and Study 2 (where the same stimuli was rated for flirtatiousness) to have a larger sample of heterosexual male and female raters who rate opposite-sex stimuli only. Future research could investigate the impact of doing this and could extend this research further to investigate the pattern of data which emerges when a sample of non-heterosexual participants are asked to rate same-sex stimuli.

8.4 Conclusions on theories of humour

In viewing the evidence presented in this thesis as a whole, the findings provide support for the view that humour evolved as a way of indicating interest in others, in both a mating context and a platonic cooperative sense. Miller's contention that humour evolved due to sexual selection may have a kernel of truth in it but the

implication in the Mating Mind theory that humour is largely a signal of genetic quality does not appear to be well supported by my thesis. The findings in Study 1 and Study 2 suggest that humour is used when attraction to an individual has already been established which is in sharp contrast to Miller's theory that humour would increase an individual's attractiveness. However, in retrospect, it seems narrow to view humour in this way; as though it is only relevant to the mating market, when we consider the long reach of laughter and humour. Furthermore, the thesis presents evidence which may be supportive of other theories of humour, such as the False Alarm theory (Ramachandran, 1998).

Ramachandran's theory suggests that humour would be used as a signal that, after a surprising or upsetting event, all is well within a group. In other words, humour and laughter would be used to demonstrate that there is no current danger in a group situation and, in so doing, groups relations remain harmonious (Ramachandran, 1998). In Study 5, the findings seem to suggest that humour is used at a similar level within the dyads, which may relate to the False Alarm theory. If humour is used in a reciprocal manner, and humour is somewhat contagious as Crystal (1988) suggests, this could be a sign of harmonious relations. This may however be dependent on the style of humour used. This is a matter which Ramachandran did not theorise about but it is likely that more positive humour styles (affiliative humour) would contribute towards maintaining harmony rather than aggressive humour. Indeed, there is much scope for future work to expand on this theory and the Desert Island competitive conversation may be an appropriate way to further our understanding of humour in groups.

A third humour theory which has been discussed in the thesis is the Encryption theory of humour (Flamson & Barrett, 2008). In this theory, Flamson

and Barrett (2008) suggest that humour appreciation is used as a way of demonstrating that you have shared knowledge with another person. For example, if an individual tells a joke which may require specialist knowledge to understand (the authors use an example of a joke comparing Frank Gehry's work to a crumpled napkin), anyone who laughs at that joke can be accepted as a 'like-minded' individual and one who has similar knowledge to the joker. The results from Study 7 provide support for this theory. Study 7 demonstrated that males demonstrate a preference for jokes told by males of a similar level of dominance. As such, these results suggest that a hint of similarity between yourself and another person can perhaps lead the way for a humorous exchange which could potentially lead to the formation of an alliance.

Study 7 also provides support for a theory mentioned frequently throughout the thesis; Li et al's (2009) Interest Indicator theory. In this parsimonious theory, Li suggests that humour is used as a way of demonstrating interest in another individual. The theory was presented in Chapter 2 as being in contrast to Miller's Mating Mind theory and the thesis provides support for Li et al's theory, rather than Miller's. In Study 1, the findings suggested that humour is used when attraction to an individual has already been established, and Study 2 expanded on this finding demonstrating that those who use humour appeared to be more flirtatious. In both studies, humour appreciation was found to be linked to interest in the actor being presented in the stimuli. In Study 7, males appreciated the humour produced by men who sounded equal to them in dominance; someone they may be interested in forming an alliance with. In sum, Li's theory is supported because it highlights the importance and prevalence of

using humour in different situations, and this is precisely what the thesis has shown.

To view humour as a way of signalling quality to a potential mate appears to be too narrow considering how humour is used. There is no natural restriction placed on humour use, despite Miller's argument, although certain social situations may make it more or less appropriate to be funny. Participants in the studies presented in this thesis produced humour in circumstances where it may seem unlikely to do so. For example, in Study 1, half of the participants who answered the solo desert island question explicitly produced humour in their answer, despite the situation of being filmed in laboratory conditions with an unfamiliar experimenter. Participants were also not instructed to be funny, yet half of them were. Similarly, in Study 5, participants produced humour whilst being filmed having a competitive conversation with a participant they had not met before, in front of experimenters they did not know; again, this seems like an unlikely situation to produce humour yet humour behaviour was observed. The robustness of humour behaviours in these situations, and many others, demonstrates that humour is an important human skill which transcends mate choice in becoming a crucial social tool. Further research in this area should attempt to understand how humour differs between mate choice and other situations because there may be subtle distinctions between these behaviours. However, humour is undoubtedly a behaviour which can be observed in a vast range of social situations between a wide variety of individuals meaning that we should lift our focus away from mate choice and explore the intricacies of the other functions of this behaviour.

8.5 Conclusion

That such a complex skill evolved, remains universal and venerated, and is ubiquitous in everyday conversations between people of different backgrounds and all stages of life suggests there is a much more powerful role for humour than to only signal quality. The importance of having the power to bond individuals, to initiate cooperation, to provide social lubricant, to demonstrate shared knowledge, troubles, and feelings cannot be underestimated. Humour is an exclusively human skill which may be difficult to produce but it appears true that the costs of producing humour are vastly outweighed by the benefits of initiating contact and cooperation with others. This thesis has shown that sex, style, and status play important roles in how humour is used and appreciated but undoubtedly there is nothing funny about the evolution of humour; it is a joyous behaviour we are fortunate to have.

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Appendix

8.6 Appendix One

Desert Island Scenario

For the last section of the video recordings, you will be asked to answer the following question on camera.

“If you were going to a desert island and you were allowed to take two of the following items, what would you take and why?”

- A can of hairspray
- A bar of chocolate
- A plastic carrier bag

We will record you answering this question in order to capture you speaking naturally. This section of the study is very open to whatever it is you want to say. Some people approach this in a serious way, some people approach it in a humourous way; we just want you to answer the way you would answer if you were speaking to friends in a relaxed environment. You can be as silly or as clever as you feel.

8.7 Appendix Two

Instructions to participants in Study 1

“Please rate the photograph (or video or audio clip) for the traits below.” Participants were then asked to rate each piece of stimuli on a scale of 1-7 according to how high or low funniness they rated it as being. Additionally, participants were asked to rate the short-term and long-term attractiveness of each piece of stimuli. They were provided with the following definitions of short-term and long-term relationships, which were present at the bottom of the screen throughout the study.

Short-term: You are looking for the type of person who would be attractive in a short-term relationship. This implies that the relationship may not last a long time. Examples of this type of relationship would include a single date accepted on the spur of the moment, an affair within a long-term relationship, and possibility of a one-night stand.

Long-term: You are looking for the type of person who would be attractive in a long-term relationship. Examples of this type of relationship would include someone you may want to move in with, someone you may consider leaving a current partner to be with, and someone you may, at some point, wish to marry (or enter into a relationship on similar grounds as marriage).

8.8 Appendix Three

Advertisement One

Dominant Male: I met Owen when we started working in media together. If you asked what sort of guy he is, I'd say any woman would be lucky to snap him up.He's into hill-walking, enjoys cooking, and he plays a decent game of basketball! His sense of humour is wickedly evil sometimes so I think he's looking for a girl who doesn't take herself too seriously!

Prestigious Male: I met Tom when we started working in IT together. If you were to ask me about Tom, I would say any woman would be lucky to be with him. He's into hiking, enjoys baking, and he plays a decent game of tennis! He's always getting up to amusing shenanigans so you'll not be disappointed by his ability to make you laugh at his adventures.

Dominant Female: I met Tracey when we started working in media together. If you asked what sort of woman she is, I'd say any man would be lucky to snap her up. She's into hill-walking, enjoys cooking, and she plays a decent game of basketball! Her sense of humour is wickedly evil sometimes so I think she's looking for a guy who doesn't take himself too seriously!

Prestigious Female: I met Laura when we started working in IT together. If you were to ask me about Laura, I would say any man would be lucky to be with her. She's into hiking, enjoys baking, and she plays a decent game of tennis! She's always getting up to amusing shenanigans so you'll not be disappointed by her ability to make you laugh at her adventures.

Advertisement Two

Dominant Male: Tony and I first met when we became college roommates. He has a very black sense of humour and is famous for his rants about lazy people which could really entertain you! In his spare time, he enjoys shopping, walking the dog, and attempting DIY. He has always been a great friend to me and he deserves to find a fantastic girlfriend…just date him already!

Prestigious Male: Craig's been a brilliant friend to me since we met. He has a very good sense of humour but loves a good rant about intolerance, which can

be hilarious and very entertaining! At the weekend, he likes taking photographs on scenic walks, and the cinema. He's a decent guy who deserves to find an equally decent girlfriend; come on, what have you got to lose?!

Dominant Female: Betty and I first met when we became college roommates. She has a very black sense of humour and is famous for her rants about lazy people which could really entertain you! In her spare time, she enjoys shopping, walking the dog, and attempting DIY. She has always been a great friend to me and she deserves to find a fantastic boyfriend…just date her already!

Prestigious Female: Amber's been a brilliant friend to me since we met. She has a very good sense of humour but loves a good rant about intolerance, which can be hilarious and very entertaining! At the weekend, she likes taking photographs on scenic walks, and the cinema. She's a decent girl who deserves to find an equally decent boyfriend; come on, what have you got to lose?!

Advertisement Three

Dominant Male: Jonny is a softie for soppy movies but you would never guess it! He is very funny with more than a decent dose of scathing sarcasm thrown in for good measure; talk about silver tongue. We've been friends since we met through my older sister. He's definitely the sort of guy anyone would be lucky to know so do yourself a favour and message him.

Prestigious Male: I met Mark when he came to my pub quiz. You've never met anyone as peacefully, affably amusing; he's funny and very inclined to collapse into a heap of very infectious giggles! He has lots of interests, as well as the usual music and films. He won't appreciate me gushing about him but it's about time he met someone I think, prove me right please!

Dominant Female: Mairead is a softie for soppy movies but you would never guess it! She is very funny with more than a decent dose of scathing sarcasm thrown in for good measure; talk about silver tongue. We've been friends since we met through my older sister. She's definitely the sort of girl anyone would be lucky to know so do yourself a favour and message her.

Prestigious Female: I met Aisling when she came to my pub quiz. You've never met anyone as peacefully, affably amusing; she's funny and very inclined to

collapse into a heap of very infectious giggles! She has lots of interests, as well as the usual music and films. She won't appreciate me gushing about her but it's about time she met someone I think, prove me right please!

Advertisement Four

Dominant Male: I would say Peter is one of my best friends. He's into reading crime novels and loves a quiet night in the pub. Peter is a bit of a cheeky chappy but he's not *too* nice; he definitely enjoys his own witty but brutal put-downs! He has always had something really unique about him and I'm sure that he'd make the right girl very happy.

Prestigious Male: I'm writing this because Steve is my very best friend. He's a good friend and always seems like one of the people you'll want to be with at a party but he loves a night out as much as the rest of us! He's never loud or brash but can be very funny; a top choice for igniting even the most tumbleweed of social occasions!

Dominant Female: I would say Rachel is one of my best friends. She's into reading crime novels and loves a quiet night in the pub. Rachel is a bit of a cheeky madam but she's not *too* nice; she definitely enjoys her own witty but brutal put-downs! She has always had something really unique about her and I'm sure that she'd make the right guy very happy.

Prestigious Female: I'm writing this because Vicky is my very best friend. She's a good friend and always seems like one of the people you'll want to be with at a party but she loves a night out as much as the rest of us! She's never loud or brash but can be very funny; a top choice for igniting even the most tumbleweed of social occasions!

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Dominant Male: Charlie's a great guy and an awesome friend to me. If he was my type, and I didn't see him as a brother, I would have snapped him up already. He is usually the centre of attention in a group because he is so loud, especially with his constant sharp-tongued mickey taking! Get in touch, especially if you share his penchant for terrible cheesy movies!

Prestigious Male: I'm Gerard's friend and all the better for knowing him. He needs someone who's easy to get along and tolerant of cheesy music! He's usually the life and soul of any party, knows how to enjoy himself, and is often very funny without realising it. He'll make someone very happy one day and I'm sure he'll get snapped up quickly so get in touch soon.

Dominant Female: Charlotte's a great girl and an awesome friend to me. If she was my type, and I didn't see her as a sister, I would have snapped her up already. She is usually the centre of attention in a group because she is so loud, especially with her constant sharp-tongued mickey taking! Get in touch, especially if you share her penchant for terrible cheesy movies!

Prestigious Female: I'm Gemma's friend and all the better for knowing her. She needs someone who's easy to get along and tolerant of cheesy music! She's usually the life and soul of any party, knows how to enjoy herself, and is often very funny without realising it. She'll make someone very happy one day and I'm sure she'll get snapped up quickly so get in touch soon.

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Dominant Male: If I was stuck on a desert-island, I'd take Ryan! The guy's sense of humour is cutting, scathing, deadpan, and hilarious-you'll enjoy it as long as you don't take yourself too seriously. His interests are diverse (travelling, maps, reading, cooking) and he loves his coffee! Any girl would be lucky to have him in her life and guaranteed you'll have a great time with him.

Prestigious Male: I'd take Will if I was stuck on a desert-island! He has a range of interests like going to gigs and collecting postcards. Rather than trotting out a corny pick up line, my brother's more likely to let you get served before him and he's got a great sense of humour; he'll have you and all your friends laughing at his witty observations on life!

Dominant Female: If I was stuck on a desert-island, I'd take Rose! The girl's sense of humour is cutting, scathing, deadpan, and hilarious-you'll enjoy it as long as you don't take yourself too seriously. Her interests are diverse (travelling, maps, reading, cooking) and she loves her coffee! Any guy would be lucky to have her in his life and guaranteed you'll have a great time with her.

Prestigious Female: I'd take Tara if I was stuck on a desert-island! She has a range of interests, like going to gigs and collecting postcards. Rather than trotting out a corny pick up line, my sister's more likely to let you get served before her and she's got a great sense of humour; she'll have you and all your friends laughing at her witty observations on life!

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Dominant Male: This is where I say Brian is a great guy! Brian is a quick-witted, caustically funny guy, full of biting sarcastic one liners, and guaranteed to be up for the craic anytime. He enjoys lots of things like films, socialising, and a bit of TV. The Perfect Miss Right is out there somewhere and I am sure Brian is the Mr. Right she's looking for.

Prestigious Male: I'm here to say what a great guy Sean is! He enjoys doing things like listening to live music, socialising, and the cinema. He's a quick witted funny guy, full of anecdotes to keep you laughing, and guaranteed to always be up for the craic. Miss Right has got to be out there somewhere and Sean is the man born to keep her very happy.

Dominant Female: This is where I say Christine is a brilliant person! Christine is a quick-witted, caustically funny lady, full of biting sarcastic one liners, and guaranteed to be up for the craic anytime. She enjoys lots of things like films, socialising, and a bit of TV. The Perfect Mr Right is out there somewhere and I am sure Christine is the Miss Right he's looking for.

Prestigious Female: I'm here to say what a great lady Louise is! She enjoys doing things like listening to live music, socialising, and the cinema. She's a quick witted funny girl, full of anecdotes to keep you laughing, and guaranteed to always be up for the craic. Mr Right has got to be out there somewhere and Louise is the woman born to keep him very happy.

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Dominant Male: Graeme is a good friend I met at a gig. He enjoys doing some snowboarding and taking in nice scenery when he can. He is a fun guy to be around, and a good laugh, despite his brutal put-downs and slightly twisted sense

of humour. Come on girls, send him a nice message today and get to know him; what have you got to lose?

Prestigious Male: I met Tim when I moved in as a lodger. He enjoys exploring the great outdoors and going to a regular pub quiz. He's great fun to be around, especially because his observations about life are guaranteed to have you doubled up in hysterics laughing. I think he's looking for someone easy to talk to whom he can adore; is it going to be you?

Dominant Female: Faye is a good friend I met at a gig. She enjoys doing some snowboarding and taking in nice scenery when she can. She is a fun girl to be around, and a good laugh, despite her brutal put-downs and slightly twisted sense of humour. Come on guys, send her a nice message today and get to know her; what have you got to lose?

Prestigious Female: I met Tessa when I moved in as a lodger. She enjoys exploring the great outdoors and going to a regular pub quiz. She's great fun to be around, especially because her observations about life are guaranteed to have you doubled up in hysterics laughing. I think she's looking for someone easy to talk to whom she can adore; is it going to be you?

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Dominant Male: Ray looked like a shy guy when I first got to know him in uni but boy can he be loud! He's really into playing 'rock-band', board games, and basically anything competitive. He definitely loves being the centre of attention and has lots of funny stories and jokes to share (even if they do run a little close to the bone sometimes!). Ray's a great guy so snap him up quick while you still can!

Prestigious Male: Rob looked like a shy guy when I first got to know him in uni but he's always been a really great friend and a solid support when I need him. In his spare time, he likes playing 'rock-band' and board games, and is an avid animal lover who loves all animals; particularly otters! He has lots of funny stories and jokes to share but is also a really great listener. Rob's a great guy so snap him up quick while you still can!

Dominant Female: Amy looked like a shy girl when I first got to know her in uni but boy can she be loud! She's really into playing 'rock-band', board games, and basically anything competitive. She definitely loves being the centre of attention and has lots of funny stories and jokes to share (even if they do run a little close to the bone sometimes!). Amy's a great girl so snap her up quick while you still can!

Prestigious Female: Julie looked like a shy girl when I first got to know her in uni but she's always been a really great friend and a solid support when I need her. In her spare time, she likes playing 'rock-band' and board games, and is an avid animal lover who loves all animals; particularly otters! She has lots of funny stories and jokes to share but is also a really great listener. Julie's a great girl so snap her up quick while you still can!

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Dominant Male: Josh is a really great guy I met in school. His idea of a good time is getting people around for a drink or two while watching a movie or playing some card games, and he also enjoys sports. He can be really funny (if a little harsh!) but be warned, there's not much you can do to stop him from talking when he wants to! He's a great catch, send him a message!

Prestigious Male: Simon is a really great guy I met in school. His idea of a good time is getting people around for a drink or two while watching a movie or playing some card games and he also enjoys sports. He can be really funny sometimes, he's a great story teller, but often takes a back-seat to conversations, offering great advice only when asked. He's a great catch, send him a message!

Dominant Female: Stella is a really great girl I met in school. Her idea of a good time is getting people around for a drink or two while watching a movie or playing some card games, and she also enjoys sports. She can be really funny (if a little harsh!) but be warned, there's not much you can do to stop her from talking when she wants to! She's a great catch, send her a message!

Prestigious Female: Danielle is a really great girl I met in school. Her idea of a good time is getting people around for a drink or two while watching a movie or playing some card games and she also enjoys sports. She can be really funny

sometimes, she's a great story teller, but often takes a back-seat to conversations, offering great advice only when asked. She's a great catch, send her a message!

8.9 Appendix Four

Participant 1: Your partner has been supplied with a list of five items which are different to yours, but have similar uses. As a team, decide which five items from both lists you are both going to take with you to the desert island. Your task is to try and bring as many from your list as possible! Before your discussion begins, please rank the items in terms of their desirability to you by marking a number beside them on the table below. One will be the most desirable item and five will be the least desirable.

Lighter
Axe
Fishing net
Torch
Shotgun

Participant 2: Your partner has been supplied with a list of five items which are different to yours, but have similar uses. As a team, decide which five items from both lists you are going to take with you to the desert island. Your task is to try and bring as many from your list as possible! Before your discussion begins, please rank the items in terms of their desirability to you by marking a number beside them on the table below. One will be the most desirable item and five will be the least desirable.

Machete
Revolver
Matches
Fishing rod
Headlamp