THE EFFECTS OF STATUS ON THE PROCESSING OF SOCIAL THREAT: THE ROLE OF ATTENTION AND MOTIVATION

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Thesis Declaration

I, Tiffanie Ru Yi, Ong, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature:

Date:

The studies presented in Chapter 3 of this thesis have been submitted to the Journal of Personality and Social Psychology with my supervisor, Ana Guinote.

Abstract

Loss of social prestige and respect from oneôs community represents a fundamental threat to the social self. Additionally, low-status individuals are frequently exposed to social stressors and unprovoked hostility in their daily lives. The current research examines how social status affects the processing of threatening faces. Nine studies, in which status was experimentally manipulated, test the hypothesis that low sense of perceived status leads to enhanced processing of social threat. Study 1 provided preliminary support for this hypothesis with low-status participants showing heightened accessibility for social-threat words in a lexical-decision task. Building from that, Study 2 found that low-status participants were quicker at recognising target faces that were embedded in a social-threat context. Study 3 utilised a modified Stroop paradigm to examine interference from irrelevant emotional face background. Study 4 investigated motivated processing effort in a facial expression identification task. Studies 5 and 6 used a dot-probe task to examine the time-course and selective attentional biases to angry and happy faces. Study 7 further examined the bias to perceive social-threat cues using a change emotion detection task in which an angry face morphed into a neutral face. It also examined the role of social interaction. These studies consistently showed that low-status enhanced the readiness to deploy processing effort and focus attention toward facial expressions of anger. It highlights the heightened awareness of overt social threat cues in low-status participants. Studies 8 and 9 investigated the ability to detect subtle cues of social threat in non-Duchenne smiles. Whilst low-status participants showed a decrease in their preference to work with targets displaying non-Duchenne smiles, high- and low-status participants did not differ in the ability to explicitly discriminate between Duchenne and non-Duchenne smiles. The implications of these findings for the links between status, attention and social relations are discussed.

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Chapter 1 General Introduction

1.1 Preface

Hierarchy is one of the most common forms of social organisation (Brown, 1991; Mazur, 1985; Murdock, 1949). Indeed, human and non-human primate societies alike are organised in a stratified structure with more members at the bottom than at the top.

As social creatures, most of our interaction with the environment revolves around relationships with other people. The social structure in which such interactions take place is built upon social asymmetries in terms of status, power or both (Farley, 1982). Hierarchical differences along these dimensions among individuals often dictate patterns of conflict, resource allocation, and mating (Báles, 1950; Berger, Rosenholtz, & Zelditch, 1980; de Kwaadsteniet & van Dijk, 2010; Ellis, 1995; Fried, 1967; Ronay, Greenaway, Anicich, & Galinsky, 2012). Even when effort is made to minimise hierarchy by employing different models of social organisation (Fiske, 1992), it inevitably emerges both between and within groups (Leavitt, 2005; Sidanius & Pratto, 1999). The pervasiveness of hierarchy suggests that there are a number of factors not just in groups, but also within and between individuals, that create, shape and sustain it across myriad settings.

Faces, in particular, have often been referred to as one of the most salient and relevant social stimuli to social interactions (Bruce & Young, 1986; Bonner, Burton, & Bruce, 2003). Faces lie at the heart of social cognition (Macrae & Quadflieg, 2010) because the ability to successfully encode faces contributes substantially towards the creation and maintenance of functional social interactions (Yardley, McDermott,

Pisarski, Duchaine, & Nakayama, 2008). Based on existing evidence on top-down influences in face processing, the current research investigates how subjective sense of status influences face memory, emotional face recognition, and basic attentional processes that underlies emotional face perception. Building from previous work showing that face perception varies as function of motives, I argue that loss of status triggers the motivation to be vigilant towards facial cues indicative of social threat, and that these top-down motivational influences feed into lower order processes in face perception.

More specifically, building from evidence suggesting that face perception is driven by the functional relevance a particular target was to the perceiver (e.g., Becker, Rinck, Margraf, & Roth, 2005; Hugenberg, Young, Bernstein, & Sacco, 2010), I propose that threatening facial expressions are perceived to be of high subjective value and relevance to a low-status individual. Therefore these faces will elicit more selective visual attention, superior face processing style, and greater recognition ability.

In relation to that, group membership and social status position often constrains how an individual thinks, feels and behaves (Mackie, Devos & Smith, 2000). Empirical studies investigating the links between status, group processes and social cognition have primarily focused on overt consequences of status such as inter- and intra-group behaviour and the individualsô perception of different social status groups. For example, the system justification theory proposes increased self-esteem and out-groups devaluation for members of high-status groups and decreased self-esteem and in-group favouritism for members of low-status groups (Jost & Thompson, 2000). Much less is known about more basic social perception processes that are likely to contribute to the proposed higher-order cognition and action.

To that end, the current research aimed to investigate how perceiversô sense of their own status affects their subsequent perception of their social surroundings. It also aimed to provide converging evidence that status can be conceived not only as a building block of our social structure, but also as a psychological factor that moderates the way we perceive and interact with the social environment. In particular, the current research examined how status triggers functionally specific motivations, which then exerts top-down influence on the processing of social threat information (Chapter 2) and facial cues indicative of both overt (Chapter 3) and subtle threat (Chapter 4).

People tend to pay close attention to facial expressions of others in order to determine their intentions (Fridlund, 1994, 1997). Given that low-status individuals experience more hostility and social challenges in their daily lives, they should be particularly preoccupied with discerning threatening facial expressions of others. The current research examines threat-related facial cues in angry emotional expressions, which signals direct social threat; and non-Duchenne smiles that conveys untrustworthiness. I propose that loss of social prestige automatically heightens accessibility of social threat signals. Thereby low-status individuals should be more motivated to process facial expression indicative of social threat. In addition, I propose that this heightened sensitivity to facial expressions of threat reflects an increased awareness of social threat. I posit that low-status individuals are motivated to be vigilant towards social threat cues instead of affiliative cues because they prioritise the detection and subsequent avoidance of threatening targets. I also propose that the attentional vigilance towards static angry facial expression would be evident in dynamic facial expression of anger. I also investigated the role of the relationship between the target and the perceiver. Specifically, whether expecting an interaction with the target influences the perception of their dynamic angry expression. I suggest

that low-status individuals would be biased in the perception of anger emotion offset in ambiguous facial expression in the faces of interaction partners and not in targets in which no interaction is expected. Finally, I propose that low-status individuals would also be sensitive to untrustworthiness cues present in non-Duchenne smiling faces. I suggest that low-status individuals would be able to discriminate between Duchenne and non-Duchenne smiles, as they are motivated to avoid threatening targets. Conversely, I do not expect high-status individuals to demonstrate this pattern of response.

In the next chapter, I will first define some of the core concepts in social hierarchy that informed the development of the rationale behind the current researchôs hypotheses. Next, I will review the links between the stigma associated with belonging to a low socioeconomic status group and aggression, followed by a consideration of the impact that social status has on threat sensitivity. Then, I will give a broad overview of the social cognitive literature on social status, with the goal of demonstrating how the loss of status leads to differential social cognitive tendencies. Finally, I will discuss the emerging evidence on the motivated basis of face perception. Integrating these lines of research gives us compelling reason to believe that the chronic exposure to social hostility and social challenges should trigger the motivation to be more sensitive to social threat cues in low-status individuals.

1.2 Concepts

Given the dynamic nature of social hierarchy, I will first introduce the relevant concepts that are highly intertwined yet conceptually distinct and conjointly sum up the complexities of social hierarchy.

1.2.1 Social hierarchy

Social hierarchy refers to the ñimplicit or explicit rank order of individuals or groups on a valued social dimensionò (Magee & Galinsky, 2008, p. 354). One possible implication from this definition is that the valued social dimension is subjective to the individual or groups, and that the context will determine which dimension(s) is most relevant for differentially ranking individuals or groups at any given moment.

The current research focuses on social status, which alongside social power has been proposed to be one of the two most important bases of social hierarchy (Blau, 1964; Mannix & Sauer, 2006; Thye, 2000). The following subsection will firstly give a general definition of how I conceptualised social status and differentiated it from social power. Then, I will briefly define other constructs closely related to social status, namely, social class and socioeconomic status (SES). These constructs are important as they contribute directly to the rationale underlying the current core research questions. It should be noted that status differences frequently manifest between groups that differ in terms of social categories. I will briefly mention some supporting evidence from those literature areas in the later parts of this introduction. However, in this particular subsection, I will only focus on social class and SES. This is because the current research intended to diverge from past research, which has focused mainly on concrete social categories such as ethnicity and gender. Specifically, I was interested in

providing novel empirical evidence on how abstract social environmental cues such as prestige and respect influences basic cognitive processes.

1.2.2 Social status

Status has been referred to as the underlying dimension in social structure and in peopleôs understanding of behaviour (for related definitions, see Lonner, 1980). A hierarchical relation between individuals is one of the basic forms of social relations (Fiske, 1992). Furthermore, relationships of status permeate everyday interpersonal experiences, because every person one encounters is either higher, lower or equal status relative to the self (Russell & Fiske, 2008). High-status individuals are seen as more worthy and are given more respect than others; therefore their recognition is more highly valued (Raven & Kruglanski, 1970). High-status also confers the ability to resist social controls on behaviours as imposed by others or situational forces (Hollander, 1958). As such, status is often conceived as a property of social relationships, which have important implications at multiple levels, ranging from psychological, cognitive, and affective to behavioural (Bugental, 2000).

Broadly, status is defined as the position of prestige and respect one holds in the social hierarchy and in the eyes of others (Ridgeway & Walker, 1995). It is important to note that unlike power hierarchies that are defined by the amount of objective control one has over valued resources (Fiske & Dépret & Fiske, 1996; Keltner, Gruenfeld, & Anderson, 2003), status hierarchies are primarily subjective (Blau, 1964; Foa, 1971; Goldhamer & Shils, 1939; Hollander, 1958; Podolny, 1993). Furthermore, power is based upon resources that belong to an actor, whereas status is based upon the social resources that are conferred upon the actor by others. In other words, status, unlike power which is a property of the actor, is a property of co-actors around the actor

(Magee & Galinsky, 2008). Finally, while a high-ranking position can be obtained through power, dominance, and ability to influence through coercive methods; status is more commonly conferred to those who are well respected and relates to positive social attention and acceptance (de Waal, 1989; Gilbert, 1997; Gilbert & Trower, 1990).

There are three constructs that are closely related to social status, namely, socioeconomic status (SES), social rank and social class. SES is a multidimensional phenomenon that takes into account a combination of variables in terms of financial, occupational and educational influences (Green, 1970; Hollingshead, 1975; Mueller & Parcel, 1981). The most common account of SES considers SES as encompassing three types of capital (Coleman, 1988): financial capital (income/material assets), human capital (non-material resources such as education), and social capital (non-material resources achieved through occupation or social connections), which influence processes that have an direct effect of well-being (Bradley & Corwyn, 2002). Additionally, there is also general consensus that the combination of income, education, and occupation represent SES better than any of these alone (White, 1982).

Social rank is commonly operationalised in terms of oneôs ability to influence othersô behaviours, thoughts, and feelings (Báles, Strodtbeck, Mills, & Roseborough, 1951; French & Raven, 1959; Mazur, 1973) and the attention that one receives from others (Anderson & Shirako, 2008; Fiske, 1993; Hold, 1976; see Anderson, John, Keltner, & Kring, 2001). Indeed, high- and low-ranking individuals differ in terms of their influence within a group, such as resource allocation and group decisions (Berger, Rosenholtz, & Zelditch, 1980). Consequently, there is a strong link between social rank and well-being, across species (e.g., Barkow, 1975; Betzig, 1986; Cowlishaw & Dunbar, 1991; Hill, 1984b; Hill & Hurtado, 1989; von Rueden, Gurven, & Kaplan, 2011).

A construct closely related to social status is social class. Social class is commonly based on both objective measures of material resources (income, education; Oakes & Rossi, 2003) and the concept of subjective sense of status rank vis-à-vis others in society (subjective status; Adler et al., 2000). Importantly, social class identity defines an individualôs physical and psychological life circumstances in ways highly similar to other social identity constructs (e.g., ethnicity, nationality). In particular, social class identity has been proposed to be a source of social stigma among lower class individuals (Croizet & Clare, 1998) and it directly affects the dynamics during social interactions because of the stigma associated with their social class (Blascovich, Mender, Hunter, Lickel, & Kowai-Bell, 2001).

It is worth noting again that, throughout this chapter, the term social status would refer to status from the perspectives of socioeconomic status (SES), social rank, and social class interchangeably. Notwithstanding the additional considerations with each specific construct such as material wealth in SES, and ability to influence others in social rank, these constructs are highly intertwined. Therefore these constructs would provide a comprehensive background for the rationale underlying the current research questions, which is based solely on subjective sense of status, specifically in the domains of respect and prestige.

The next section aimed to set the background framework for the overarching aim in the current research, which is to investigate how social status affects the processing of threatening faces. Firstly, I will discuss the relationship between socioeconomic status, stigma and hostility. I will highlight the role of psychological/social stressors in contributing to the disparities between high and low-status individuals. Then, I will outline the physiological consequence of social status, with an emphasis on differential experiences and expression of aggression as a result of

oneôs status position. I will also attempt to illustrate how the stigma associated with low social-status contributed to the phenomenon hypothesised by the current research.

1.3 Social status, stigma and hostility

In many species, reproductive success is often associated with those who hold dominant positions in the social hierarchy. One proposition is that those with higher status have a greater chance of survival and are better able to provide and protect for their offspring (Clutton-Brock, 1988; Clutton- Brock & Harvey, 1976; Dewsbury, 1982; Ellis, 1995). Not surprisingly, people place great importance in fulfilling expectations of their hierarchical ranking; to move up to higher positions and to avoid being demoted to lower positions (Brown, 1985; King, 1995).

In other words, natural selection favours those in high-status positions. Accordingly, it is plausible that our physiological system and cognitive functioning should have evolved such that a loss or gain in status triggers an alarm signal that impacts both our bodily response and social cognitive processes. For the remainder of this section, in light of the aims of the current research, which is to demonstrate that status triggers functionally distinct motivations that then has a top-down influence on social cognitive process, I will discuss how oneôs socioeconomic status leads to differential physiological changes and social stresses. I will elaborate on how these factors have been proposed to account for the health disparities between individuals from high and low socioeconomic status background. Next, to further explain why oneôs physiology and stress-response varies as a function of their status, I will outline how status influences onesôexperiences and expressions of aggression.

1.3.1 Status and health: The role of physiological changes

Socioeconomic factors are of great interest in psychological research, health practice, education and policy because they play a crucial role in human functioning

across the life span, including development, well-being, and physical and mental health (APA, 2007).

In the recent report by the American Psychological Association (APA) task force on SES, Saegert and colleagues highlighted the relationship between lower social standing and increased exposure to violence and other debilitating stressors and threats (APA, 2007). High SES is typically associated with relatively greater health advantages. However, it should be noted that disparities are most striking at the lower ranking positions (Gallo, Smith, Cox, 2006), and elevated stress and negative emotions have been proposed to contribute to the relative health disadvantages.

A number of studies indicate that naturally occurring status differences affect stress related physiology. Research focusing on the links between SES and health has found higher health risks and earlier mortality from all causes in low-status individuals compared to high-status individuals (Saplosky, 2004, 2005; Marmot, Rose, Shipley, & Hamilton, 1978). For example, in their longitudinal Whitehall studies, Marmot, Davey, Smith, and Stansfield, (1991) investigated the links between hierarchical position at work, stress and health in 28,308 civil servants over the period of 10 years. These studies found that those at the bottom of the hierarchy (e.g., messengers, doorkeepers) had a greater likelihood to suffer from heart and chronic respiratory disease, some cancers, and higher mortality compared to those at the top (e.g., administrators). The differences were associated with increased cortisol awakening response (the difference between cortisol levels upon awakening and thirty minutes later) in those in the lower ranks, and remained after controlling for lifestyle differences. The stress response that comes with a low-status position at work is also associated with decreased perceived control and autonomy (Steptoe & Kivimäki, 2012).

Converging evidence shows that in response to the challenge of losing status, the brain activates the autonomic nervous system, which in turn stimulates the release of the hormones cortisol and adrenaline (Cummins, 2005). In addition, there is also a direct correlation between androgen and serotonin levels in higher-status primates (Ellis, 1995; Sapolsky, 1990; Sapolsky & Ray, 1989). Serotonin levels increase in lower-status subordinates who improve their social position and winnersô exhibit an increase in androgen levels (Sapolsky, 1990, 1999; Sapolsky & Ray, 1989; Niehoff, 1999). In order to establish causality rather than correlation of this effect, past studies have manipulated social position in the hierarchy and consistently showed acute effects of lowered social status. In particular, losing oneôs dominant position leads to an increase in cortisol levels (Shively et al., 1997) and an animal that has been defeated in an antagonistic encounter also show greater cortisol activity compared to the victor (e.g., Kollack-Walker, Watson, & Akil, 1997). In sum, these studies suggest that acute or chronic threats to oneôs social status lead to an increase in cortisol activity, this effect are augmented when conditions are perceived as uncontrollable.

Recent evidence shows that adults and children from low SES backgrounds typically have higher cortisol levels than those of higher SES (Kapuku, Treiber, & Davis, 2002; Lupien, King, Meaney, & McEwen, 2001) and this occurs above and beyond differences in access to health-care, or other objective factors. Importantly, these results highlight the role of perceived status vis a vis others (Adler, Boyce, Chesney, Cohen, Folkman, Kahn, & Syme, 1994; Adler, Boyce, Chesney, Folkman, & Syme, 1993; McEwen & Wingfield, 2002). For example, even within a household, perceptions of spousal dominance correlates with blood pressure reactivity during interactions between married couples (Brown, Smith, & Benjamin, 1998). Therefore, instead of looking at the objective measures of status such as SES, ranking or

differences between social groups, the current research aimed to provide novel evidence in investigating how perceived status vis a vis others influences basic social cognitive and attentional processes in the perception of social threat related cues in faces. Additionally, threat, as a construct, has gained the reputation in empirical research as a difficult construct to assess directly. As a result, past studies have often looked at threat as a general construct instead of distinguishing between the physical threat and social threat components. In the current research, I aimed to focus specifically on social threat. Specifically, I aimed to demonstrate the bidirectional relationship between social threats and status. Specifically, I tested the notion that loss of status is both associated with increased exposure to both physical and social threats, which in turn motivates enhanced processing and attentional vigilance towards social threat cues in the environment. To that end, the next subsection will outline the relationship between social stressors as a form of social threat and social stats.

1.3.2 Status and social stressors

Stress is often the result of the perception that oneôs environment contains the risk for threat, loss, or harm (Carver, 2007). That is, an individual may experience stress when the threat from a threatening situation exceeds the individualôs available resources and perceived ability for coping (Folkman & Lazarus, 1988). Importantly, this pertains to threat in both the physical and psychological environment. Recent evidence demonstrates that social-evaluative threats to the *social self* (Grunewald, Kemedny, Aziz, & Fahey, 2004) such as rejection and criticism are especially powerful stressors (Dickerson & Kemeny, 2004; Stroud, Tanofsky-Kraff, Wilfley, & Salovey, 2000). For example, the anticipation of being a target of prejudice or discrimination has been shown to activate the stress-response system (i.e., mobilising bodily resources to

meet the demands of the threatening situation) (Sawyer, Major, Casad, Townsend, & Mendes, 2012). Specifically, anticipating prejudice or discrimination because of oneôs social identity leads to vigilance for cues of biased treatment (Inzlicht, Aronson, & Mendoza-Denton, 2009) and hyperawareness for signs of the expected discriminatory treatment. In addition, chronic vigilance, often coupled with rumination and worry, further worsens the negative effects of stress in physical and mental health (Brosschot, Gerin, & Thayer, 2006).

Stresses associated with uncertainty about oneôs personal identity and values (McGregor & Marrigold, 2003; McGregor, Zanna, Holmes & Spencer, 2001) also represents a significant form of social threat that may trigger salient coping strategies such as fight-or-flight, and/or tend-and-befriend (Taylor, 2006). However, considering the vulnerable position that low-status individuals are in, the question remains as to which threat-alleviating strategy they would adopt. Given that social resources such as social support have been shown to be effective in reducing psychological stress (Taylor, 2007), and helping in coping with feelings of anxiety (Kirkpatrick & Navarrete, 2006), it is plausible that being in a low-status position would trigger the urgency and necessity of identifying reliable social support.

In relation to that, Piff, Stancato, Martinez, Kraus, and Keltner (2012) proposed that peopleôs strategies for defending against the threats from the perception of chaos are significantly influenced by their social status (Adler, Epel, Castellazzo, & Ickovics, 2000; Kraus, Piff, & Keltner, 2011; Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Keltner, 2012). Chaos in this context refers to perceptions that threaten the *social self* as it acts against peopleôs core need to view the world as stable and structured (see Gaucher & Galinsky, 2009). This perception of chaos is psychologically threatening and deleterious to well-being (e.g., Haidt & Rodin, 1999; Pennebaker & Stone, 2004).

Therefore, people are often motivated to adopt strategies to manage this threat (Kay, Moscovitch, & Laurin, 2010). In particular, individuals from high SES backgrounds (e.g., high annual household income) are often buffered against psychological stresses. This is because material resources affords an individual a sense of control (Lachman & Weaver, 1998) in so far as material resources can be used to achieve desired goals and outcomes (Lea & Webley, 2006). Indeed, it has been shown that material resources alleviates psychological distress and diminishes physical pain in situations of threat (Johnson & Krueger, 2006; Zhou, Vohs, & Baumeister, 2009).

Indeed, health disparities between different social groups are often attributed to the higher stress levels among low-status groups/minorities caused by chronic exposure to prejudice and discrimination (Pascoe, Smart Richmond, 2009). More specifically, lower SES is often associated with greater exposure to acute stress as well as greater chronic stress. This greater exposure to stress directly translates to the perception of a more threatening social environment, which in turn affords fewer opportunities for control (Lachman & Weaver, 1998) and ultimately contributes to the development of negative affective responses such as hopelessness, hostility and anger (Gallo & Matthews, 2003).

1.3.3 Experiences and expressions of aggression

Status alters the relationship individuals have with the social environment, their emotional experiences, and their propensity to aggress. Nonhuman low-ranking primates have fewer resources compared to their high-ranking conspecifics. For example, subordinate animals have less access to food and sexual partners (Boehm & Flack, 2010), have fewer means of social support, such as grooming, and have fewer

opportunities to displace aggression (less lower rank animals to aggress against) than their higher rank counterparts (Sapolsky, 2004).

The links between status and aggressive behaviour are multifaceted. First, status may affect the emotional experience of anger. Even though low-status individuals often experience frustration and hostility (Chow, Tiedens, & Govan, 2008; Gallo & Matthews, 2003), the emotion of anger is more frequently associated with the perceived entitlement that comes with being in a high-status position (Tiedens, 2001). Secondly, status may affect the expression of hostility. For example, high-status individuals have a greater ability to act on their anger (Thomsen, Green, & Sidanius, 2008; see also Cuddy, Fiske, & Glick, 2007). Finally, high-status individuals may have more social outlets to express their aggression than low-status individuals. The remainder of this subsection will elaborate each of the abovementioned links in greater detail.

Status seems to affect the type of emotions that people experience. It has been proposed that when the *self is strong*, such as when individuals have social support and respect from others, the self is more likely to experience irritation and anger. However, when the *self is weak* it is more likely to experience anxiety and fear (Mackie, Devos, & Smith, 2000). In a series of studies, Mackie et al. found that having social admiration and support lead to irritation and anger in the face of negative events, as well as the endorsement of offensive action tendencies. Brown and Levinson (1987) showed that high-status individuals are less concerned about dealing with the threatening consequences of their actions, and therefore are more likely to tease their low-status counterparts in a more hostile manner. For example, analyses of interactions in the medical settings found that doctors tended to tease more often than midwives, who were more likely to make jokes at the expense of nurses. Similarly, Keltner, Young, Heerey, Oemig, and Monarch (1998) found that high-status individuals teased in more

hostile ways. Furthermore, their teasing involved more aggressive provocation, and lacked positive politeness tactics, such as praise or expression and approval, and negative politeness tactics, such as apologies or deferential displays (Brown & Levinson, 1987). The same pattern of downward displacement of hostility was also observed with children at an observational summer camp (Savin-Williams, 1987).

Experimental research converges to show that the membership in a high-status group increases the propensity to socially discriminate, especially against low-status group members (Mullen, Brown, & Smith, 1992). For instance, in minimal intergroup contexts (see Tajfel, Billig, Bundy, & Flament, 1971), participants assigned to a high-status position discriminated more against outgroup members than did low-status participants (Sachdev & Bourhis, 1984, 1991). Conversely, low-status group members were generally more concerned with parity.

Members of stigmatised and devalued groups have less access to opportunities and financial means. For example, they attain less prestigious job positions, and have lower pay (APA, 2007). Importantly, the reduced opportunities that low-status individuals have at their disposal could contribute to a sense of unfairness and social discrimination, and heightened awareness of hostility. However, even though low-status individuals often experience negative emotions and threat (Page-Gould, Mendoza-Denton, & Tropp, 2008), they tend to accept the status quo and are generally less likely to aggress (see Jost & Burgess, 2000). Instead, low-status individuals often experience more embarrassment, an emotion that signals submissiveness and appeasement intentions (Keltner, 1995).

The ability to aggress against other individuals is an important coping outlet when experiencing frustration or stressful life events (Sapolsky, 2004; Wills, 1981). The displacement of aggression occurs generally towards safe targets, usually of less or

equal ranking. Therefore, in human and nonhuman primates, the higher the actorsô status, the more targets they have at their disposal to displace unprovoked aggression (Miller & Bugleski, 1948; Olweus, 1995; Wills, 1981; for a review see Gibbons et al., 2002). In his downward comparison theory, Wills (1981) posits that people can increase their wellbeing by comparing themselves to less fortunate others, and that this comparison often takes the form of active hostility directed at lower-status others. For example, in a study by Cadinu and Reggiori (2002) psychology students received positive or negative feedback from medical doctors regarding clinical psychologists, or were in a control condition. Subsequently, compared to other students, students who had received negative feedback discriminated more against social workers (i.e., made more negative trait evaluations), a low-status outgroup, but not against medical doctors (a high-status outgroup). Mendes, Blaskovich, Major, and Seery (2001) found that downward comparisons with a lower-status partner decreased cardiovascular threat responses and increased wellbeing. Importantly, this coping strategy is less available to low-status individuals. More generally, compared to low-status individuals, high-status individuals have more opportunities, resources, and are the recipients of more social rewards, such as praise (Sweetman, Spears, Livingstone, & Manstead, 2013). As a result, high-status individuals, may be more motivated to attend to social rewards. At the same time high-status individuals may disdain low-status conspecifics, and often behave in a hostile manner towards them.

Research focusing on SES has demonstrated that individuals from low SES backgrounds are exposed to more severe violence compared to individuals from high SES backgrounds. For example, women who occupied households within the annual income level bracket of less than $10,000 were at 4-times greater risk of experiencing violence, including physical and sexual assault than women in wealthier households

(Bassuk et al., 1996; Browne, Salomon, & Bassuk, 1999). Similarly, low-status racial minorities suffer disproportionate hostility. For example, in the US, from 2007 to 2011 an average of 259.7 nonfatal biased victimisations against low-status group members occurred per year (National Crime Victimization Survey, 2011). In the UK Equality and Human Rights Committee reported that Black citizens are 7 times, and Asian citizens twice, more likely to be stopped and searched by the police than white citizens.

Despite the more subtle dynamics of status and aggression in humans compared to nonhumans, it remains true that compared to high-status individuals, low-status individuals are more often the target of discrimination and unprovoked aggression from different social sources. Therefore, it is possible that the hostile social environment that low-status individuals experience heightens the need for self-protection. In particular, it is plausible that being in a low-status position motivates an individual to identify and process signals of social threat in others more so than high-status individuals as this enhanced ability to detect hostile intentions in others would enable low-status individuals to protect themselves against any further maltreatment and social devaluation.

Being in a low-status position may be psychologically stressful because of the high levels of uncertainty about oneôs identity and values. In line with that, Dandeneau and colleagues (Dandeneau, Baldwin, Baccus, Sakellaropoulo, & Pruessner, 2007) proposed that early-stage attentional processes influences the perception of social threat and this has a significant impact on the subsequent stress response. According to the authors, past research on psychological factors involved in the stress response has focused on late-stage cognitive appraisal processes such as judgements, self-evaluations and other means through which an individual appraises the situation as exceeding their coping resources (Gross, 2002). Much less is known about the role of early-stage

attentional processes which play a vital role in the perception of the potentially threatening cues that an individual may choose to attend to for further processing or ignore (Compton, 2003; Gross, 2002; Koster, Crombez, Verschuere, & De Houwer, 2004; Robinson, 1998). Extending from this line of research, I propose that loss of social status threatens the social-self and therefore acts as a powerful stressor, which then influences attentional processes involved in perception of social threat.

To sum up, this section attempted to provide supporting background evidence for the underlying rationale behind the current researchôs hypotheses by illustrating the effects of status on stress responses on a physiological level, the role of social threats, and the possible effects of differential experiences of aggression and hostility. To further justify the specific predictions in the current research with regards to the measures used, the next section will review recent evidence on how socio-cognitive tendencies are influenced by social status. Specifically, the next section will attempt to justify why low social-status might lead to heightened threat sensitivity from a social cognitive perspective.

1.4 Low social status and threat sensitivity.

Several lines of research suggest that being in the bottom position of the status hierarchy enhances individualsô threat reactivity (Sapolsky & Ray, 1989; Williams, 2007). Members of low-status groups are generally aware of the societyôs low regard for them and of the negative stereotypes associated with their group (Crocker, Major, & Steele, 1998; Heatherton, Kleck, Hebl, & Hull, 2000). Such awareness contributes to a self-fulfilling prophecy (Steele & Aronson, 1995). As a result, these individuals not only expect more hostile reactions from others, they also tend to experience increased anger and respond with increased antisocial behaviour relative to high-status counterparts (Page-Gould et al., 2008).

Similarly, correlational studies have found a relationship between objective measures of low SES (e.g., lower education and income), measures of cynicism toward others and physiological measures of increased threat sensitivity. For example, children from lower SES backgrounds reacted to both threatening and ambiguous written social scenarios with increased heart rate and blood pressure (Chen & Matthews, 2001). Furthermore, mothers from similar backgrounds also tended to experience more hostile emotions in response to hypothetical stories of their childôs anger (Martini, Root, & Jenkins, 2004). In addition to that, such heightened threat sensitivity also fosters behavioural responses such as chronic vigilance and cynicism in intent of others, which will only further increase conflict and stress in social relations (Chen & Matthews, 2003).

Cynical hostility, or cynical mistrust, is characterised by the tendency to view the world with negative attitudes, general suspiciousness, and to interpret othersô actions as reflecting selfish intent (Smith, 1992). Cynical hostility has been associated

with cardiovascular morbidity and mortality in healthy individuals (Barefoot, Larsen, von der Lieth, & Schroll, 1995). Notwithstanding the physiological impact hostility has on an individual such as stress-induced cardiovascular and health risk behaviours (Everson et al., 1997) hostile individuals also suffer from a variety of psychosocial adversities, such as low-level of social support and a high level of interpersonal conflicts (Kivimäki et al., 2003). Recently it has been suggested that hostility could simply be a manifestation of oneôs SES or play a role in the process in which SES influences cardiovascular risk (Pulkki, Kivimäki, Elovainio, Viikari, & Keltikangas-Järvinen, 2003). This proposition is supported by evidence in the literature, which show a significant correlation between low SES in childhood and adulthood, and high levels of cynical mistrust and hopelessness in adulthood (Harper et al., 2002).

Children and adults from low status backgrounds have disproportionately greater direct and/or indirect experiences of social rejection (e.g., prejudice and discrimination) compared to their high status counterparts. These repeated experiences contribute to the development of memory and mental representations that may fuel the expectation and tendency to interpret hostility in situations of benign or ambiguous intent. Furthermore, Ostrove (2003) found that women from lower and middle-class backgrounds reported feeling less belonging during their time spent at an elite college. In addition, the increased exposure to hostility may also lead to selective attention to threat cues, greater accessibility to threat-related constructs and as a result low-status individuals may be more likely to interpret ambiguous social cues as hostile compared to their high-status counterparts. Despite the significant role vigilance and cynicism plays in maintenance of this vicious cycle of threat hypersensitivity, research has rarely examined at which stage vigilance effects take place and the specificity of the cues which vulnerable targets are sensitive to.

In the context of the current research, a low-status individualôs exposure to provoked or unprovoked hostility and aggression could cause increased expectation of hostile intent and aggressive behaviours from others in ambiguous social scenarios. It has also been suggested that socio-cultural and relational factors such as social rejection (Coie & Dodge, 1988) and exposure to neighbourhood violence (Guerra, Huesmann, Tolan, Van Acker, & Eron, 1995) may contribute to the development of a hostile attribution bias and lead to selection attention to hostile cues (e.g., Crick & Dodge, 1994), increased accessibility of aggressive constructs (Burks, Laird, Dodge, Pettit, & Bates, 1999) and a disproportionate expectancy for hostility in social interactions (Coie, Dodge, & Kupersmidt, 1990).

In conclusion, there is abundant evidence showing that status positions influence social and emotional experiences. High-status individuals are perceived as more competent (Fiske, Cuddy, Glick, & Xu, 2002), enjoy greater social support and experience more pride and anger compared to low-status individuals (Tiedens, Ellworth, & Mesquita, 2000; Fiske et al., 2002). The former experience less instances of social discrimination and unprovoked aggression compared to the latter (Sachdev & Bourhis, 1991; Sapolsky, 2005). High-status humans and nonhumans tend to reassert their superiority and dominance over low-status conspecifics, often in aggressive ways, in order to maintain their position in the social hierarchy (Clark, Pataki, & Carver, 1996; Sapolsky, 2005). To deal with their increased challenge, low-status individuals pay closer attention to conspecifics and superiors, and develop more complex social representations about their surroundings than their high-status counterparts (Anderson, John, Keltner, & Kring, 2001; Fiske, 2010; Guinote, 2001; Lorenzi-Cioldi, 1993; Lorenzi-Cioldi, Eagly, & Stewart, 1995). In doing so, low-status individuals are in a better position to detect valuable social information and to take necessary actions to

protect themselves against further social threats. Moreover, a recent study by Kraus and colleague has shown that perceptions of oneôs low-status triggers greater sensitivity to the social context and the adoption of a more other-focused social orientation. It was reasoned that the relative unpredictability and challenges faced by low-status individuals in their social environments gives rise to these adaptive social-cognitive tendencies. That is, low-status individualsô life outcomes are more dependent upon external forces in their social context relative to high-status individuals (Kraus & Keltner, 2009). Due to this increased external context dependence, low-status individuals focus a disproportionate amount of attention to their social surroundings. In other words, being in a low-status position triggers the motivation to pay attention to others (Fiske, 1993; Kraus & Keltner, 2009), especially to superiors in order to reduce uncertainty about their future (Fiske, 2010). In spite of this evidence, the links between status and social perception remain poorly understood.

For the remainder of this section, I will further elaborate on how low social status influences an individualsô perception of their social environment. Specifically, I will discuss the stigma associated with low social status and how low social status leads to biased perception of hostile intent.

1.4.1 Low social status and stigma

Stigma is defined as a social identity that is devalued in a particular context (Crocker, Major, & Steele, 1998). The social identity threat literature provides a comprehensive background on the causes and consequences of experiencing threat of devaluation of oneôs identity in a particular context (Steele, Spencer, & Aronson, 2002). Steele and colleagues argue that perceiving such a cue triggers a working hypothesis in the individualôs mind ï *a theory of context* ï that is aimed at verifying the

potential devaluation of the individualôs social identity. More specifically, this theory of context prompts cognitive processes such as vigilance that may undermine performance on tasks that are relevant in the context (e.g., Inzlicht & Ben-Zeev, 2000; 2003).

Members of stigmatised groups are generally more preoccupied about how they are being evaluated by interaction partners from high-status groups (Vorauer, 2006). They develop expectations of prejudiced treatment (Pinel, 1999; Vorauer, Main, & OôConnell, 1998) and as a result, they tend to avoid across group interactions (Shelton & Richeson, 2006; Stephan & Stephan, 1985). Furthermore, when interactions across group boundaries do occur, stigmatised individualsô expectation of prejudiced treatment leads to self-fulfilling prophecies that may lead stigmatised individuals to perceive signs of prejudice from their interaction partnersô ambiguous social cues (e.g., facial expressions). Subsequently, this negatively affects how stigmatised individuals behave towards members of the out-group (Pinel, 2002).

Indeed, studies investigating the effects of social stigmatization found that individuals who anticipate being a target of prejudice are more vigilant for cues that their social identity is under threat (Kaiser, Vick & Major, 2006). That is, individuals with chronic or situationally induced concerns about prejudice preconsciously screen their environment for signs of identity devaluation. This finding suggests that stigmatized individuals are vulnerable to experiencing automatic social-identity threat, which can cause them to become attentionally vigilant toward cues that could potentially threaten their identity. This gives reason to propose that the hypervigilance to potentially threatening social cues may be a compensatory mechanism that low-status individuals employ in order to prevent further social devaluation.

Despite the relative lack of empirical evidence on how stigma moderates the effects of status on cognitive processes, there is a wealth of theoretical propositions that low social-status negatively influences social cognition. For example, the Stigma Compensation Theory (SCT; Henry, 2009) is a theoretical framework that has been put forward to understand how belonging to a low-status group influences oneôs core psychological processes. High social status groups are naturally more valued than those groups at the bottom of the hierarchy (Pratto, Sidanius, & Levin, 2006). How much a group is valued is reflected in how many financial and psychological resource are available to them. According to the SCT, people have an innate sense of relative value that society bestows upon different groups. Members of low-status groups may experience threats to their social worth either directly and/or indirectly from the way others in the society treat them. Importantly, this theory posits that oneôs sense of social worth is deeply ingrained such that simply knowing that one is member of a low-status group serves as a constant reminder that one is less valued by the society compared to members of high-status groups. This pervasive threat to oneôs social worth creates a psychological conflict between wanting to be valued by others, and at the same time being aware of the lack of it to members of high-status groups. As a result, low-status individuals develop compensation strategies that function to protect their sense of social worth against further threats. Indeed, Henry (2009) found that members of low-status groups respond to potential threats to social worth with increased vigilance and perceived threats to social worth with increased aggression. However, the motivation to be vigilant and aggressive is reduced when participants are allowed to reaffirm their sense of social worth. This evidence suggests that the vigilance and aggression observed functions as protective compensation strategies enabling quick identification of potential threats in order to prevent further losses to oneôs sense of social worth.

1.4.2 Hostile attribution bias

Hostile intent refers to the desire and determination to carry out some form of aggressive act toward another (Anderson & Bushman, 2002). However, before the actual malevolent act is carried out, intent can be inferred from available social cues and situational information. This form of inferences is susceptible to potential cognitive biases (Bruner, 1957). That is, if the available information is ambiguous, the perceiver may rely on existing knowledge structures, and heuristic processing mechanisms to judge intentionality (Crick & Dodge, 1994) and this may lead to a biased social perception. Hostile attribution bias (Nasby, Hayden, & DePaulo, 1980) refers to the tendency to attribute hostile intent to otherôs behaviour when their true intentions are ambiguous (Dodge, 1980).

This bias toward interpreting hostility from ambiguous social cues has been proposed to be partly due to distinct social information processing (SIP) mechanisms (Crick & Dodge, 1994). The original SIP model was built based on childrenôs adjustment and outlined six steps for processing social information (Dodge, Pettit, McClaskey, & Brown, 1986). These include: (1) initial encoding, (2) representing and interpreting, (3) specifying goals, (4) generating potential responses, (5) selecting a response, and (6) enacting the response. According to this model, the hostile attribution bias could be due to biased processing at one or more points through this series of steps. A more recent revision of the SIP model states the abovementioned series of six steps does not occur in a strictly unidirectional way in which the only source of input is from the encoding stage. Instead, there is a bidirectional processing occurring simultaneously between each of these steps with previous experience, knowledge, and memory structures (Dodge & Pettit, 2003). Indeed, knowledge and memory structures play a large role in determining how people attend to, interpret and respond to social

behaviour (Murphy & Medin, 1985). An important implication of this is that these mental representations stored in the long-term memory are mutually shaped by the mechanisms in SIP (see Dodge & Pettit, 2003).

Put together, this suggests that low-status individuals may be prone to this social information processing bias in which they have a tendency to exaggerate the hostile intent based on social cues and situational information. This is because presumably low-status individuals have a greater proportion of previous experiences of being targets of aggressive acts. These mental representations and memory structures subsequently shape how the individual attends to, interprets, and responds in social situations.

In this section, I have outlined several possible routes, which could account for the proposed relationship between low social status and threat sensitivity. In particular, I have emphasised how prior experiences of being the target of aggression and the awareness of the stigma associated with low social status could lead to biased social information processing and a hostile attribution bias with regards to the intent of others. The evidence that I have discussed so far has primarily involved some physical form of hostility. However, the current research examines subjective sense of status, which pertains to a psychological experience involving the social self. Therefore, in the next subsection, I will explain how low social status exposes an individual not only to physical threat in the form of unprovoked aggression, but also psychological threat in the form of threats to oneôs social self in the context of social interactions. I will also highlight how the motivation to protect the social self triggers similar processes as the motivation to protect the physical self. On the basis of the shared common theme of threat to the social self, I will draw parallels from relevant literature, namely rejection

sensitivity and self-esteem in outlining how loss of social status may affect processing of social threat.

1.5 Social interactions: Opportunities and threats

Relative to other animals, much of our interaction with the environment involves social interactions (Neuberg, Kenrick, & Schaller, 2010). The myriad social problems that exerted selection pressures in our ancestral human population can be broken down into two main domains. The first domain pertains to social opportunities, which has a positive impact on inclusive fitness if successfully obtained. The second domain pertains to social risks, which has a negative impact on inclusive fitness if unsuccessfully avoided (Schaller, Park, & Kenrick, 2007).

Social interactions bring about the possibility for interpersonal relations and social support. Meaningful relationships optimise onesô inclusive fitness (Dunbar, 2003). However, social interactions also entail that an individual is exposed to potential threats to health and well-being (e.g., Kurzban and Leary 2001; Neuberg and Cottrell, 2006; Schaller, Park, & Faulkner, 2003). These potential threats range from anotherôs intention to harm, cheat, or other forms of social contract violation such as failing to reciprocate a resource-consuming prosocial act (Cosmides & Tooby, 1992). Negotiating between attaining social opportunities and avoiding social risk is likely to have exerted a significant natural selection pressures on the evolution of human social cognition (Schaller et al., 2007). Cognitive adaptations within the social self that might have arisen as a result of evolutionary pressures mostly pertain to specific attentional hypersensitivities or information-processing biases (Schaller et al., 2007).

Recent functionalist accounts of interpersonal relationships states that in order to establish and maintain relationships, people must also manage the risk of possible rejection and the pain associated with it (Downey, Mougios, Ayduk, London, & Shonda, 2004; Murray, Homes, & Collins, 2006; Pickett, Gardner, & Knowles, 2004).

In addition, these models also state that in the case of managing threats to relationship formation and maintenance, a bias toward underestimating threat is potentially adaptive (McKay & Dennett, 2009). In other words, interpreting cues from others in a way that downplays social threats and giving others the benefit of the doubt is particularly useful at the early stages of relationships (Fletcher & Kerr, 2010).

However, past evidence has consistently shown that there are individual differences associated with the negotiation between the goal to form relationships and the goal to prevent rejections. Specifically, these individual differences typically arise from threats to the social self. Unlike the physical self, the social self reflects oneôs internal sense of social value, esteem and status. Importantly, it is largely based upon othersô perceptions of oneôs worth (de Waal, 1989; Gilbert, 1997). Not surprisingly then, individuals that have the highest social standing and respect from others are those who possess qualities that are valued by the group. On the other hand, those who lack in the desired attributes by the group are often rejection by group members and are at the lower status position on the social hierarchy. These dynamic social assessments feed into the development of the social self (Dickerson & Kemeny, 2004).

Humans are motivated to be vigilant to threats that may jeopardize their social status as they have the core need to preserve the social self (Dickerson & Kemeny, 2004). This motivation has been described in various other theories such as the need for social status, positive self-presentation, and positive self-regard (Allport, 1937; Baumeister & Leary, 1995; Bowlby, 1969; Leary & Kowalski, 1990; Maslow, 1987; McClelland, 1984; Taylor & Brown, 1988). Additionally, this motivation has also been demonstrated in other nonhuman primates such that they show an adaptive psychobiological response to threats to social status in hierarchies (Sapolsky, 1993).

Kemeny and colleagues (Dickerson, Gruenewald, & Kemeny, 2004; Kemeny, Gruenewald, & Dickerson, 2004) proposed that the motive to maintain and preserve the social self activates a similar biological process as the motive to preserve the physical self. This system coined as the social self-preservation system monitors the social environment for threats to oneôs social status. When threat is detected, the system coordinates psychological, physiological, and behavioural responses necessary to cope with such threats. Possible responses to these threats include an increase in negative self-evaluations. The intensity of these responses depends on several factors such as the severity of the threat, the context in which it appears in, and the vulnerability and social coping resources an individual has in that particular social situation (Dickerson & Kemeny, 2004). In particular, social coping resources such as high self-esteem, certainty about oneôs state of belonging (i.e., low rejection sensitivity), and of interest high subjective sense of status.

Individuals with low levels of global self-esteem have a biased tendency to interpret the behaviour and affect of others as more rejecting compared to individuals with high global self-esteem. It is proposed that this is because low self-esteem individuals have higher expectations of interpersonal rejection (Murray, Rose, Bellavia, Holmes, & Kusche, 2002). Furthermore, the development of low self-esteem has been theorised to be a result of repeated experiences of social rejection and criticism. These experiences condition an individual to be particularly sensitive to negative social evaluations (Baccus, Baldwin, & Packer, 2004; Dandeneau & Baldwin, 2004; Gilbert, 1992; Leary, Tambor, Terdal, & Downs, 1995). Indeed, under similar circumstances, high self-esteem individuals interpret the behaviour of strangers they have just met as more accepting than low self-esteem individuals (Cameron, Stinson, Gaetz, & Balchen, 2010). In addition, systematic biases in the perception and interpretation of social

events have also been shown between individuals with high and low rejection sensitivity. Rejection sensitivity is defined as the disposition to anxiously expect, readily perceive, and strongly react to social rejection (Downey & Feldman, 1996; London, Downey, Bonica, & Paltin, 2007). Crucially, these differences only occur with negative social events, but not with positive social events. This suggests that self-esteem regulation and rejection sensitivity systems may be social threat focused.

Situations that require the display of valued attributes in the presence of others can threaten the social self as the inability to demonstrate these skills could potentially lead to a loss of social status and social rejection. These threatening social-evaluation conditions may have a direct effect on other social goals. For example, the desire to maintain and improve oneôs social status may overlap with oneôs need for interpersonal belonging. That is, being in a low-status position would imply that an individual is not well-respected and this may decrease the likelihood of others wanting to form close personal relationships with them (Dickerson & Kemeny, 2004).

Importantly, these social-evaluation conditions can significantly impact the way we see ourselves because self-evaluations are often based on how we are viewed by others (e.g., Baumeister, 1998; Cooley, 1902/1983; Hardin & Higgins, 1996; Mead, 1934). The mere presence of others and/or evaluations by them can lead to social comparisons (e.g., Swallow & Kuiper, 1988; Taylor, Neter, & Wayment, 1995) or self-awareness (Carver & Scheier, 1981; Pyszczynski & Greenberg, 1987) which perpetuates negative self-evaluative processes such as negative self-related emotions (e.g., shame, embarrassment) (Gilbert, 1997). The resulting negative self-related states may mediate the effects of loss of status on social cognitive processes. Taken together, the current research proposes that the systematic bias to perceive social-threat cues

associated with high rejection sensitivity and low self-esteem extends to individual differences in the domain of subjective sense of status.

1.5.1 Social threat detection system

Building from the traditional notion of fight-or-flight tendencies, theorists have recently proposed that mammals evolved a threat detection system that is not only sensitive to physical threats, but also social threats. For example, social rejection (MacDonald & Leary, 2005), stigmatisation (Mendes, Major, McCoy, & Blascovich, 2008), and perceived subordinate rank within social hierarchies (Chow et al., 2008). This system enables the organism to respond adaptively to social threats by triggering several processes such as threat vigilance in ambiguous situations (Pickett & Gardner, 2005). The present research extends previous work by examining the possibility that low subjective sense of status represents a form of social identity threat. Therefore, just as being socially rejected or stigmatised, loss of status should lead to vigilance towards potential sources of threat in the social environment. Specifically, the current research proposes that situationally activated concerns about perceived low-status might trigger social cognitive biases for potential sources of social threat. This process may serve as a learned and adaptive strategy to navigate a more challenging and unstable social environment.

Consistent with this, Dickerson and Kemeny (2004) argue the human social self analogue to social status threats in animals is threats to social esteem, respect, and acceptance. In other words, it is possible that low self-esteem, high rejection sensitivity and low sense of status share the common ground of being a fundamental source of social threat.

The bulk of research inspired by this framework has looked at more concrete environmental cues, such as numerical representation; there has been little empirical research on the effects of relatively more abstract social environmental cues, such as the amount of respect one receives from their community. More specifically, unlike social identities defined by race and gender, onesô subjective perception of status is a largely invisible characteristic (Johnson, Richeson, & Finkel, 2011). Therefore it is not immediately obvious whether individuals will experience the same form of stigma and identity threat that is brought about by their relatively lower perception of status. That is, whether lower subjective sense of status serves as a potential source of social identity threat and if it does, does it trigger similar selective cognitive processes as a result of the activation of the threat detection system?

Emerging evidence shows that attention and behavioural responses during social interactions differ depending on oneôs current motivational state. The fundamental motives framework states that motivational systems have evolved according to natural selection to produce behaviours that enhances reproductive fitness (Kenrick, Neuberg, Griskevicius, Becker & Schaller, 2010). In order to maximise reproductive success; human beings need to achieve multiple secondary goals such as affiliation, self-protection and status. Crucially, successful attainment of each goal demands functionally different cognitive and behavioural responses (Kenrick et al., 2010). Furthermore, Kashack and Maner (2009) proposed that challenges associated with group living may trigger behaviour and motives such as fear of social exclusion and effective monitoring of onesô status in the group (Sedikides & Skowronski, 2009). Importantly, group challenges could have led to the evolution of a cognitive and nervous system that regulates social behaviour based on an organismôs position within its hierarchy (Schultheiss, Wirth, Torges, Pang, Villacorta & Welsh, 2005).

Kenrick, Maner, and Li (2005) suggested that the processing of social stimuli is selective such that it is often in service to the particular social motive activated. This perspective allows for the predictions of which specific type of social target might be preferentially encoded when particular motives are activated (Kenrick et al., 2005). These motives range from those in the domains of self-protection, seeking and maintaining romantic relationships, coalition building and striving for status (Bugental, 2000). From an evolutionary perspective, goals that are most closely linked to adaptive outcomes in social groups are those that are likely to have the most impact on the perception of other people (Bugental, 2000; Kenrick, Li, & Butner, 2003). Most empirical research inspired by this reasoning focused on hypotheses pertaining to conscious and deliberate higher order social-cognitive processes, for example logical reasoning, overt judgement, and behavioural decision making (Kenrick, Neuberg, Zierj, & Krones, 1994). Much less is known about how fundamental motivational states can influence lower order processing of social information. For instance, selective attention and preferential encoding of social information that is likely to contribute to the observed overt cognition and action. In addition, while it is generally agreed that social cognition is adaptively tuned, most research inspired by these theories lacks direct investigation of basic social perception.

Accurate identification and discrimination between individuals who are functional or detrimental requires allocation of attention to social features that may provide information diagnostic of either social opportunities or social threat. Social attention is defined as an essential ability for achieving emphatic contact with others and to discover potentially relevant information in the environment (Shepherd, 2010). Given that attention is a finite resource, a compromise is unavoidable such that some features in the social environment must be prioritised at the expense of others. The

ability to selectively allocate attentional resources to cues most relevant for enhancing oneôs survival and reproductive success is highly adaptive.

This pattern of selectively acquiring information most relevant to survival and reproduction has been found in abundance in the animal literature (Dukas, 2002). Similar findings have been obtained in the human cognition literature, specifically within research that focuses on visual attention. Visual attention requires the selection of events in the environment to be processed at a higher cognitive level (Alvarez & Cavanagh, 2004). Not surprisingly then, the question of which stimuli receive prioritised processing (attention) at the expense of other stimuli remains one of the central problems of our finite cognitive system. This process has been coined *selective attention*. It should be noted that attention comprises three separate processes: disengaging attention from initial target, shifting attention to a new target, and finally reengaging attention (Posner, Walker, Feldrich, & Rafal, 1984). A more detailed account of the separate processes involved in attention will be outlined in Study 6 in Chapter 3.

In the next section, I will discuss top-down influences on selective attention. I will attempt to illustrate how the visual input from the same social stimulus may be perceived in distinctly different ways due to differences in expectations, attitudes, motives, emotional states, and/or prior experiences of the perceiver. Specifically, I will highlight how status differentially influences top-down control of selective attention towards overt and subtle forms of social threat in facial expressions.

1.6 Face perception and selective attention

The most basic behavioural response to social stimuli requires two cognitive steps. First, one must attend to a wide range of social stimuli in order to identify the implications an interaction with different individuals may have. Second, once these social cues have been differentiated, one must select the most appropriate means for a functionally effective and beneficial behavioural response (Schaller et al., 2007). While perception is frequently associated with the first step in social cognitive processes, attention is required before perception can take place. The most basic metaphor often used to conceptualise attention is that it functions like a ñspotlightò (e.g., Derryberry & Tucker, 1994). It follows that this spotlight of attention can illuminate only a limited amount of information at any given time, thereby allowing further processing of those stimuli. In other words, not all stimuli present in the visual field are perceived. Instead, attention is directed to some stimuli, resulting in a greater likelihood of these stimuli reaching the threshold of awareness (Posner, 1994) while the unattended stimuli are processed only very minimally or not at all. This model of attention adheres to the traditional notion of a processing bottleneck in our cognitive capabilities (Broadbent, 1958). In other words, the first step relates to basic selective attentional processes and the second step relates to higher-order cognitive processes.

It is widely established that selective attention can be driven by two distinct mechanisms: bottom-up and top-down control. Bottom-up mechanisms are thought to rely on raw sensory input and relate to salient features of stimuli that automatically capture attention. For example, stimuli that appear unexpectedly (Yantis & Johnson, 1990), and stimuli that give the illusion that they are either moving (Theeuwes, 1995), or approaching the perceiver (Franconeri & Simons, 2003). However, it has also been

suggested that the ability of these salient features of a stimulus in capturing attention is moderated by the state of the perceiver in a relatively top-down manner (Bodenhausen & Hugenberg, 2009). Top-down mechanisms refer to longer-term cognitive strategies (Connor, Egeth, & Steven, 2004). Most relevant to the current research, expectancies, goals and prior experiences have been shown to be a powerful top-down factor determining how attention is oriented and focuses.

Following selective attention towards a particular stimulus, the next step in social perception is to extract meaning from the attended stimuli. This process typically involves both bottom-up and top-down factors such that low-level features of the stimuli enable the perceiver to construct a more meaningful representation of the visual world. However, the ecological perspective stresses the importance of the perceiverôs prior experience in recognising and appreciating the implications of the structure (low-level features) of the attended stimuli (McArthur & Baron, 1983). This proposition is in line with the classic account in social perception that the different perceptions of the social world are a result of the top-down aspects such as different expectancies, attitudes, motives, emotional states, and/or prior experiences of the perceiver (Kelley, 1950).

The majority of research on the impact of expectancies on perception looks at the influence of an actorôs social category membership on perceptions of his/her behavior. In particular, cues that inform social identities such as race, sex and age are rapidly extracted. This information directly serves to establish expectations that will influence the perception of the targetôs subsequent behavior. For example, African American targets are often perceived as more threatening or aggressive compared to European American targets (Duncan, 1976; Sagar & Schofield, 1988). Recent neuropsychological research provided evidence for the role of expectation to explain

the effect of social categorization on early attentional processes. Ito and Urland (2003) used event-related potentials to investigate how White participants responded to Black and White targets. They found that Black targets compared to White targets elicited stronger attention in the White participantsô early waveform components (N100, P200). Importantly, White participants tended to shift their attention towards members of their racial in-group and away from Black targets later in the attentional stream. The authors reasoned that because of the racial stereotype about Black men and violence, they elicited stronger early attentional vigilance than other social categories. However, insofar as the stimuli in the task does not demand sustained vigilance, attention shifts back to in-group targets who are presumably evaluated in a more positive light.

Having said that, while Hugenberg and Bodenhausen (2003) showed that hostility was more likely to be attributed to African American, compared to European American faces by European American participants; this effect was moderated by participantsô implicit (automatic) racial prejudice. That is, participants who showed little evidence of implicit prejudice did not differentially perceive the target faces as a function of their race. Put together, these studies suggest the bidirectional relationship between the perceiversô expectancies and their attitudes in constraining the top-down aspects of extracting meaning from a given stimulus input.

Emerging evidence have emphasised the role of the perceiverôs emotional and motivational states on attention and perception. The classic demonstration of this phenomenon was shown using a simple perception of coin size task. The size of coins that were of greater value was consistently overestimated. Interestingly, the perceiverôs SES moderated this tendency such that perceivers from low SES backgrounds showed a greater óvalue biasô compared to their high SES counterparts (Bruner & Goodman, 1947). In addition, Postman and Bruner (1948) found that perceivers experiencing

emotional distress tended to avoid processing unpleasant stimuli by increasing their perceptual defences (awareness thresholds). In a similar vein, Sacco and Hugenberg (2008) tested the idea that motivational states can also enhance perceptual acuity of the visual system. In this study, participantsô were manipulated to be either in a cooperative, competitive or control mindset. The interpretation of morphed angry to happy expressions varied as function of these motivational states such that competitively motivated participants interpreted the ambiguous expressions as more angry than the cooperatively motivated participants. In another task, both cooperatively and competitively motivated participants had an enhanced ability in discriminating between Duchenne (genuine) and non-Duchenne smiles. These findings converge in suggesting that perceivers make inferences about current priorities based on motivational and emotional states. Attentional processes are typically tuned towards these priorities (Bodenhausen & Hugenberg, 2003). In addition, motives can also enhance the perceptual processing and acuity of motivationally relevant stimuli.

In relation to that, it has also been suggested that expectations and current goals interact with bottom up factors such as visual salience to form a ósalience mapô which controls where, how and what is attended (Compton, 2003; Corbetta & Shulman, 2002; Feinstein, Goldin, Stein, Brown, & Paulus, 2002). Of particular interest, Corbetta and Shulman (2002) suggested that the individual differences in selective attention may be attributed to some form of contingency that is established in the brain by learning, development or genetics.

Compton (2003) put forward another theory as to how the brain evaluates which incoming stimuli to devote cognitive resources to. Accordingly, the primary way to determine the importance and hence prioritised processing is to evaluate the emotional significance of a particular stimulus. She further argues that this enhanced processing

of emotionally significant stimuli occurs via two attentional mechanisms, namely the aforementioned bottom-up and top-down mechanisms. Bottom-up- mechanisms are responsible for the automatic orienting of attention, while expectations mediate ótop-downô pathways to produce motivated and effort shifts in attention (Bledowski, Prulovic, Goebel, Zanella, & Linden, 2004; Compton, 2003; Corbetta & Shulman, 2002; Hopf & Mangun, 2000; Nobre, 2001). Importantly, the top-down mechanism gives these significant stimuli priority in the competition for attentional resources. For example, compared to visual stimuli such as mushrooms and flowers, people are quicker at detecting the presence of snakes and spiders (Öhman, Flykt, & Esteves, 2001). The authors proposed that evolutionarily relevant threatening stimuli in the natural environment are especially effective in capturing attention.

While selective attention allows an individual to process relevant information and ignore less relevant information, it is insufficient for ensuring and enhancing onesô survival fitness. Having gathered fitness-relevant information about onesô surrounding social world, one needs higher-order cognitive processes that provides effective means of enabling adaptive behavioural responses. Past research has shown that many different types of motives can influence social cognition (e.g., Kruglanski, 1989; Kunda, 1990). Indeed, the temporary activation of goal-relevant motives can shape the way people attend to, encode, and interpret information about others. For example, Neuberg and Fiske (1987) proposed that people are motivated to form accurate impressions of targets deemed as important for accomplishing personal goals. To that end, these targets will prompt more in-depth processing, which includes increased attention to individuating information. Moreover, it has also been proposed that selective attention to threat may not always be adaptive. The anticipation of potential threats has been consistently theorised to account for the physiological findings in

anxiety (MacLeod et al., 1986; Mogg, & Bradley, 1998). That is, the vigilance to threat demonstrated by individuals high in anxiety is driven by top-down expectations to perceive threats in their surrounds. Vigilance, in this context, is referred to as a readiness to evaluate potential threats in the environment (Oathes, Squillante, Ray, & Nitschke, 2010).

Selective attention to social-evaluative threats has been proposed to act as a filter on processing of incoming information such that an individual sees their social environment as hostile and unsupportive. This perception feeds back into the vicious cycle of further undermining the social self (Dandeneau & Baldwin, 2004; Williams, Mathews, & MacLeod, 1996). For example, Dandeneau and Baldwin (2004) found that low self-esteem individuals showed attentional vigilance for rejection-related words compared to acceptance-related words in a reaction time task. This pattern of hypervigilance or attentional bias for social evaluative threats relevant to oneôs current concerns has also been found in clinical disorders such as social anxiety, social phobias, and generalised anxiety disorder (Williams et al., 1996).

Previous research suggests that top-down mechanisms in the frontal and parietal lobes are important for assessing the motivationally relevant cues in the environment, and subsequently, to direct attention to those relevant stimuli (Corbetta & Shulaman, 2002; Hopf & Mangun, 2000; Thomsen, Specht, Ersland, & Hugdahl, 2005). Posner and Petersen (1990) suggested that the frontal-parietal network regulates selective attention processes by maintaining alert states and actively search for motivationally relevant cues in the visual environment. Top-down processes, as mediated by activity in the frontal-parietal region, plays a crucial role in controlling whether attention is directed toward or away from a particular visual cue (Hillyard & Anllo-Vento, 1998). Using an attention paradigm, Small et al. (2005) found that activity in the medial

orbitofrontal cortex was positively correlated with the responses to targets associated with gaining money. On the other hand, activity in the dorsal region of the cingulate cortex and insula increased when responding to targets associated with losing (Small et al., 2005). Put together, this suggests that top-down attentional processes influences attentional focus and orientation to facial cues that are in line with the current goals and motivations of the observer (Theeuwes, Atchlet, & Kramer, 2000).

Furthermore, Bugental (2000) suggested that the basic approach/avoidance system is especially sensitive towards the evaluation of potential benefits and dangers of interaction with different people and for the specific functions of these different relationships. Given that interactions with others can either offer social opportunities or pose social threats, it is plausible that low-status individuals tend to be more preoccupied with social evaluative information during interactions with others (Vorauer, 2006). Faces, in particular provide a rich source of social evaluative information. In light of the current researchôs aims, in the next subsection, I will focus specifically on how status exerts differential top-down influences on the perception facial expressions indicative of social threat.

1.6.1 Top-down influences on perception of facial expressions of threat

Facial expressions of others are effective diagnostic cues in identifying someoneôs emotions and intentions (Zebrowitz, 1997). They provide a vast amount of information regarding their intent ï whether they intend to harm us, avoid us, or befriend us. The current research proposes that oneôs perceived status may exert top-down influences on attentional vigilance such that some social cues are selected for further processing while others are ignored (Kastner & Ungerleider, 2001). Specifically, the current research posits that being in a low-status position triggers the

goal of self-protection and this motivates low-status individuals to selectively attend to threatening facial cues.

Cognition serves adaptive action (see also Fiske, 1992, 2010; Semin & Smith, 2002). Relevant stimuli in the environment are processed more extensively to establish potential response mobilization based on prior learning (Scherer, 2001). A selective resource allocation to relevant stimuli allows enhanced perceptual analysis of these stimuli and triggers necessary changes in the autonomic and motor systems that prepare the organism for adaptive behavioural responses (Sander, Grandjean, & Scherer, 2005). In particular, threat-related expressions demand a need for rapid in-depth processing for response preparation (Brosch, Sander, Pourtois, & Scherer, 2008) intended to rectify anger-inspiring situations (Ratcliff et al., 2012).

There is abundant evidence on the special status of human faces in capturing attention, especially facial features such as the eyes, eyebrows and mouth that are necessary for the identification of facial emotion (Lunqvist and Öhman 2005; Ristic, Friesen, & Kingstone, 2002). Accordingly, people are adept at inferring otherso emotional states based on their specific facial expression (Ekman, 1972). Burgeoning evidence suggest that top-down influences may bias the way other peopleos emotion are processed.

To briefly reiterate the rationale outlined in the earlier sections in this chapter, being in a low-status position is highly stressful as it represents a significant form of threat to the social self. It threatens the core need to have a positive sense of self-worth and it also creates high levels of uncertainty over oneos life outcomes. In addition, low-status individuals are frequently exposed to both physical and psychological forms of social hostility and aggression. Taking into account these factors, I have reasoned that several social-cognitive processes may be implicated such as the biased processing of

social information, and the hostile attribution bias. Furthermore, I compared low-status individuals to individuals high in rejection sensitivity and low in self-esteem because of their shared nature of threat to the social self. Therefore, the current research focuses on how status influences processing of facial expressions indicative of social threat. Specifically, it looks at the emotional expression of anger, which is a signal of direct social threat, and non-Duchenne smiles, which is a subtle signal of social threat in the form of untrustworthiness.

In the next subsection, I will give a general overview of the nature and functions of emotional facial expression, in particular angry expressions and non-Duchenne smiles. Then I will conclude this section by describing several potential moderators that has been proposed in past research to account for individual differences in the processing of threat-related cues from faces.

1.6.2 Emotional expression of anger

Emotional expressions affect perceptions of social position. People believe individuals with angry facial expression occupy more powerful social positions than do individuals with sad facial expressions (Keating, 1985b). In other words, people seem to believe that emotional expressions are diagnostic of the social position of the expresser. Furthermore, the status boundary enforcement framework (Thomsen, Green, & Sidanius, 2008) posits that more attention is directed towards angry high-status individuals because they have relatively greater ability to act on their anger.

Emotional facial expressions also play a crucial role in the formation and maintenance of social relationships (Parkinson, 2005), acting as a dynamic social cue to communicate and signal the expressers thoughts and intentions. Ekman (1972) proposed six universal facial expressions: anger, disgust, fear, happiness, sadness and

surprise. Of all these expressions, anger is a particularly important emotion (Ratcliff, Bernstein, Cundiff, & Vescio, 2012) as the inability to detect anger signals may lead to negative consequences. Two distinctive features typically signal angry facial expressions: down-turned mouth and frowning (ñv-shapedò) eyebrows (Fox et al., 2000). Anger is associated with the behavioural-approach system (Harmon-Jones & Sigelman, 2001), which is the motivational system responsible for regulating appetitive, incentive motivation, and approach behaviour (Gray, 1982; 1987). Importantly, anger signals that the expresser is a direct impending threat to the perceiver (Adolphs, Russell, & Tranel, 1999) and therefore it is an important social cue for predicting actions and behaviours of others that are likely to be threatening (Adams, Ambady, Macrae, & Kleck, 2006). Displays of anger are also similar to the facial display shown by dominant primates when they assert their positions in social hierarchies (Hinde, 1975).

This notion is supported by the well-established evidence that humans tend to preferentially attend to angry faces (Hansen & Hansen, 1988). Furthermore, it has also been suggested that expressions of anger automatically engage selective attentional processes (Fox, Russo, & Dutton, 2002) and initiate rapid avoidance behaviour (Marsh, Ambady, & Kleck, 2005). However, despite this automaticity, emerging evidence suggests that processing of emotional expressions is sensitive to top-down influences, in particular, contextual and motivational factors (Barrett, Mesquite, & Gendron, 2011). For example, angry expressions were recognised more quickly when individuals were experiencing high feelings of threat (Coles, Heimberg, & Schofield, 2008), or when the angry expressions were presented alongside threatening nonverbal cues such as aggressive body postures (e.g., Adams & Kleck, 2005; Aviezer et al., 2008).

As previously stated, the current research is interested in how status influences the perception of facial expressions indicative of overt and subtle forms of threat. The next subsection will give a brief overview of trustworthiness. I will highlight how perceived untrustworthiness from another individualsô facial expression may imply an increased likelihood of a social interaction that may be threatening (Winston, Strange, O'Doherty, & Dolan, 2002). In Chapter 5, non-Duchenne smiles were used as the facial stimuli indicative of subtle forms of social threat. The distinction between Duchenne and non-Duchenne smiles will be reviewed in the next section.

1.6.3 Untrustworthy facial expressions: Non-Duchenne smiles

Upon encountering someone for the first time, one needs to make an immediate decision whether to trust that unfamiliar person or not. Perceived trustworthiness determines ones approach/avoidance behaviour. Therefore the ability to make accurate trustworthiness judgements is one of the most important decisions for social interaction.

Smiling has been shown to be highly correlated with trustworthiness such that the more a person smiles, the more trustworthy they are perceived to be. Although smiling is a powerful cue of affiliation intent, it is also one of the easiest expressions to fake (Ekman & Friesen, 1982; Ekman, Friesen, & OôSullivan, 1988). People may fake smiling in order to gain access to resources that would otherwise be denied (Krumhuber et al., 2007). Accordingly, Ekman and Friesen (1982) suggested that there are two variants of human smiles: Duchenne (genuine) smiles, and non-Duchenne (fake) smiles. These two types of smiles can be distinguished on the basis of behavioural markers such as morphology, intensity, timing, location and laterality. In particular, Duchenne smiles can be differentiated from non-Duchenne smiles based on the presence of the crowôs feet wrinkles in the eye region which arises from the automatic

activation of the orbicularis oculi (Ekman, 1989; Ekman & Friesen, 1982). Crucially, a Duchenne smile is typically indicative of honest intent of cooperation and affiliation (Brown & Moore, 2002). On the other hand, a non-Duchenne smile may be an attempt to conceal underlying negative emotions (Ekman et al., 1988). Put simply, Duchenne smiles reflect trustworthy intent, whereas non-Duchenne smiles reflect untrustworthy and potentially threatening intent.

Lundqvist, Flykt, and Öhman (1998) demonstrated that trustworthiness judgements are highly correlated with other traits. Using a set of standardised faces, they found that judgements of trustworthiness correlated .83 with judgements of emotional stability, .75 with judgements of attractiveness, -.76 with judgements of aggressiveness, and .63 with judgements of intelligence. Hence, it appears that in situations lacking context, trustworthiness judgements from faces reflect overall inferences about the positivity/negativity of the face. In other words, when clear emotional cues demonstrating the intentions of the other person are absent, judgements of trustworthiness are crucial to an approach/avoidance decision.

Having said that, it is not surprising that these judgments are made faster than a variety of other personality judgements. To obtain the minimal time exposure to a face required for people to form a person impression, Willis and Todorov (2006) studied five trait judgments from emotionally neutral faces: likeability, trustworthiness, competence, aggressiveness, and attractiveness. Participants were asked to make one of these five judgements when faces were presented for 100, 500, or 1000ms. For all five judgements, judgements made after 100ms exposure to faces closely agreed with control judgments made in the absence of time constraints. More importantly, this agreement did not improve with additional time exposure. This indicates that 100ms exposure is sufficient for people to form a reliable person impression and that people

are particularly efficient at making trustworthiness judgments from faces. In sum, trustworthiness is an excellent approximation of the general valence evaluation of faces (Oosterhof & Todorov, 2008) and hence serves the function of preparing oneôs behaviour in relation to the other person (Todorov, Said, Engell, & Oosterhof, 2008).

It should be noted that in the current research, Duchenne and non-Duchenne smiles were used as stimuli instead of faces that varied on trustworthiness for two reasons. Firstly, I was interested in dynamic facial expressions (i.e., facial expressions that changes from one state to another) as they are more indicative of natural social interactions. As will be explained in more depth in Chapter 4, the stimuli used in Studies 8 and 9 involved an initially neutral target face shifting to a smiling expression and back to neutral expression. Importantly, the targets displayed either Duchenne or non-Duchenne smiles. Given that trustworthiness is a personality trait, it was not possible to construct dynamic stimuli in which a targetôs trustworthiness or untrustworthiness gradually became apparent.

Secondly, I also wanted to eliminate the possibility of a ceiling effect with presenting participants with a stereotypical trustworthy and untrustworthy face. The stimuli used in Studies 8 and 9 were all of smiling expressions that do not appear to differ objectively, and therefore it provides a stronger test for the hypothesis that low-status heightens the ability to detect subtle cues of untrustworthiness.

1.6.4 Individual differences in threat sensitivity

Past studies in research areas pertinent to the development of the rationale underlying the current research has indicated several potential variables that may indirectly account for the proposed enhanced threat sensitivity in low-status individuals. More specifically, numerous studies have indicated that differences in the

level of self-esteem, rejection sensitivity, mood/affective state, need to belong and generalised trust would influence how individuals process social-threat related information. I will briefly define each of the abovementioned moderating factors and elaborate on how these factors have been implicated in the processing of social threat in past studies.

Self-esteem can be defined as the general emotional evaluation of the self. It relates to the extent to which individuals are accepted and liked by themselves (Sedikides & Skwronski, 2003). Past studies have shown that difference in the level of self-esteem can affect how individuals respond to information related to evaluative threat information (Heatherton & Vohs, 2000). In particular, it has been reasoned that low self-esteem arises in part due to repeated experiences of social rejection and criticism. As a result, an individual may be vigilant to perceive the environment with an attentional bias for negative social evaluations (Baccus, Baldwin, & Parker, 2004). Using the dot probe task and ERP technology, Li and Yang (2013) found that emotional stimuli (both angry and happy faces) elicited greater mobilisation of attentional resources in individuals with low self-esteem. Thereby demonstrating that the attentional bias observed in low self-esteem individuals is not constrained to negative information, but emotional information more generally.

Rejection sensitivity is defined as the extent to which an individual anxiously expects, readily perceives, and overreacts to social rejection (Downey & Feldman, 1996). Individuals high in rejection sensitivity are more likely to interpret ambiguous stimuli as rejection. As a result, they overreact and consequently feel greater distress, compared to individuals low in rejection sensitivity (Downey & Feldman, 1996). Past research has shown that rejection sensitivity moderates social, cognitive, and behavioral responses to potentially socially threatening information. For example, individuals high

in rejection sensitivity interpret short video clips of othersô ambiguous emotional responses as expressing more interpersonal negativity, instead of positivity (Romero-Canyas, Downey, Franco, & Bolger, 2008).

The role of affective state/mood in influencing attention has been described in various mood-cognition frameworks. Of interest, selective attention processes have been put forward as a possible explanation of the downstream effects of mood states, such as mood-congruent processing in the domains of judgment (e.g., Schwarz & Clore, 1983), or memory (e.g., Bower, 1981), and decision-making (e.g., Petersm Vastfjall, Garling, & Slovic, 2006). Accordingly, such mood-congruent processing tendencies increase the accessibility of undesirable stimuli in negative mood states and the accessibility of desirable stimuli in positive mood states (Watson, 2000). While there is some evidence that positive mood states bias attention in favour of rewarding stimuli in the environment (e.g., Carver, 2001; Watson, Vaidya, & Tellegen, 1999), the majority of the evidence demonstrates that negative mood states biases attention to threatening information in selective attention paradigms (e.g., Mogg & Bradley, 1998; Williams, Watts, MacLeod, & Matthews, 1997).

The need to belong relates to the need for seeing oneself as socially connected with others (Baumeister & Leary, 1995). In particular, stigmatisation threatens this need and gives rise to belonging uncertainty. Individuals in this state may be especially sensitive to information indicative of the quality of their social connections (Walton & Cohen, 2007). Specifically, when individuals are uncertain about their state of belonging, they may develop a bias of being stereotyped and this may manifest as selective attention for concerns relevant to specific individuals.

Finally, generalised trust refers to the act of trusting a stranger or a casual acquaintance. That is, oneôs belief that the unfamiliar target has a benign intention in

social interactions (Yamagishi & Yamagishi, 1994). This form of trust is qualitatively different from trusting someone of which one is familiar with and have shared knowledge. Past research has shown that social class, a closely related construct to social status, is a robust predictor of generalised trust. Individuals from higher social class backgrounds are relatively more trusting than their counterparts from lower social class backgrounds (Putnam, 2000; Whiteley, 1999).

Taken together, self-esteem, rejection sensitivity, mood/affective state, need to belong and generalised trust could potentially moderate the effects of status on perception of social-threat related information. Therefore, the extent to which enhanced sensitivity to angry faces can be accounted for by these factors were examined in Studies 3, 4, and 5.

1.7 Summary and aims of the present research

The core purpose of the current research was therefore to further our understanding of how subjective sense of status influences social cognitive processes involved in perception of social threat cues and threatening facial expressions Specifically, the current research aimed to empirically test the causal relationship between loss of social status and social threat vigilance in social information processing and face perception.

The bulk of the existing research on social status and social cognition has been focused on theorising the link from an evolutionary perspective, and examining the structure and antecedents of the effects of status. In addition, effects of status are frequently looked at from the target groupôs perspective, instead of the individual perceiverôs perspective. The present research aimed to contribute to filling this gap by focusing on the social cognitive processes that may vary as a function of subjective perception of status.

The underlying assumption in the current research is that subjective sense of status predicts differential patterns of social perception. In building up the rationale to support that assumption, my review has so far described how status leads to physiological changes that are primarily driven by exposure and experiences of social stressors. I have also reviewed the stigma associated with being in a low-status position, in terms of how it increases occurrences of experiences with physical threats and how it exacerbates the negative consequences of social threats. Additionally, I have highlighted some of the evolutionary and cognitive theoretical propositions on how social status could influence social cognitive tendencies. Of central interest, I outlined the emerging evidence on the motivated basis of face perception and how status might

triggers functionally distinct motivations, which in turn influences basic social cognitive processes.

Guided by the findings from the rejection sensitivity and self-esteem literature, and by the theoretical frameworks of the stigma compensation theory, social preservation theory, and hostile attribution bias, I proposed that low status individualsô chronic exposure to social hostility and social challenges should trigger the motivation to be more vigilant towards sources of social threat in their environment.

Given the intricate nature of natural group relations, it is important to differentiate which specific aspects of between and within individualsô causes heightened threat vigilance. The current research examines the role of subjective sense of status in the domains of respect and prestige. A personôs subjective status differs from objective SES measures in that it reflects internal perceptions of their prestige in the social hierarchy compared to others. The current account of subjective sense of status also differed from the related constructs of social rank and social class. Social rank implies the ability to influence others, and social class takes into account both SES and subjective sense of status. The current research aimed to separate these intertwining concepts in social status by explicitly looking at subjective sense of status. Furthermore, the rationale behind the current research was built based upon the notion that loss of status represents a significant form of threat to the social self. Therefore, the definition of social status was confined within the domains of social prestige and respect.

The current research investigated how the subjective sense of social status shapes various processes along the social information-processing stream including attentional processes and social evaluative judgements above and beyond objective SES measures. In particular, I aimed to disentangle and identify the unique contributions of

social status in the domains of respect and prestige in the documented phenomenon of increased threat reactivity in low-status individuals in past studies. To that end, I focused mainly on attentional processes towards social-threat related information and facial expressions indicative of threat. I hypothesised that loss of status in the domains of respect and prestige selectively heightens vigilance and processing motivation of social threat, and not for general threat or negative valence social stimuli.

Furthermore, the existing evidence on the behavioural correlates of low social status seems to diverge. On the one hand, low-status individuals are more submissive than their dominant counterpart. On the other hand, it is frequently reported that individuals from low SES backgrounds have a greater tendency to respond to social threats with increased aggression. Insofar as attentional and social perception processes predicts later-stage behaviour, the current research attempted to disentangle these conflicting behavioural effects by looking at the consequences of loss of social status on an attentional and early processing stage. In relation to that, this research also aimed to explore how status influences the way individuals negotiate the conflict between the goal of creating promising interpersonal connections and the goal of protecting themselves against detrimental interactions.

To address the empirical and theoretical gap in the relationship between status and top-down influences on social perception, specifically social threat information and facial expressions of threat, all the studies in the current paper manipulated social status. Moreover, as stated above, I was interested in providing novel empirical evidence on how abstract social environmental cues such as prestige and respect influences basic social cognitive processes. Therefore, In studies 1, 2, 4, 5, 6, and 7 participants were asked to recall a recent interaction they had with a person either at the very top or at the very bottom of the hierarchy as defined by a person who is most (or

least) respected by members of their community. Based on previous studies, it is reasoned that recalling and describing an interaction with a highly or least respected individual would temporarily prime subjective perceptions of low or high sense of status. Study 3 employed the dot-estimation task, which is a common minimal group paradigm (Tajfel, 1970) commonly used to arbitrarily categorise participants into separate groups. Finally, in studies 8, and 9, participants were given false information regarding the status of graduates from their department compared to other departments in the university. Research on social status are often interlinked with other variables (e.g., SES, power), the manipulation of subjective sense of status specifically in the domain of respect provides the first evidence that this construct can sufficiently create differential attentional biases. Furthermore, manipulations of this nature help establish stronger causal links between social status and social cognitive tendencies.

The current research advances previous studies by investigating the effect of status on various stages of social information processing, specifically at the attentional processing and social evaluation levels. I also proposed a potential attentional mechanism that could account for these status-specific differences. Importantly, the proposed attentional vigilance towards social threat in low-status individuals may be driven by a direct or indirect phenomenon. A direct phenomenon would be based upon the prior and learned experiences a low-status individual had with increased hostility and aggression. These past experiences create the expectation of further encounters with threatening targets and therefore lead to an increased motivation to be vigilant towards social threat cues. An indirect phenomena would imply that the heightened threat sensitivity demonstrated by low-status individuals was due to secondary related factors such that self-esteem, rejection sensitivity, mood, need to belong, and generalised trust. These variables have been implicated in accounting for individual

differences in sensitivity to threat in past studies. The current research will measure by means of questionnaires, whether status influences these variables across the studies in Chapter 3.

In order to gain a more comprehensive understanding of the source of heightened threat reactivity observed in individuals from low SES backgrounds, I examined the perceptual and processing biases that may be involved. I aimed to demonstrate that low-status individuals have perceptual biases in allocating attention to angry facial expression, and a bias to process social-threat related information more extensively. To this end, I used a variety of tasks to examine the role of status in the perception of socially threatening facial cues.

My core hypothesis was that low-status individuals will demonstrate vigilance and enhanced processing motivation for threat-related cues in faces. Social-threat will be operationalised both in the context of angry emotional facial expression and untrustworthy facial expression. Study 1 aimed to first establish the influence of status on social threat information processing. It was hypothesised that low-status individuals would have heightened accessibility for social threat information, whereas high-status individuals would not show any differentiation in their accessibility for social threat and general negative information. Study 2 investigated if heightened accessibility of social threat also extends to face processing. It was hypothesised that low-status individuals would be more motivated to encode targets embedded within a social-threat context.

Study 3 tested the assumption that status triggers functionally distinct motives. Stimuli relevant to these motives should disrupt attention and interfere with any simultaneous processes. It was hypothesised that irrelevant angry background faces would cause the greatest interference on low-status individuals goal-directed attention

on the focal task. Study 4 investigated the role of social status in moderating processing motivation and processing styles of emotional faces. It was hypothesised that low-status individuals are motivated to accurately identify angry faces such that they would redirect additional processing resources to compensate for difficulties in identifying an inverted facial expression. Studies 5 and 6 examined if vigilance towards threatening social cues (angry faces) along the time-course of attention would vary as a function of status. It was hypothesised that low-status individuals would show strategic vigilance towards angry faces. It was further predicted that this selective vigilance towards angry faces results from an enhanced motivation to increase awareness of direct social threat in the environment. Consequently, low-status individuals should also suffer greater interference on simultaneous processes when presented with angry faces, but not fearful faces, because they are motivated to avoid direct social threat. Study 7 tested the idea that the selective vigilance towards static images of angry faces would also extend to processing of dynamic facial expression in low-status individuals. It also examined the role of the relationship between the target and the perceiver. It was hypothesised that low-status individuals would take a longer time in detecting the initial hostile expression offset in targets they expected to interact with, but not with targets whom they do not expect an interaction with. Finally, studies 8 and 9 examined the social evaluative consequences of the proposed social threat vigilance. In particular, it investigated whether low-status individuals would also be sensitive towards more subtle cues of social threat, such as those present in non-Duchenne smiles as they are an indicator of untrustworthiness. It was hypothesised that low-status individuals would be able to discriminate between Duchenne and non-Duchenne smiles, and they would also be motivated to avoid targets displaying non-Duchenne smiles.

In conclusion, the current research aimed to investigate the link between early-stage attentional process and late-stage behavioural reactions in social interactions. More specifically, whether early-stage attentional biases predict social evaluation judgements, and crucially, if this link varies as a function of status. Moreover, I aimed to provide a comprehensive overview of how subjective perception of oneôs social standing in the status hierarchy can significantly influence perceptual and attentional processes during face perception and its subsequent effects of social evaluative judgements.

Chapter 2 Selectivity in Social Information Processing

2.1 Introduction

In the current chapter, I aimed to provide novel evidence that the loss of status in the domains of prestige and respect selectively activates accessibility of social threat. To this end, I pitted social threat against non-social threat information in Study 1; and social threat against general negative valence in Study 2. I also aimed to show that this heightened accessibility of social threat extends to face processing, such that targets associated with social threat are better encoded and subsequently better remembered by low-status individuals. Finally, I expected that these effects would not be present in high-status individuals.

There is abundant evidence that social information receives preferential processing. First, it has been shown that social relations are automatically extracted from the social stream. For instance, people are often spontaneously categorised based on their relationships (e.g., family, married couple, friends). Following that initial categorisation, information about those individuals is subsequently stored within their relationships (Sedikedes, Olsen, & Reiss, 1993). Furthermore, in the domain of attribution formation, the causal effect of interpersonal demands has been shown to be the strongest dimension in attributional processing (Anderson, 1991). This work highlights how social information processing may be influenced by top-down factors such as motivation and prior expectations.

For the remainder of this section, I will first give a broad overview on how motivation influences information processing. Then I will review evidence on the role

of prior expectation in biasing social perception. Finally, in justifying the rationale underlying the current hypotheses that low social-status leads to enhanced accessibility and processing of social threat, I will draw supporting evidence from the relevant literature of social identity threat, self-esteem and rejection sensitivity.

2.1.1 The role of motivation

It is generally agreed that motivation influences information processing. Theories on the relationship between motivation, deprivation, and goal attainment states that when an individual fails to achieve satisfaction from an important goal, they would seek alternative means of satisfying that thwarted need (Maner, DeWall, Baumeister, & Schaller, 2007). For example, Brewer and Pickett (1999) showed that heightening the need for assimilation and belonging led to increased self-stereotyping. It has been argued that low-status individuals tend to search more exhaustively for information about others in the environment to compensate for a lack of certainty over their life outcomes (Pittman & Pittman, 1980). Importantly, these findings also suggest that motivation can influence the intervening cognitive processes.

The subjective perception of being in a low-status position may signal that oneôs need for control and security is thwarted. That is, being in a vulnerable position threatens the social self, low-status individuals may feel a strong desire to restore their subjective sense of value by being aware of possible threats around them. Despite the common assumption of ñautomaticò biases toward threat (e.g., Carlson & Reinke, 2008; Dolan & Vuilleumier, 2003), recent evidence has suggested that not all threat processing fulfils the criteria for automaticity (Schneider & Shiffrin, 1977) in terms of the involuntary and capacity-free nature of automatic processing. Instead, processing of threat is strategically subjected to top-down goals, which influences processing of

threat at an attentional level. The current study proposes that the loss of status in the domains of social prestige and respect may trigger heightened sensitivity or accessibility to social threat-related concepts. In the next subsection, I will discuss the role of prior expectations. Specifically, I will elaborate on how prior expectations can exert top-down influences on motivation and subsequent basic cognitive processes in social information processing and face perception.

2.1.2 The role of prior expectations

Human survival relies heavily on the ability to anticipate and prepare for possible future events before actually experiencing them (Bar, 2007; Holland, 1900). This ability is based largely on the ability to bring to the fore mental representations of prior experiences (Bar, 2007, 2009; Friston, 2005). However, if our subjective experiences are shaped by expectations set by prior mental representations and actual sensory input (Petrovic et al., 2005), then there is the inherent risk that these mental representations may bias sensory input. For example, evidence from brain imaging studies have found that false expectations can skew perceptual judgement, affective responses and neutral processing in various stimulus modalities including olfaction (e.g., De Araujo, Rolls, Velazco, Margot, & Cayeux, 2005), pain (e.g., Wager et al., 2004) and vision (e.g., Petrovic et al., 2005). The general finding from these studies is that preconceptions based on past experiences may provide misleading information that could modulate perceptual experience by enhancing prefrontal top-down influences on category-specific sensory brain activation (Diekhof et al., 2011).

Being constantly reminded of negative stereotypes about oneôs in-group could trigger universal expectations of prejudice. That is, one might develop a script for intergroup rejection, in which one worries about being socially devalued and becomes

vigilant for cues communicating this rejection. Recent research supports this notion such that individual differences in prejudice expectations, such as stigma consciousness or rejection sensitivity can activate a biologically based defensive motivation system that orients individuals towards negative stimuli in order to react appropriately (Lang, Bradley, & Cuthbert, 1990).

In line with that, Kaiser et al., (2006) found evidence suggesting that women who were high in stigma consciousness paid more attention to subliminally presented social-identity threatening cues. Furthermore, Downey and colleagues (2004) found that individuals who were high in personal rejection-sensitivity reacted to rejection-relevant cues with an augmented startle eye-blink response, which is a marker of the activation of the defensive motivation system. This suggests that they were especially sensitive to rejection cues and readily perceives rejection in other peopleôs behaviour.

Being in a low-status position is socially threatening as it exposes an individual to various social challenges which may be difficult to overcome given the limited disposable social resources low-status individuals have. Thus, it is possible that accessibility of social-threat related concepts may be influenced by the prior experiences of being in a socially threatening position coupled with the awareness of their unfavourable comparison compared to high-status individuals.

In conclusion, deriving from the rationale outlined in the Chapter 1, relative to others, low-status individuals are more often victims from being targets of direct and indirect forms of hostility, including social discrimination and unprovoked aggression (e.g., Bradley & Corwyn, 2002; Crocker et al., 1998; Sapolsky, 2004; Sidanius, Levin, Federico, & Prato, 2001). I proposed for the first time that low-status individuals would be motivated to detect and engage with social threat cues. An enhanced accessibility and processing of social threat could help low-status individuals navigate a more

challenging social world as this awareness would enable them to protect themselves against potential sources of further hostility. Specifically, I hypothesised that loss of status in the domains of prestige and respect increases accessibility for social threat that also extends to face memory. Two studies addressed these hypotheses, Study 1 used a lexical decision task as a measure of accessibility, and Study 2 used a face recognition task as a measure of motivated processing of relevant targets.

2.2 Study 1

The primary aim of Study 1 was to provide an initial test of whether status triggers differential motivations, which then heightens accessibility of motivationally relevant concepts. Additionally, the current study was also interested in whether there would a differentiation between social and non-social threat related words as a function of status.

Participants completed the status manipulation task, after which they completed a lexical decision task (LDT) that included social threat words, non-social threat words, and matched control neutral words. The LDT is a commonly used reaction-time measure of accessibility. In this task, participants are asked to decide whether or not letter strings form English words. Crucially, some of the letter strings are target-related words, some are target-unrelated and others are non-words. Higher accessibly of the target concept is indicated by the relatively faster accurate detection of target-related words (Meyer & Schvaneveldt, 1971). This procedure allowed the assessment of the extent to which participants were quicker to respond to social threat and non-social threat words in comparison to the matched control-neutral words. This pattern of effects will inform us as to whether or not accessibility of threat-related concepts vary as a function of status. In addition to measuring accessibility, I also used the LDT to measure social goal activation. Using this implicit measure allowed us to identify whether low social status increases accessibility of social threat without the participantsô conscious control. As active goals can temporarily increase the cognitive accessibility of goal-relevant information (Shah, Friedman, & Kruglanski, 2002), I expected low status participants to identify words associated with social-threat compared to non-social threat and neutral words more quickly.

Method

Participants and design. Sixty-three participants recruited from the University College London (UCL) subject pool received monetary compensation for participation. One participant with an overall mean accuracy lower than 3 *SD* of the sample was excluded. The remaining 62 participants (40 females, 22 males, Mean age = 23.89) were randomly assigned to a high-status condition (n =22), low-status condition (n =21) or control condition (n =19). This study employed a 3 (Status: high, low, control) x 3 (Word type: social threat, non-social threat, neutral) mixed-model design, with repeated measures on the last factor. There were no effects of participant gender, which are not discussed further.

Materials. A total of 32 social threat, 32 non-social threat and 64 neutral words (See Appendix I) were selected from the ANEW (Bradley & Lang, 1999) database. Social threat, non-social threat and neutral words were matched in terms of length and frequency (See ion of lengths were constructed.

Table 2.1). Using the ARC nonword database (English) (Rastle, Harrington, & Coltheart, 2002), 128 nonwords that matched the target words on distribution of lengths were constructed.

Table 2.1

Mean (and standard deviations) of lexical characteristics of word stimuli used in Study 1

	Word type		
	Neutral	**Social threat**	**Non-social threat**
Word length	6.84 (1.48)	6.25 (1.59)	6.72 (1.22)
Word frequency	26.77 (27.17)	30.39 (15.49)	20.45 (12.93)

Procedure. After providing informed consent, participants completed the entire experiment in individual cubicles. The study was described as a study on ñlinguistic

processingò and social factors that may influence this process. There were two parts to this study. Firstly, participants completed the status manipulation task. Next, they completed the lexical decision task.

Status manipulation task. The status manipulation was adapted from Kraus, Côté, and Keltner (2010). In this task, participants were presented with a ladder with 10 rungs. Participants were asked to think of the ladder as representing where people stand in their country. Participants received the following instructions:

ñNow, please compare yourself to the people at the very bottom (top) of the ladder. These are people who are the worst (best) off ï those who are least (most) respected in your society. In particular weôd like you to think about how you are different from these people in terms of your own social prestige. Where would you place yourself on this ladder relative to these people at the very bottom (top)?ò

To strengthen the status manipulation, participants were asked to write about a recent interaction with a person from the bottom (top) of the ladder. In particular, participants were asked to ñthink about how the differences between you might impact what you would have talked about, and how the interaction went. ò Next, participants indicated their perceived position on the ladder relative to the person at the very bottom (top) (1 = *bottom rung* to 10 = *top rung*) (see Appendix II).

In the control condition, participants were not presented with the ladder. To match the recall task of the experimental conditions they were asked to write about their day yesterday.

Lexical decision task. Participants were tested individually in a cubicle. Each trial began with a fixation cross that appeared at the middle of the screen for 500ms followed immediately by the letter string. The letter string remained on the screen for 2000ms or until a response was given (whichever was earlier). Participants were

instructed to press the z key on the keyboard (marked green) if the string was a word, and the m key on the keyboard (marked red) when the string was not a word. Participants were told to respond as quickly and as accurately as possible. There was a blank inter-trial interval of 1000ms after participants made a response or time-out (See Figure 2.1). After twelve practice items, the 128 words and 128 non-words were presented in a random order. Upon completion, participants were checked for suspicion, carefully debriefed, paid and thanked.

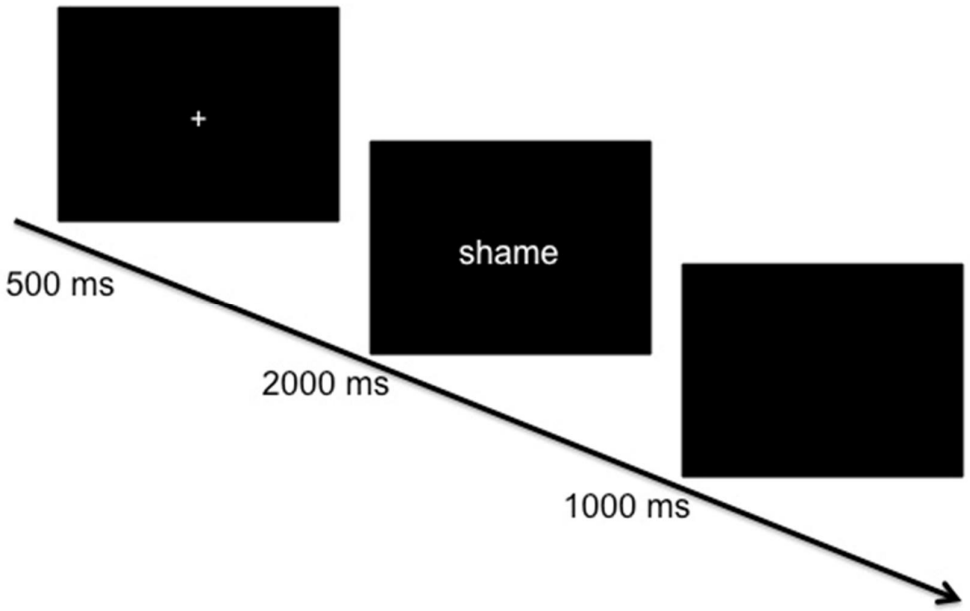

Figure 2.1 Trial sequence of lexical decision task in Study 1. Trial onset was indicated by a fixation cross. This is followed by the presentation of a letter string (in this example, a social threat word). Participants then indicated using labelled keys on the keyboard whether the letter string was a word or a non-word.

Results and Discussion

Manipulation check. Participantsô indication of their perceived standing on the ladder served as the manipulation check scores; the bottom rung was coded as ñ1ò, and the top rung was coded as ñ10ò. The manipulation check scores were subjected to an

independent-samples *t*-test. Participants in the high-status condition reported significantly greater perceived status (M = 6.82, SD = 1.50) compared to participants in the low-status condition (M = 5.52, SD = 1.54), t (41) = -2.79, $p < .01$, d = .85. This indicates that the status manipulation was successful.

Reaction times. The data analysis for this task was based on RTs for correct responses. RTs faster than 200ms were excluded from analysis. Outliers, defined as RTs that deviated more than three SD from the overall mean RT were removed. Data from trials with errors and outliers were discarded and not analysed further. Error rates did not differ across status conditions, p = .702.

My primary interest was whether status influences the accessibility of neutral, social threat and non-social threat words. Shorter RT for social threat and/or non-social threat words as compared to matched control-neutral words would indicate that accessibility of those word categories had been activated as a result of the status manipulation task. For each participant, I averaged (separately) their RTs for each word category. Low-status participants were quickest to respond to social threat words (M = 549.84, SD = 66.57), followed by non-social threat words (M = 557.12, SD = 68.20), and neutral control words (M = 563.73, SD = 67.93). High-status participants were quickest to respond to non-social threat words (M = 547.43, SD = 54.61), followed by neutral control words (M = 556.74, SD = 61.12), and social threat words (M = 558.49, SD = 65.49). Control participants were quickest to respond to social threat words (M = 575.77, SD = 87.31), followed by neutral control words (M = 588.08, SD = 81.47), and non-social threat words (M = 590.26, SD = 75.77). These averages were subjected to a 3 (Status: high status, low status, control) x 3 (Word category: social threat, non-social threat, neutral) mixed-modal ANOVA with repeated measures on the latter factor. Results revealed a main effect of word category, F (2, 118) = 3.32, $p < .05$, η_p^2 = .053

such that participants were quickest to respond to social threat words (M = 560.86, SD = 72.75), followed by non-social threat words (M = 563.84, SD = 67.64) and neutral words (M = 568.71, SD = 70.25). Of interest, there was a significant interaction between word category and status, F (4, 118) = 3.18, $p < .02$, $\eta_p^2 = .097$. (See Figure 2.2).

Planned comparisons using one-way ANOVA for each status condition respectively revealed that there was a significant difference in accessibility across word categories for low status participants, $F(2, 40) = 4.57$, $p < .02$, $\eta_p^2 = .186$. Low-status participants were marginally faster at categorising social threat words (M = 549.84, SD = 66.57) compared to non-social threat words (M = 557.12, SD = 68.20), t (20) = -1.78, p = .09. Importantly, they were significantly faster at categorising social threat words compared to neutral words (M = 563.73, SD = 67.93), t (20) = -3.05, $p < .01$; the accessibility of non-social threat words did not differ significantly from neutral words, $p > .2$. There was no significant difference in accessibility across the word categories in the high-status and control condition.

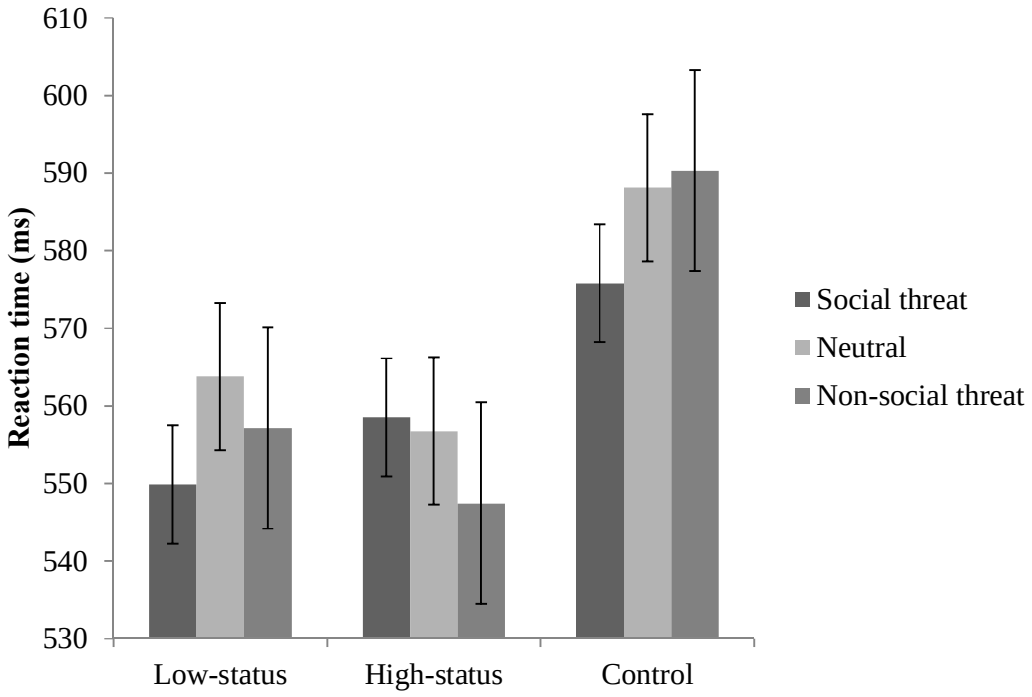

Figure 2.2. Mean lexical decision RT for social-threat, neutral, and non-social threat words as a function of status conditions; error bars represent standard error.

The current findings provide preliminary support to the hypothesis that subjective perception of low-status heightens accessibility of social threat such that low-status participants were quicker at accurately identifying social threat words compared to matched neutral control words. High-status and control participants did not show this pattern of response as they did not differ in their response times across the word categories. Based on the overall pattern of response within each status category, it is worth noting that while low-status and control participants were quickest to respond to social threat words, high-status participants were slowest to respond to this category. This raises the possibility that high-status individuals may be inhibiting the accessibility of social threat words, however the current results lack statistical evidence for this claim.

In so far as cognitive accessibility of goal-relevant information informs the underlying social goal, the current study suggests that low-status individuals may be motivated by the self-protection goal, specifically in the social domain and not threat in general. The next study sought to investigate if this heightened accessibility for social threat extends to face perception. Specifically, if targets associated in a social threat context would be privileged in face processing. That is, the next study aimed to test the notion that heightened accessibility for social threat observed in low-status individuals would also lead to better memory of social stimuli (faces) associated with social threat.

2.3 Study 2

Faces provide a rich source of social evaluative information. That is, embedded in each face are cues signalling an individuals identity and social category, it also provides information about their emotions and behavioural intentions. As a result, faces elicit enhanced attention and processing resources during social encounters (Bindermann, Burton, Hooge, Jenkins, & de Haan, 2005).

The significance of faces as social stimuli has led to a wide array of social cognitive research on face perception and processing that focuses on how facial cues, once encoded, modulate other cognitive processes. For example, structural cues on faces have been shown to influence trait inferences (Wills & Todorov, 2006), impression formation (Zebrowitz & Montepare, 2005), prejudice and discrimination (Maddox, 2004).

Recently, there has been burgeoning interest in how social motives exert top-down influences on basic cognitive processes in face perception such as the way faces are attended to, remembered, and encoded (Ratcliff, Hugenberg, Shriver, Bernstein, 2011). More specifically, face processing is attuned to targets that are deemed functionally relevant for a perceiver (Hugenberg et al., 2010), and these top-down motivational influences are reflected in the lower order social cognitive processes involved in encoding faces. For example, men and women who have mating goals active selectively attend to signals of both sexual receptivity and genetic fitness sent by female faces (Sacco, Hugenberg, & Sefcek, 2009). Group memberships can also serve as a trigger to selectively attend and encode a face (Hugenberg et al., 2010). This is because a shared in-group membership indicates that the person may serve as social

resources (Correll & Park, 2005), and therefore motivating perceivers to direct more processing resources to encode that particular target.

Study 2 aimed to expand on this research on how motivations exert top-down influences in face processing by investigating how the perceiverôs social status influences face processing. Hugenberg and colleague (2010) proposed that the ability to remember facesô identities reflects the amount of processing resources that has been allocated to a face) and this allocation of processing resources is often dependent upon top-down factors. In relation to that, past studies have shown that face perception is attuned to targets that are functionally relevant for the perceiver (Becker et al., 2005). Faces that are deemed low in subjective relevance may be disregarded. For example, Rodin (1987) found that face memory was better for potential interaction partners and targets who were more physically attractive (see also Maner et al., 2003). In other words, there was a memory disadvantage for social targets that were deemed irrelevant to the perceiverôs goals and motives.

I argue that social status activates differential social motivation that subsequently influences the memory for target faces deemed most relevant to the perceiver. The current study investigates this notion by pairing neutral target faces with different types of personal context created by descriptions of common daily events. I manipulated the relevance of different target faces based on the personal context these faces are embedded in. In particular, personal context were either of social threat or general negative valence nature were included.

The current study proposed that differences in social prestige and respect influence face memory independent of cultural, educational or financial differences that accompany naturally occurring status differences. There were three parts to this study. Firstly, participants completed the status manipulation task. Next, utilising an

adaptation of Higgins and Tykocinskiôs (1992) diary paradigm as a measure of motivated processing, I paired each diary event with a neutral target face. According to Higgins and Tykocinski (1992), an individualôs chronic-self guides influence the type of information that was later recalled about another individualôs life. In their studies, they found that participants who were motivated to avoid losses or anticipate gains preferentially remembered events reported in another studentôs diary that were consistent with their underlying motivations.

In the current study, each face was paired with a diary extract describing an event that had ostensibly occurred to that target yesterday. The events were either social or non-social in nature. Crucially, the social events could be further categorised as either threat-related or non-threat related (general negative valence). Participants are instructed to form a global impression about each target they are presented with. That is, to form an impression based on the targetôs face and also the accompanying diary event. Following a short filler task, a surprise recognition task was given. Participants were presented with a series of faces, half of which were novel faces and were asked to indicate as quickly and as accurately as possible which targets were óOldô or óNewô.

As shown in Study 1, mere reduced sense of prestige and respect could increase the accessibility of threat-related cues in the social domain. Building from that, in the current study, I claimed that the heightened accessibility of social threat information could be derived from increased motivation to process social-threat information more extensively. It was hypothesised that loss of perceived sense of respect and prestige would trigger the motivation to process threatening information in the social domain more extensively. It was also predicted that this effect would be social threat-specific and not negative valence in general. Therefore, I expected that low-status individuals to be more motivated to process targets embedded in a social-threat context compared to

high-status individuals. Specifically, low-status individuals would be quicker at accurately recognising targets associated with social threat.

Method

Participants and design. Fifty participants recruited from the University College London (UCL) subject pool received monetary compensation for participation. Three participants with an overall mean accuracy lower than 3 *SD* of the sample were excluded. The remaining 47 participants (30 females, 17 males, M_{age} = 23.89) were randomly assigned to either a high-status condition (*n* =23) or a low-status condition (*n* =24). This study employed a 2 (Status: high, low) x 2 (Event type: social, non-social) x 2 (Valence: positive, negative) mixed-model design, with repeated measures on the last two factors. There were no effects of participant gender, which are not discussed further.

Materials. Twenty-eight male and 28 female target photos selected from the Glasgow Unfamiliar Face Database (Burton, White & McNeill, 2010) served as stimuli. All targets faces wore a neutral expression and faced the camera. A separate sample of participants rated the faces for physical attractiveness on a scale ranging from 1 (not attractive) to 7 (highly attractive). Faces were average in physical attractiveness with a mean score of (*M* = 3.33, *SD* = 0.54). Male (*M* =3.32, *SD* =0.39) and female (*M* =3.34, *SD* =0.52) target faces were matched on attractiveness, *t* (54) = -0.21, *p* > 0.8. Half of these faces (14 males, 14 females) were randomly paired with a diary event. Target faces were situated on the bottom left-hand corner of the screen while the diary event appeared as a ótought bubbleô above the photo on the upper right-hand corner. All 56 faces (without diary events) were later presented in the recognition task (see Figure 2.3).

The diary events were presented as events extracted from a diary of another individual (Gardner, Pickett, & Brewer, 2000). Participantsô task was to form an impression about this individual based on their face and the accompanying event. The events could either be social or non-social in nature. Crucially, the social events were either social-threat related or general negative valence (See Appendix III).

Figure 2.3 Example of stimuli used in Study 2. In this example, a female target paired with a social threat background.

Procedure. After providing informed consent, participants completed the entire experiment in individual cubicles. The study was described as an experiment designed to investigate indirect impression formation and social factors that may influence this process. More specifically, the study ostensibly investigated the relationship between the different types of social interactions people have in their daily lives and how they

form impressions about others in the absence of face-to-face interaction. There were three parts to this experiment. Firstly, participants completed the status manipulation task. Next, they were presented with faces paired with diary events. Finally, they were given a surprise recognition task of the faces.

Status manipulation. The status manipulation procedure for the high-status and low-status conditions was identical to Study 1.

Face recognition task. Next, participants were presented with 28 faces each paired with a diary event that has ostensibly occurred to that particular target the day before. Participants were asked to pay attention to both the face and the accompanying event description and to form a general impression of each target they were presented with. Following the presentation of all 28 targets, participants were asked to complete a timed verbal ability task in which they made as many words as possible using the letters from the word CRUSTACEAN and LIBRARIAN. This task acted as a filler task for four minutes. Finally, participants were asked to complete a surprise recognition task. In this task, participants were presented with 56 faces (28 previously seen target faces without the diary events and 28 new target faces) individually and were asked to press 1 for óOldô faces (faces previously seen in the earlier parts of the experiment) and 2 for óNewô faces. This task was self-paced but participants were instructed to respond as quickly and as accurately as possible. Finally, participants were checked for suspicion, carefully debriefed and thanked.

Results and Discussion

Manipulation check. Participantsô indication of their perceived standing on the ladder served as the manipulation check; the bottom rung was coded as ñ1ò, and the top rung was coded as ñ10ò. The manipulation check scores were subjected to an independent-samples *t*-test. Participants in the high-status condition reported

significantly greater perceived status (M = 6.52, SD = 1.27) compared to participants in the low-status condition (M = 5.54, SD = 1.67), t (45) = 2.26, p < .03, d = .68. This indicates that the status manipulation was therefore successful.

Reaction times (RT) for accurate recognition. Another common means of measuring recognition is the signal detection parameter sensitivity (*d'*). This measure is assesses perceiversô overall performance in a recognition task. (Stansislaw & Todorov, 1999). This is done by taking into account perceiversô ñoldò responses to faces that were presented before (*hits*), and perceiversô ñoldò responses to faces that were not presented before (*false alarms*).

However, in the current study, this measure was not suitable due to the hypothesis of the current study. More specifically, the current aimed to investigate the extent to which the perceiverôs social status influenced the motivated processing of targets associated with social threat compared to targets associated with general negative valence. To that end, the current study is primarily interested in faces that were previously paired with social-threat and negative valence events. Both these categories of faces are ñoldò/previously seen faces. The calculation of the *d'* scores require both hit rates and false alarm rates. The hit rate (the probability of responding ñoldò to old/previously seen faces) and the false alarm rate (the probability of responding ñoldò to new faces). However, given the current hypothesis, only faces that were previously paired with social threat context and the general threat context were of interest. The ñnewò faces/faces that were not previously paired with any context were not relevant. Therefore, it was not possible to compute the false alarm rates for the variables of interest in the current study. In addition, the signal detection measure takes into account both sensory processes and decision processes (Sternberg, 2004), which are beyond scope of the current study. With regards to overall recognition performance,

participants in the high-status (M = 1.93, SD = .91) and low-status (M = 1.48, SD = .81) conditions did not differ significantly, F (1, 45) = 3.16, $p > .05$.

The data analysis for this task was based on RTs for correct responses. Outliers, defined as RTs that deviated more than three *SD* from the overall mean RT were removed. Data from trials with errors and outliers were discarded and not analysed further. Error rates did not differ across status conditions, $p = .503$.

It was predicted that low-status, and not high-status would trigger the motivation to process target faces paired with threatening social events more extensively compared to target faces paired with general negative social events. That is, low-status participants should be quicker at accurately recognising faces that were previously paired with social-threat events compared to faces that were paired with negative valence events. This pattern of response should not be evident in the high-status condition. To test this, the RTs for accurate target recognition were entered into a 2 (Status: high, low) x 2 (Social event type: threat, negative) mixed-model ANOVA with status as the between-subjects factor (See Figure 2.4).

Results revealed no main effect of status ($p = .257$); the two status conditions did not differ in their RT for correct responses. Of interest, there was a significant interaction between event type and status, F (1, 45) = 4.62, $p < .05$, $\eta_p^2 = .093$. Planned comparisons using one way ANOVA for each social event type revealed that there was a significant difference between high- and low-status condition for the faces paired with the socially threatening events, $F(1,45) = 4.12$, $p < .05$, but not for the non-threat related/negative valence events, $p > .6$. Additionally, participants in the low-status condition were marginally quicker at correctly recognising faces paired with socially threatening events (M = 1231.64, SD = 358.77) compared to general negative valence social events (M = 1426.35, SD = 533.49), F (1, 23) = 3.50, $p = .07$, $\eta_p^2 = .132$. In

contrast, there was no significant difference between event types for participants in the high-status condition.

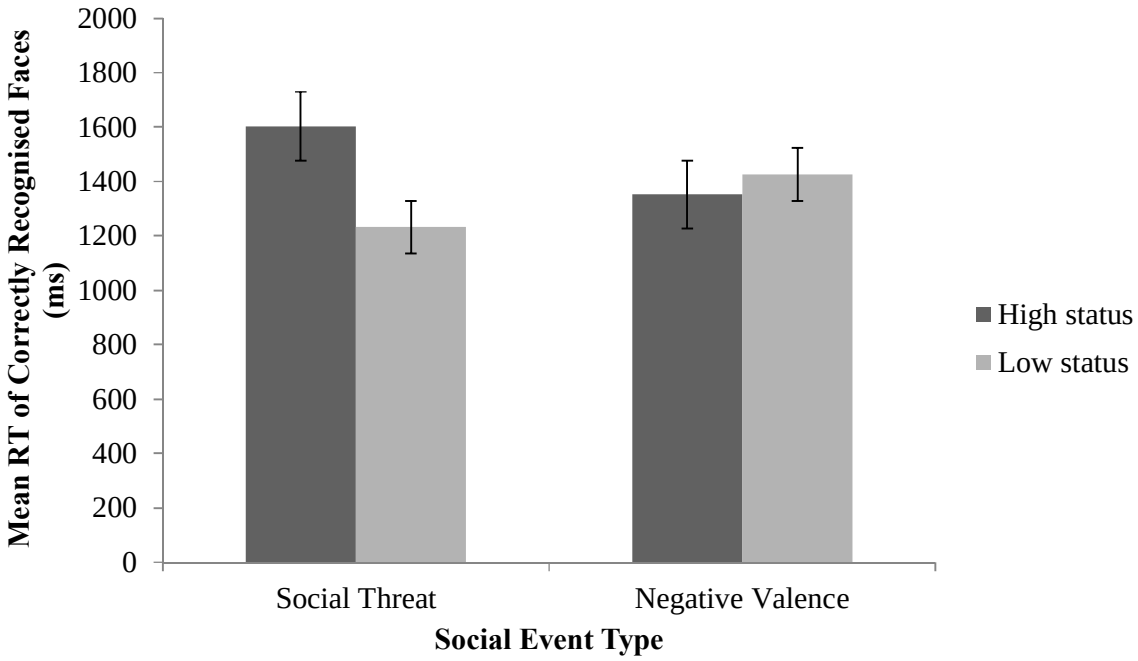

Figure 2.4 Mean RT of correctly recognised faces paired with social threat or negative valence events as a function of status; error bars representing the standard error of the mean.

The results supported the proposed notion that social status differentially triggered motivations that influenced the selective processing of social information. Specifically, loss of social respect and prestige influence processing of faces such that low-status participants allocated more resources to the processing of faces presented in a social-threat context. Low-status participants were quicker at accurately recognising faces that were previously paired with social-threat events compared to high-status participants. No differences in reaction time was found for the faces paired with the negative valence event suggesting that high- and low-status participants differed in their processing of threat-related of the social information, and not general negative

valence social information. Having said that, the results could also be interpreted as high-status participants being slower at accurately recognising faces that were previously paired with social-threat events compared to low-status participants. This is broadly consistent with the pattern of response observed in Study 1, in which high-status participants were slower at accurately categorising social-threat words. Therefore, it remains a possibility that high-status individuals may be suppressing or inhibiting the processing of social threat information. This notion is investigated in greater detail in the remaining studies of the current research.

2.4 Summary and Conclusions

Past studies on social cognition indicate that basic social cognitive processes involved in information processing and face perception can be influenced by top-down factors such as motivation. In addition, prior research on naturally occurring SES effects indicates that low social status leads to heightened threat reactivity. Studies 1 and 2, integrated these independent lines of research to show, for the first time, a link between subjective sense of status and early-stage social cognitive processes. Study 1 found that low-status participants showed increased accessibility of social-threat related words compared to neutral control words. Study 2 extended this result by showing that low-status participants were quicker at accurately recognising faces that were previously presented in a social-threat context compared to high-status participants. Furthermore, the effects obtained were social-threat specific and did not extend to general negative valence.

The present findings are consistent with past research showing that members of low SES tend to be more wary of potential threats in their external environment compared to members of high SES groups (Gallo, Bogart, Vranceanu, & Matthews, 2005; Taylor & Seeman, 1999). Indeed, with fewer resources to buffer against threats, individuals from low SES backgrounds consistently show elevated self-reports of hopelessness, and hostility (for a review, see Gallo & Matthews, 2003). Here I established that mere decrease of social prestige is capable of activating accessibility of social threat, independent of educational and financial factors. In addition, the current findings also provide novel evidence that processing of neutral targets may be influenced by the type of information the target is associated with such that motivationally relevant information received enhanced processing.

Although the theoretical basis for heightened threat reactivity in low-status individuals is well established, the actual mechanism and social cognitive processes likely to contribute to this biased perception of threat, especially in the domain of face processing has been widely neglected. Studies 1 and 2 provides preliminary evidence that loss of social status in the domains of social prestige and respect is associated with heightened accessibility to social threat which can extend to processing of faces. This further demonstrates that status has a fundamental impact on motivation and this can affect basic cognitive functions, such as processing of threatening social information. However, the paradigms used in Studies 1 and 2 did not allow us to distinguish between possible cognitive processes that could underlie the heightened accessibility of social threat and quicker recognition of targets associated with social threat. That is, the shorter response times low-status participantsô needed to accurately recognise targets associated with social threat may be driven by selective attention allocation during the initial encoding stages or memory biases during the retrieval stages.

The studies in the next chapter aimed to elucidate the underlying processing and attentional biases that may be associated with the observed heightened accessibility and motivation to process social threat. Specifically, the studies presented in the next study aimed to examine how attention is involved in involuntary processing and recognition of emotional faces, registering and differentiating between different facial expressions of emotion.

Chapter 3 Perception of Overt Threat from Angry Facial Expression

Faces are especially diagnostic in identifying a personôs emotions and intentions (Zebrowitz, 1997). The ability to accurately identify and respond appropriately to emotional expressions is well documented in humans and other social species (Darwin, 1872; Haxby, Hoffman, & Gobbini, 2002). In particular, the facial expression of anger has been shown to have a strong influence on perception and cognition because it signals direct social threat and a high likelihood for imminent conflict (Adolphs, 2002). Hence, the inability to detect and respond appropriately to anger signals may potentially lead to undesirable consequences.

While there is widespread consensus that the expression of anger automatically engages selective attentional processes (Fox et al., 2002) and initiates rapid avoidance behaviour (Marsh et al., 2005), recent evidence suggests that processing of emotional expressions is sensitive to top-down influences, in particular, motivational factors (Barrett, Mesquite, & Gendron, 2011). The current chapter extends this notion of motivated face perception by providing novel evidence that low-status enhances the readiness to respond to, orient attention towards, and deploy effort during the processing of facial expressions of anger. As mentioned in the previous chapters, my central focus is on how differences in subjective sense of status drive attention to emotional expressions of anger independent objective measures of status. Additionally, I examined the motivational orientation that accompanies sensitivity to angry expressions in low-status individuals. The aim of the studies presented in the current chapter is threefold. Firstly, I aim to show that mere reduced sense of social prestige

and respect could automatically increase the readiness to identify and process angry facial expressions.

Secondly, I aimed to demonstrate that angry faces, and not other negative or positive expressions elicit enhanced attentional processing in low-status individuals. I also inspected whether status affects attention to other negative emotions (fear, sadness). Specifically, I aimed to demonstrate the selectivity in enhanced attentional processing of angry faces compared to other negative facial expressions. Both the facial expressions of fear and anger have largely been presumed to represent threat to perceivers and therefore are often used as threatening stimuli across a wide range of studies (Fitzgerald, Angstadt, Jelsone, Nathan, & Phan, 2006; Marsh, Ambady et al., 2005). Angry faces signal direct impending aggression on the part of the expresser, whereas fear faces suggest potential environmental threat perceived by the expresser (Adolphs et al., 1999; Whalen et al., 2001). Based on the underlying rationale behind the current research that loss of status represents a significant form of social threat coupled with the findings from Studies 1 and 2, I expected that low-status individuals would show vigilance to angry faces only and not to other negative emotions. That is, status should not lead to generalised sensitivity to negative social information. This was tested in Studies 3 and 4. Happy faces were also included to examine status related biases in positive emotional processing. High-status individuals are more exposed to admiration (Sweetman et al., 2013). Therefore high-status individuals may be particularly sensitive to signs of social reward and approval. Given that the smile of a happy face signals social reward (O'Doherty, Winston, Critchley, Perrett, Burt, & Dolan, 2003), I explored the possibility that high-status increases attention to happy faces. By looking at a range of negative and positive emotional expressions, I was in a

better position to determine the attentional priorities of high- and low-status individuals.

Finally, I claim that these effects are motivational in nature and are dependent on the top-down control of attention. Increased sensitivity to angry faces in low-status individuals may reflect a desire to suppress and ignore hostility that is present in the environment or a desire to be vigilant and respond to hostility. I expected low-status individuals to show strategic vigilance towards angry faces. To test that prediction, I present five studies that used different paradigms that allow us to distinguish between the desire to avoid threat and the desire to be aware of and the readiness to engage with threat.

In sum, this chapter tested the hypothesis that low-status triggers the enhanced motivation to heighten the readiness to respond to, orient attention towards, and deploy effort during the processing of facial expressions of anger across five studies. Study 3 utilised a modified emotional Stroop paradigm (Stenberg, Wiking, & Dahl, 1998) and investigated whether low-status individuals prioritise the processing of angry expressions, compared to other expressions, even when angry expressions were irrelevant to the task at hand. Study 4 used an emotion expression identification task (Young & Hugenberg, 2010) to inspect face processing styles and allocation of effort during the identification of emotional expressions. Studies 5 and 6 examined the effects of status on attentional biases towards threatening faces, along with the time-course of attention, using a dot-probe paradigm (MacLeod et al., 1986; for a review, see Mogg & Bradley, 1998). Across these studies I examined the role of various factors that have been related to status and could be implicated in the enhanced sensitivity towards angry faces in low-status individuals: mood, self-esteem, rejection sensitivity, self-worth, need to belong, and general trust. Finally, Study 7 inspected whether the threat

vigilance observed with static images of angry facial expression extends to dynamic expression of angry faces. It also examined whether the expected interaction with the target would affect the perception of hostile cues in those targetôs faces.

3.1 Study 3

Study 3 tested the notion that low-status individuals prioritise the processing of anger in facial expressions, using an adaptation of the emotional Stroop paradigm (Williams et al., 1996). In this paradigm participants are given a focal task (e.g., reading words) whilst irrelevant-stimuli (emotional facial expressions) are simultaneously presented on the computer screen. In order to maximise performance participants need to ignore the distractor faces. However, if the distractor faces are relevant to other accessible goals they will capture attention and will interfere with performance of the focal task. Therefore, interference scores reflect the relative processing of the irrelevant stimuli, and variations in interference as a function of type of distractor reflect the motivational relevance of the distractor information (see Engle, 2002).

In the present study, background distractor faces expressed anger, fear, sadness, and happiness or was neutral. If low-status triggers a motivation to detect facial signals of social threat, then low-status individuals should show greater interference (i.e., should be slower at categorising target words) in the presence of distracting angry faces compared to neutral faces or faces that expressed other negative emotions. Fearful facial expressions inform us about potential threats in the environment (Adams, Gordon, Baird, Ambady, & Kleck, 2003), whereas sad facial expressions have been linked to general negative emotion that is nonthreatening (Öhman et al., 2001). Therefore, if low-status triggers generalised sensitivity to negative emotional expressions, low-status individuals should show increased interference from all negative (vs. neutral) emotional stimuli. In contrast, if low-status individuals have a generalised sensitivity to threat they should be more sensitive to both angry and fearful

faces. However, based on the findings from Studies 1 and 2, I expected prioritised processing shown by low-status participants to be specific to angry faces as they signal direct social threat. Lastly, happy faces were included to identity whether status affects the processing of positive facial stimuli. Past studies have shown that expressions of happiness are identified more quickly than other emotions, an effect termed the happy-face advantage (Kirita & Endo, 1995). Furthermore, it has been proposed that the smile in the mouth region, with the visibility of the teeth, is a distinctive feature of happy expressions that captures attention in a bottom-up manner, independently of the motivational states of the perceiver (Calvo & Nummenmaa, 2011; see also Treisman & Gelade, 1980). In addition, sensitivity to social reward should also be indicated by greater interference from happy faces.

Study 3 also examined whether status affects mood, self-esteem and rejection sensitivity, factors that have been implicated in sensitivity to threatening emotional expressions (Burklund, Eisenberger, & Lieberman, 2007; Ewbank et al., 2009; Li & Yang, 2013) and could be implicated in the links between status and the processing of facial expression of anger. Negative affective states influence responses to facial signals of threat (Ewbank et al., 2009). Similarly, individuals with low self-esteem tend to mobilise more attentional resources towards the processing of negative stimuli such as angry faces (Li & Yang, 2013). Finally, sensitivity to disapproving facial expressions is moderated by individual differences in rejection sensitivity (Burklund et al., 2007).

Method

Participants and design. Thirty-five participants (21 females, 14 males, M_{age} = 26.1), recruited from the departmental subject pool at UCL, were paid for participation.

Participants were randomly assigned to either a high-status condition (n =17) or a low-status condition (n =18). The study employed a 2 (Status: high, low) x 5 (Face type: angry, fear, sad, happy, neutral) x 2 (Word valence: positive, negative) mixed-model design, with repeated measures on the last two factors. There were no effects of participant gender, which are not discussed further.

Materials. Fifty pictures were taken from the Ekman and Friesen (1976) set of emotional expressions. The pictures comprised ten individuals (5 females) each posing angry, fear, sad, happy, and neutral facial expressions with gaze directed into the camera (see Appendix IV for examples). The external features of the faces were removed and the faces were presented in a grey rectangular frame. The image size (including the frame) measured 9cm x 11. 5 cm centred on the screen. The words were displayed in black 24-point text and were positioned such as to occupy the area across the lower part of the nose. This area was chosen to minimize hiding of any of the facial features essential for the detection of the facial expressions (see Stenberg et al, 1998).

Two hundred and ten words was selected from the ANEW (Bradley & Lang, 1999) database. 105 positive words and 105 negative words that were matched on word length and word frequency dimensions were chosen such that on a scale of 1 (most negative) to 9 (most positive) ratings were lower than 3.5 for negative words; and higher than 6.5 for positive words. Ten combinations of word valence and facial expression were constructed (See Table 3.1). Each combination appeared in 1 practice trial and 20 test trials, resulting in a total of 10 practice trials and 200 test trials for this study.

Table 3.1

Mean (and Standard Deviations) of lexical characteristics of word stimuli used in Study 3

	Word type	
	Negative	**Positive**
Valence	2.76 (0.498)	7.24 (0.456)
Word length	5.86 (1.794)	5.91 (1.494)
Word frequency	8.96 (0.543)	9.05 (0.537)

For the dot-estimation task, 10 slides with random collections of yellow dots on a blue background were created and presented on a Microsoft PowerPoint slideshow with each slide shown for 500ms.

Procedure. After providing informed consent, participants completed the entire experiment in individual cubicles. Participants learned that the purpose of this study was to investigate the relationship between perceptual acuity and word processing.

Status manipulation. First, participants completed a dot-estimation task (Gerard & Hoyt, 1974) on the computer. In this task, participants saw a series of slides with dots presented on the computer screen, and estimated the number of the dots. Next, while waiting for the score, participants read information about different perceptual styles. In this information pack, the dot-estimation task was described as a measure of perceptual style and acuity that identified two groups of perceivers: overestimators and underestimators. Participants in the high (low) status were told that overestimators have a superior (inferior) perceptual style because it has been consistently shown that their style predicts better (worse) performance in other unrelated tasks. Participants were then given false feedback about their perceptual style (all participants were categorised as overestimators).

As the status manipulation check, participants were asked, on 7-point scales, to what extent do they think that overestimators: (1) will have prestigious professional positions in the future compared to underestimators? (2) will have high social recognition in the future compared to underestimators? (3) will attain financial success in the future compared to underestimators? All three questions were averaged to assess perceived status (Ŭ= .87).

Word processing task. Participants then completed the word processing task (following Stenberg et al., 1998). They were instructed to categorise words as positive or negative by pressing one of two response keys on the keyboard. Each trial began with a fixation-cross presented at the middle of the screen for 500ms, followed by the presentation of a picture of a face for 250ms. Subsequently, the compound picture-word stimulus was presented for 500ms, followed by a blank screen the participant made a response or 1500ms had elapsed (see Figure 3.1). Participants were asked to ignore the background picture, and to respond as quickly and as accurately as possible to the word. Participants were given 10 practice trials to familiarize themselves with the procedure before completing the 200 test trials. All stimuli and instructions were presented on a computer screen, using SuperLab Pro software package (Cedrus Corporation, 2002).

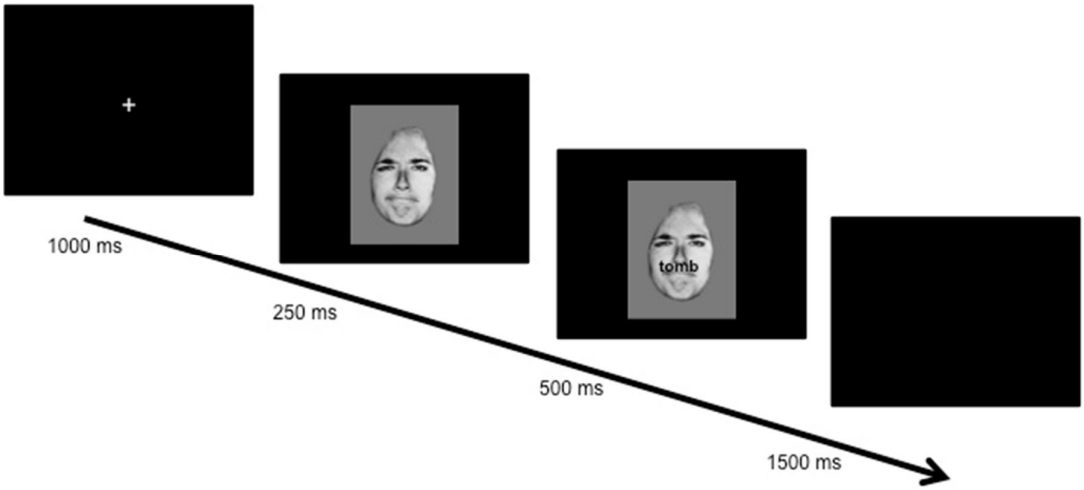

Figure 3.1 Trial sequence for word processing task in Study 1. Trial onset was indicated by a fixation cross. The presentation of a face (in this example, an angry facial expression) is followed by the presentation of a word (in this example, a negative word). Participants then indicated using labelled keys on the keyboard whether the word was positive or negative.

Finally, participants completed the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), the Rosenberg Self-Esteem Scale (Rosenberg, 1965), and the Adult-Rejection Sensitivity Questionnaire (A-RSQ; Downey & Feldman, 1996). The PANAS is a 20-item self-measure of current emotional state that assesses positive (Ŭ = .86) and negative affect (Ŭ = .77). Self-esteem was measured with Rosenbergôs (1965) Self-Esteem Scale. This scale assesses a personôs overall evaluation of their self-worth. Participants indicated their agreement with 10 items (1 = *completely disagree* to 6 = *completely agree*) on a 6-point scale (Ŭ= .91). The RSQ measures anxious expectations of rejection (Downey & Feldman, 1996). This measure consists of 9 situations in which there is a possibility of being rejected (Ŭ =.69). For each situation, participants indicate how concerned/anxious they would be about the outcome of the situation (1 = *very unconcerned*, 6 = *very concerned*) and how

likely will they experience acceptance (1 = *very unlikely*, 6 = *very likely*). The order of the questionnaires was counterbalanced across participants. Upon completion, participants were checked for suspicion, carefully debriefed, paid and thanked.

Results and Discussion

Manipulation check. The manipulation check scores were averaged and examined using an independent-samples *t*-test. Participants in the high-status condition reported significantly greater perceived status (M = 5.87, SD = 1.50) compared to participants in the low-status condition (M = 4.54, SD = 1.66), t (33) = 2.60, $p < .02$, d = .84. The status-manipulation was therefore successful.

Reaction times. Individual reaction times (RTs) that deviated more than three standard deviations (SDs) from an individual participantsô overall mean were removed. The remaining RTs were log transformed to correct for lack of normality and averaged to obtain a mean RT for each trial type. All analyses were based on the transformed means of correct responses (raw means are reported in the text/figures). Error rates did not differ across status conditions, p = .54. Errors and outliers accounted for 11% of the data (See Table 3.2).

Table 3.2

Mean Reaction Times and Standard Deviations (in ms) Angry, Fear, Sad, Happy and Neutral Faces Across Status Conditions in Study 3.

Face type	Angry	Fear	Sad	Happy	Neutral
High status	320.34 (109.87)	329.01 (137.19)	310.7 (126.86)	361.59 (133.83)	322.89 (118.96)
Low status	324.66 (148.37)	308.01 (147.94)	301.42 (139.57)	387.35 (143.61)	311.72 (136.2)

To examine whether status affects the processing of emotional facial expressions, separate interference scores were calculated for angry, fear, sad, and happy faces. This was done by subtracting the log transformed mean RT for each emotional facial expression (angry, fear, sad, happy) from the mean RT for the neutral facial expression (baseline value) for both positive and negative words respectively. A positive interference score indicates that emotional faces captured less attention than neutral faces, and therefore interfered less with word categorization. In contrast, a negative interference score indicates increased interference when an emotional face was present compared to baseline. For ease of interpretation, the means and *SD* reported below have been converted back to milliseconds.

An initial inspection of the data was made using a 2 (Status: high, low) x 4 (Face type: angry, fear, happy, sad) x 2 (Word valence: positive, negative) repeated-measures ANOVA on transformed interference scores with status as a between subjects condition. This analysis yielded a main effect of face type, $F(3,99)= 31.28$, $p < .001$, $\eta_p^2 = .49$, and a marginally significant interaction between face type and status, $F(3,99) =2.38$, $p = .07$, $\eta_p^2 = .07$. Emotional interference differences were found both for high-status, $F(3,48)= 9.83$, $p < .001$, $\eta_p^2 = .38$ and low-status participants, $F(3,51)= 24.43$, $p < .001$, $\eta_p^2 = .59$, thereby with a different profile. There was no main effect of word valence, $F < 1$, or a significant 3-way interaction between word valence, face type and status, $F < 1$. Therefore, the data were collapsed across word valence for all critical analyses (See Figure 3.2)

To examine interference biases for the different emotional expressions, the transformed interference scores were compared to zero (the value of no interference) in separate one-sample *t*-test for high-status and low-status. Significant interference scores emerged only for happy and angry faces. Happy faces showed the strongest

interference of all emotional faces, for both low-status (M = -74.79, SD = 49.37), $t(17)$= -5.62, $p < .001$, d = -2.3 and high-status participants (M = -37.88, SD = 40.37), $t(16)$ = -3.61, $p < .01$, d = -1.81. This result is consistent with past research showing that happy faces are recognised faster than neutral or angry faces (Gallegos & Tranel, 2005; Kaufmann & Schweinberger, 2004; Shimamura, Ross, & Bennett, 2006). Of particular importance, there was an interference bias for angry faces only for low-status participants (M = -13.31, SD = 33.76), $t(17)$ = -2.10, p = .051, d = -1.02 and not for high-status participants (M = 5.24 , SD = 52.97), $t(16)$ = 1.01, p = .33. In addition, there was no reliable increased interference effects for sad faces for both low-status, t (17)= 1.03, $p > .3$, and high-status participants, $t(16)$ = 1.92, $p > .05$; there was also no interference for fearful faces for both low-status, $t(17)$= -.31, $p > .7$, and high-status participants, $t(16)$ = .35, $p > .7$.

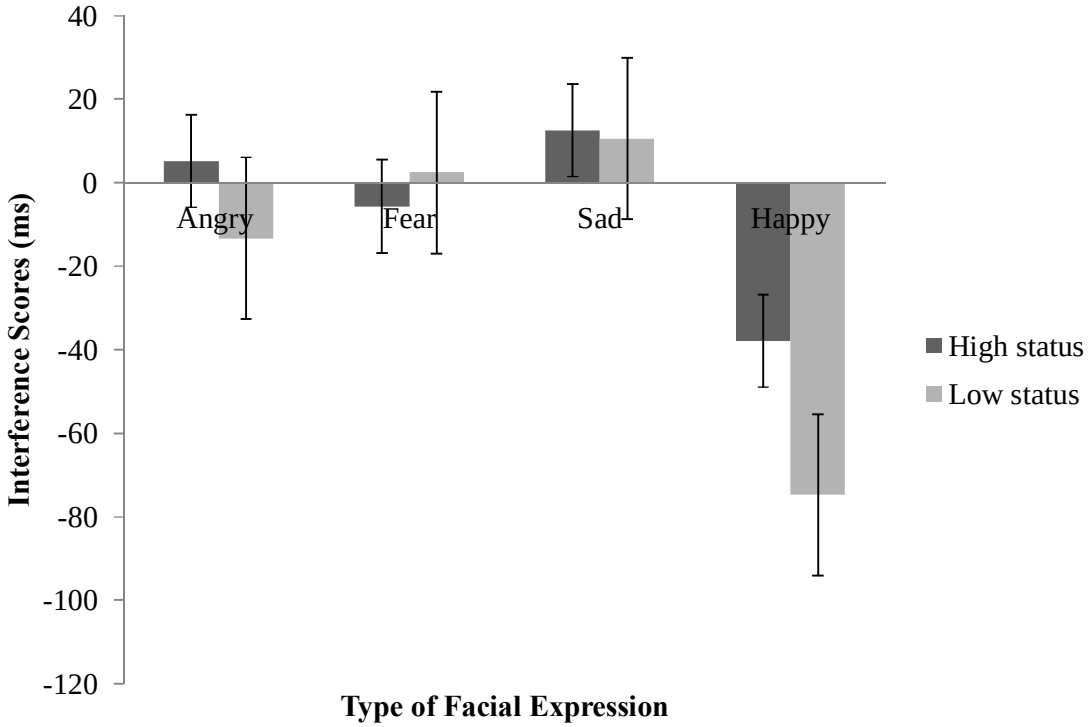

Figure 3.2 Mean interference score (ms) for angry, fear, sad, and happy facial expressions as f function of status in Study 3; error bars representing the standard error of the mean.

To test whether the observed findings were due to changes in affect, self-esteem, or rejection sensitivity, three one-way ANOVAs were conducted on the scores obtained in these measures. The results revealed no significant differences between the status conditions for the positive affect subscale, $F(1,33) = 1.04$, $p > .3$ and the negative affect subscale $F(1,33) = .45$, $p > .5$, the self-esteem scale, $F(1,33) = .51$, $p > .4$ and for rejection sensitivity questionnaire, $F(1,33) = 2.70$, $p > .1$. These results suggest that the observed interference effects for angry faces in the low-status condition were not due to differences in affect, self-esteem and rejection sensitivity.

Overall, the results of this study provide further support for the hypothesis that low-status individuals have increased sensitivity towards angry faces, a signal of direct social threat. That is, angry faces were more likely to interfere with the deliberate

responses of low-status participants. High-status participants did not show this pattern of response[1].

In addition, happy faces showed the greatest interference level compared to other emotional expressions across both status categories. This finding is consistent with the happy-face advantage (Kirita & Endo, 1995) and the notion that the distinctive feature of a smile in the mouth region captures attention in a bottom-up manner, independently of the motivational states of the perceiver (Calvo & Nummenmaa, 2011). Therefore, the present results were difficult to interpret. Since top-down and bottom-up processes were likely to interact to optimise attentional performance (see Egeth & Yantis, 1997), I was unable to conclusively differentiate whether the interference effects observed were driven primarily by top-down or bottom-up effects of status, or both. In the next three studies, I addressed this issue with a better control of the saliency of the smiles, and by pitting responses to happy and angry faces against each other (Studies 5 and 6).

[1] The interference scores were calculated by subtracting the response times for the emotional face trials (angry, fear, sad, and happy) from the neutral trials. Therefore, it was not possible to directly compare the interference scores between the high- and low-status conditions as each status condition had a separate baseline (response times on the neutral trials).

3.2 Study 4

In Study 3 angry faces (compared to baseline neutral faces) interfered with the performance of low-status participants on the focal task. The pattern of performance interference for high-status participants did not differ when presented with angry faces or baseline neutral faces. The faces of Study 3 were easily visible and accessible for processing. They did not require extensive effort on the part of the participant to detect them. Furthermore, even though in Study 3 angry faces disrupted on-going goal-directed processes in the low-status condition, I was unable to determine whether the interference observed was due to automatic attention capture or controlled attentional bias towards angry faces. This occurred because the irrelevant face background preceded the letter string (focal task). When participants performed the focal task enough time had elapsed for the engagement of effortful processes. The aim of Study 4 was to obtain stronger evidence for an effortful, motivational component of attention to angry faces in low-status individuals.

Despite the broad agreement on the universality and biological basis for accurate encoding and identification of emotional expressions (e.g., Ekman, 1972, Ekman, Friesen, & Ellsworth, 1972), many studies have observed reliable top-down effects in both the identification of faces and of their emotional expressions (e.g., Marsh, Elfenbein, & Ambady, 2003). For example, emotions are better identified in ingroup compared to outgroup faces (Young & Hugenberg, 2010). This occurs in part because perceivers are more motivated to process ingroup relative to outgroup faces and this enhanced motivation translates into a superior processing style (configural) for ingroup relative to outgroup faces (Young & Hugenberg, 2010).

The current study proposes that low-status increases the motivation to process and identify angry faces. To test this hypothesis I used a face-inversion paradigm (e.g.,

Teunisse & de Gelder, 2003). Configural processing (i.e., processing the spatial relations between facial features) is presumed to contribute to efficacious face processing and superior face recognition accuracy (Tanaka, Kiefer, & Bukach, 2004). Inverting faces disrupts configural processing and dampens the perceiversô ability to identify facial expressions (McKelvie, 1995). However, given enough motivation and processing capacity (e.g., encoding time) perceivers can overcome the disruption caused by face inversion (Hugenberg & Corneille, 2009; see also Palermo & Rhodes, 2002). In particular, should there be sufficient motivation; any additional processing resources will be redirected to the encoding of inverted faces thereby allowing better identification of these faces.

In the present study I manipulated the orientation (upright, inverted) of the faces and the amount of time participants had to encode the faces. I hypothesised that status differentially affects the allocation of attentional resources to the processing of angry faces, but not to the processing of other negative emotions. I expected low-status participants to overcome the inversion effect for angry faces, shown by superior expression identification for inverted angry faces, when given enough time to process these faces.

Method

Participants and design. Sixty participants recruited from the online subject pool from UCL received monetary compensation for participation. Four participants with an overall mean accuracy lower than 3 *SD* of the sample were excluded. The remaining 56 participants (44 females, 12 males, M_{age} = 21.89) were randomly assigned to the status and face orientation conditions. The study employed a 2 (Status: high, low) x 2 (Orientation: upright, inverted) x 4 (Facial expression: angry, sad, fearful, happy) x

2 (Time: 250ms, 500ms) mixed-model design, with repeated measures on the last two factors. There were no effects of participant gender, which are not discussed further.

Materials. Twenty (10 female, 10 male) target identities were taken from the Karolinska Directed Emotional Faces (KDEF) database (Lundqvist, Flykt, & Öhman, 1998) and served as stimuli. These images were photographs of amateur actors between 20 and 30 years of age with no beards, moustaches, earrings, eyeglasses or visible make-up, all wearing grey T-shirts. Each target identity displayed anger, happiness, sadness, and fear, for a total of four expressions per identity, or 80 target images total. (see Appendix V for examples). The image (including the frame) measured 6. 7cm x 8. 6 cm and was centred on the screen. All stimuli and instructions were presented on a computer screen, using E-Prime software package (Schneider, Eschman, & Zuccolotto, 2002) and were viewed by participants from a distance of approximately 60cm.

Procedure. After providing informed consent, participants completed the entire experiment in individual cubicles. Participants were told that the experiment was designed to look at the relationship between social interactions and social perception. Participants were told that the experiment consisted of two phases, the first phase involved describing a recent social interaction they had; the second phase involved an emotion-identification task.

Status manipulation. The status manipulation procedure for the high-status and low-status conditions was identical to Study 1.

Expression identification task. After completing the status manipulation task, participants proceeded to the emotion-identification phase of the experiment. Participants were informed that they would be presented with faces of other people. Their task was to use the keyboard to identify which emotion was expressed by each target. Both accuracy and speed were emphasized in the instructions. The expression

identification task consisted of 80 trials (10 facial identities, each expressing four different emotions, presented onscreen one at a time). On half (40) of these trials, each face was presented for 250ms, and on the remaining half, the faces were presented for 500ms.

On each trial, a fixation cross was presented at the centre of the computer screen for 1000ms. Next, the stimulus face was presented. After 250 or 500 ms the face was replaced by a blank grey square for 1000ms. Finally, participants identified the emotion of the previous face, and were given reminders of the emotion-key mappings. The next trial began immediately after participants responded.

Results and Discussion

Manipulation check. Participants indication of their perceived standing on the ladder served as the manipulation check scores; the bottom rung was coded as ñ1ò, and the top rung was coded as ñ10ò. The manipulation check scores were subjected to an independent-samples *t*-test. Participants in the high-status condition reported significantly greater perceived status (M = 6.21, SD = 1.05) compared to participants in the low-status condition (M = 5.37, SD = 1.80), $t(54) = 2.14$, $p < .05$, $d = .58$. This indicates that the status manipulation was successful.

Emotion identification accuracy. Participantsô percentages of correctly identified emotions were calculated separately for each facial expression. These scores were submitted to a 2 (Status: high-status, low-status) x 2 (Face orientation: upright, inverted) x 4 (Emotion expression: anger, happiness, sadness, fear) x 2 (Encoding duration: 250ms, 500ms) mixed-model analysis of variance (ANOVA) with status and facial orientation as between-subjects factors.

This analysis revealed three significant main effects. First, a main effect of emotion expression, $F(3,156) = 42.69$, $p < .001$, $\eta_p^2 = .45$, showed that the happy emotion was the most accurately identified compared to the other emotions ($M_{happy} = 97.38$, $M_{sad} = 83.53$, $M_{angry} = 72.75$, $M_{fear} = 72.05$). This result replicates the well-established happy face advantage in expression identification (e.g., Kirita & Endo, 1995). The main effect of emotion type was not moderated by status, $F(3,156) = 1.48$, $p = .22$. Second, there was a main effect of encoding duration, $F(1,52) = 16.95$, $p < .001$, $\eta_p^2 = .25$, with participants more accurately identifying the facial expressions when presented for 500ms ($M = 80.72$, $SD = 15.55$) compared to 250ms ($M = 74.86$, $SD = 16.12$). Third, the analysis revealed the expected main effect of face orientation, $F(1,52) = 33.05$, $p < .001$, $\eta_p^2 = .39$, with upright faces ($M = 87.83$, $SD = 7.68$) being identified more accurately than inverted faces ($M = 74.16$, $SD = 8.73$). There were several other lower order effects, all of which were qualified by the marginally significant four-way interaction between status condition, face orientation, encoding duration, and facial expression $F(3, 156) = 2.50$, $p = .062$, $\eta_p^2 = .05$. Separate analyses for high- and low-status participants revealed that for high-status participants, there was a facial expression and orientation interaction, $F(3, 81) = 3.71$, $p < .02$, $\eta_p^2 = .45$ but the three way interaction between facial expression, orientation and encoding duration was not significant, $F(3, 81) = .79$, $p > .5$. In contrast, the analyses with low-status participants revealed not only a facial expression and orientation interaction, $F(3, 75) = 3.92$, $p < .02$, $\eta_p^2 = .48$, but crucially also a three-way interaction between facial expression, orientation and encoding duration interaction, $F(3, 75) = 3.61$, $p < .02$, $\eta_p^2 = .13$.

My hypothesis proposed that status differentially affects the allocation of attentional resources to the processing of angry faces but not to the processing of other

negative emotions. In addition, I was interested in comparing the amount of processing effort allocated to each emotional expression. To test this hypothesis, separate analyses were conducted for each emotional expression.

Angry faces. The 2 (Status: high-status, low-status) x 2 (Face orientation: upright, inverted) x 2 (Encoding duration: 250ms, 500ms) mixed-model analysis of variance (ANOVA) with status and facial orientation as a between-subjects factor for angry faces revealed a significant main effect of time, $F(1,52) = 9.87$, $p < .01$, $\eta_p^2 = .16$, in which participants were more accurate when the angry faces were presented for 500ms ($M = 77.83$, $SD = 22.71$) than when they were presented for 250ms ($M = 67.68$, $SD = 30.62$). There was also a significant main effect of orientation, $F(1,52) = 26.22$, $p < .01$, $\eta_p^2 = .34$, in which participants were more accurate for upright angry faces ($M = 84.81$, $SD = 14.41$) compared to inverted angry faces ($M = 58.84$, $SD = 23.40$). Crucially, a significant three-way interaction between encoding duration, status and facial orientation emerged, $F(1, 52) = 4.28$, $p < .05$, $\eta_p^2 = .08$ emerged. Further analyses were conducted for high- and low-status participants separately to gain a better understanding of the nature of this 3-way interaction.

As predicted, the main effect of encoding duration, $F(1,25) = 11.41$, $p < .01$, $\eta_p^2 = .31$ and interaction between encoding duration and face orientation, $F(1,25) = 11.94$, $p < .01$, $\eta_p^2 = .32$, was only significant for low-status participants and not for high-status participants. At 250ms, low-status participants were significantly better at recognising upright angry faces ($M = 88.61$, $SD = 13.42$) than inverted angry faces ($M = 46.50$, $SD = 28.45$), $F(1,25) = 24.79$, $p < .001$, $\eta_p^2 = .5$. However, facial orientation did not significantly affect recognition at 500ms, $F(1,25) = 1.59$, $p > .22$. In addition, the recognition accuracy of low-status participants significantly improved when inverted angry faces were presented for 500ms ($M = 79.53$, $SD = 22.36$) compared to

250ms (M = 46.5, SD = 28.45), $F(1,13) = 14.28$, $p < .01$, $d_p^2 = .543$. Low-status participants did not show significant improvement in accuracy when presentation time increased from 250ms to 500ms in the upright condition, $F(1,13) = .01$, $p > .9$.

Furthermore, a comparison between high and low-status participants revealed that when faces were upright, status did not affect the identification of angry faces, $F(1, 28) = 1.68$, $p > .2$. However, when the faces were inverted, and configural processing was difficult, a significant interaction between encoding duration and status emerged, $F(1, 24) = 5.88$, $p < .05$, $d_p^2 = .20$. As expected, planned comparisons revealed that at 250ms, there was no significant difference between high and low-status individuals. However, at 500ms, low-status participants (M = 79.53, SD = 22.36) were significantly better at identifying inverted angry faces than high-status participants (M = 58. 57, SD = 28.57), $t(24) = -2.09$, $p < .05$. $d = -.85$. This result is consistent with the notion that low-status participants invested more effort during the processing of angry faces. On the other hand, high-status participants did not show enhanced motivation to accurately identify angry faces. Together these results indicate a top-down advantage for low-status individuals during the processing of angry faces.

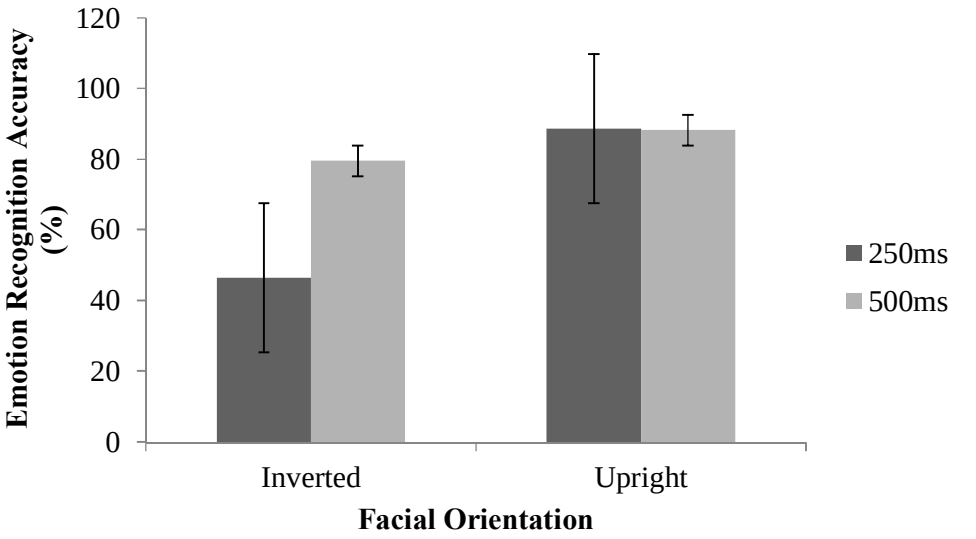

Figure 3.3. Emotion recognition accuracy (%) and standard errors for angry faces as a function of face orientation and presentation duration for the low-status condition in Study 4; error bars representing the standard error of the mean.

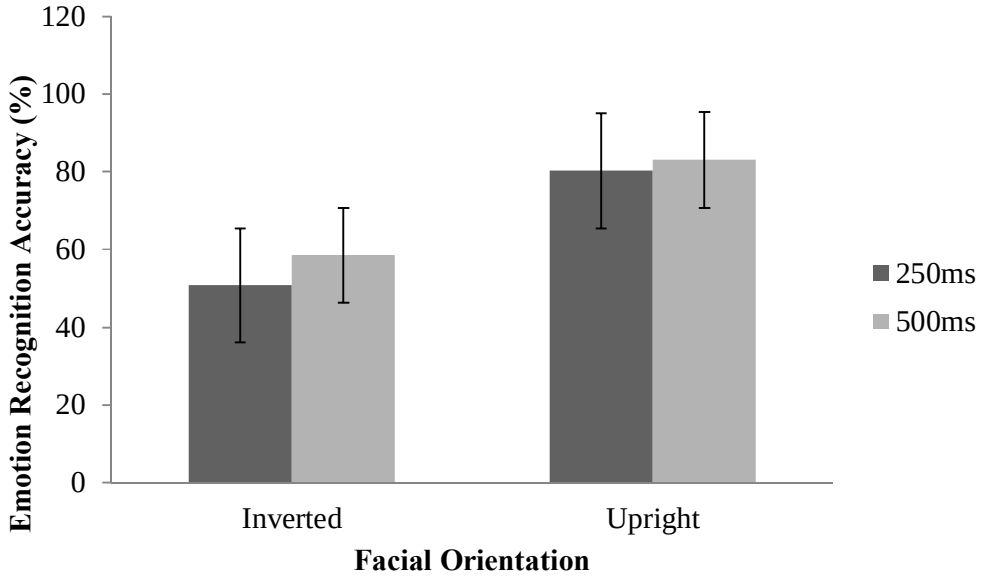

Figure 3.4. Emotion recognition accuracy (%) and standard errors for angry faces as a function of face orientation and presentation duration for the high-status condition in Study 4; error bars representing the standard error of the mean.

Sad, fearful, and happy faces. A 2 (Encoding duration: 250ms, 500ms) x 2 (Face orientation: upright, inverted) x 2 (Status: high-status, low-status) repeated measures ANOVA with facial orientation and status as between subjects factor revealed no significant interactions with status for sad, fearful, and happy faces, and therefore were not analysed any further.

The current results indicate that the effects of status are specific to angry faces. Low-status participants, compared to high-status participants, more accurately recognised angry faces, even when presented in an inverted orientation. They did not show a generalised negativity bias. The effects of status on angry faces occurred as a result of differential motivation to redirect attentional resources to the processing of angry faces, more so than to other facial expressions.

In addition, past studies have also shown that adults only demonstrate the detection advantage for angry faces when they are presented in an upright orientation; they are no longer quicker at detecting angry faces compared to happy faces when the faces are inverted (Fenske & Eastwood, 2003). The current study highlights the role of top-down motivation in processing of emotional faces such that the processing advantage for angry faces can be sustained even when the faces are inverted.

Finally, studies 3 and 4 complement studies 1 and 2 and provide stronger evidence of a bias that is specific to perceptions of social threat rather than general negative valence in low-status participants.

3.3 Study 5

Study 3 demonstrated that low-status individuals prioritised the processing of angry faces even when doing so interfered with a focal task. Study 4 found that low-status individuals invested top-down effort in order to accurately identify angry faces. In both studies the faces were centrally presented and participants did not need to orient their attention to the faces. Furthermore, angry faces did not compete for attention with other social stimuli. In addition, it has been proposed that while tasks like the one used in Study 3 measures attentional resource allocation, it was also confounded by effortful control. For example, the increase in interference from angry faces in the low-status condition could be due to attentional avoidance or attentional vigilance to threat. That is, the longer time low-status participants took to categorise the letter strings may reflect either the motivation to suppress the processing of threatening background faces or the motivation to direct attention towards the processing of angry faces. More importantly, it is unclear from Studies 3 and 4, whether the threatening faces were processed automatically during early stages of attention deployment, or if strategic attentional intervention interacted with reactive processing.

Given the power of social stimuli, in particular faces, to attract attention (Ro, Russell, & Lavie, 2001), and the propensity of low-status individuals to be socially attentive (Fiske, 1993; Guinote, 2001), it is possible that the increased sensitivity to angry faces of low-status individuals would no longer occur when angry faces compete for attention with other faces simultaneously present. In Study 5, I examined attention orientation to threatening faces, when threatening and non-threatening faces are presented simultaneously and compete for attention. An attentional bias towards angry faces emerged under these circumstances provides a more robust test to the hypotheses

that low-status individuals give priority to the processing of angry faces among other emotional expressions.

The influence of emotional relevance of a social stimulus on the orientation of attentional resources is well established (Taylor & Fragopanagos, 2005; Vuilleumier, 2005; Yiend, 2010). The dot-probe paradigm (MacLeod et al., 1986) is one of the most commonly use paradigm to investigate the relationship between attention and emotion on selective attentional processes. The dot-probe method was initially developed with the use of auditory probes by Halkiopoulos (1981) to investigate the relative allocation of attentional resources to threatening auditory information, when threatening and non-threatening information was presented simultaneously to both ears in a dichotic listening task (see Eysenck, MacLeod, & Mathews, 1987; Mathews, 1990). In the visual version of this method used here (Mathews & Mackintosh, 1998; Mogg & Bradley, 1999), participants were presented with pairs of faces (happy-neutral or angry-neutral, in counterbalanced locations), followed by a probe that replaces one of the faces. Selective allocation of attentional resources to the angry face would be reflected in faster RTs when the probe replaces the angry face (vs. the neutral face). That is, when the probeôs location is congruent with the angry faceôs location (see Lipp & Derakshan, 2005). Such a pattern of response shows *vigilance* to angry faces. Vigilance occurs when perceivers are motivated to selectively orient attention to the target cues. It often precedes the preparation of a response that actively copes with the threat. In contrast, delayed responses to probes that replace an angry (vs. neutral) face at the same location would reflect an *avoidance* pattern. Avoidance occurs when perceivers are motivated to prevent objective evaluation of the threatening cues (Mogg, Bradley, de Bono, & Painter, 1997).

As previously noted, attention is not a unified construct. It comprises processes that allow capture of attention and also processes that allow holding of attention. Past findings that have been attributed to the *capture* component of attention have recently been called to question and the role of the *hold* component of attention takes precedence. Indeed, an increasing number of empirical studies in the attention research are devoted to distinguishing between stimuli that captures attention versus stimuli that holds attention. For example, Fox and colleagues (e.g., Fox, Russo, Bowles, & Dutton, 2001; Fox, Russo, & Dutton, 2002) highlighted the inadequacy of common attentional paradigms such as the Stroop task in disentangling between automatic attention orientation towards a stimuli during the pre-attentive scan, or whether once attention has been engaged, there is difficulty in disengaging it.

Furthermore, according to the cognitive-motivation model by Mogg and Bradley (1998), a valence evaluation system controls the deployment of attention during the processing of threatening stimuli. This process does not consist as a unitary preconscious attentional orientation, but rather a system of multiple levels of processing ranging from early attentional deployment to strategic cognitive mechanisms that enables disengagement of on-going focus of attention to the switching of attention to goal-relevant stimuli.

Taken together, it is possible that enhanced processing for angry faces may arise from biases that may occur at any of the multiple stages. To that end, the dot probe task used in the current study aimed to determine whether attentional biases triggered by status occur in the early and/or late stages of attentional processing, and whether the direction of these biases (i.e., vigilance or avoidance) varies across these information-processing stages. This was examined by varying the presentation duration of the facial stimuli (100ms, 500ms, and 1250ms). Following an active motivational account of the

effects of status, I hypothesised that a low-status position would lead to vigilance to angry faces, shown at the longer stimulus duration, as a result of a strategic top-down orienting of attention.

The current study also aimed to examine whether the difference in sensitivity towards angry faces induced by status are due to an increase in sensitivity in the low-status condition, or a decrease in sensitivity in the high-status condition. To this end the study incorporated a control condition. Finally, Study 5 examined the contributions of mood, self-esteem and rejection sensitivity to the effects of status on selective attention to angry faces. Sensitivity to threatening faces could be the result of heightened rejection sensitivity (Burklund et al., 2007), low perceived self-worth (Li & Yang, 2013) or negative affect (Ewbank et al., 2009).

Method

Participants and design. Sixty-three participants recruited from the UCL subject pool were paid for participation. Two participants were excluded because of an error with the experimental program. The analyses were based on the remaining 61 participants (38 females, 23 males, M_{age} = 26.4). Participants were randomly assigned to a high-status (n = 20), low-status (n = 22) or control condition (n = 19). This study employed a 3 (Status: high, low, control) x 2 (Face type: angry, happy) x 2 (Congruency: congruent, incongruent) x 3 (Stimulus presentation time: 100ms, 500ms, 1250ms) mixed-model design, with repeated measures on the last three factors. There were no effects of participant gender, which are not discussed further.

Materials. Thirty pictures were taken from the Ekman and Friesen (1976) set of emotional expressions. The pictures comprised ten individuals (5 females) each posing angry, happy, and neutral facial expressions with gaze directed into the camera. The

external features of each of the faces were removed and the internal features were presented in a grey rectangular frame. The image size (including the frame) measured 6.7cm x 8.6cm and was centred on the screen. Each emotional face (angry or happy) was paired with a neutral face of the same gender identity. The face pair was placed on a white background, side-by-side, separated by 5cm. Two versions of each face-pair were created with the relative position switched so that each face could appear in either location (left or right). All stimuli and instructions were presented on a computer screen, and were viewed by participants from a distance of approximately 60cm. This task was programmed and presented using an E-Prime software package (Schneider et al., 2002).

Procedure. After providing informed consent, participants completed the entire experiment in individual cubicles. The study was described as an experiment designed to investigate social cognitive processing and social factors that may influence this process. More specifically, the study ostensibly investigated the relationship between the different types of social interactions people have in their daily lives and social cognitive processes involving faces. There were three parts to this experiment. Firstly, participants completed the status manipulation task. Next, they completed the dot probe task. Finally, they were given a set of questionnaires to complete.

Status manipulation. The status manipulation procedure for the high-status, low-status and control conditions was identical to Study 1.

Dot-probe task. After the status manipulation, participants completed the dot-probe task. Each trial started with a fixation-cross presented in the middle of the screen for 1000ms. A pair of faces, with margins of 2.2cm from the centre of the screen appeared then for 100ms, 500ms or 1250ms at the left or right side of the screen. This was then followed by 3 dots that appeared on either side (left or right) of the screen.

Participantsô task was to identify whether the dots were horizontally or vertically orientated by pressing one of two response keys on the keyboard. It was emphasized that the face was irrelevant to the task and should be ignored. The dots remained on the screen for two seconds or until a response was made (Figure 3.5). Participants were given 12 practice trials to familiarise themselves with the procedure. This was followed by 240 test trials with a break in the middle. There were a total of 12 conditions, with 20 test trials each: two emotional facial expressions (angry, happy), two probe position/congruency (the location of the emotional face/congruent, the location of the neutral face/incongruent), and three presentation times (100ms/500ms/1250ms). Presentation of trials was fully randomized, and type of probe (horizontally or vertically orientated) was counterbalanced across participants.

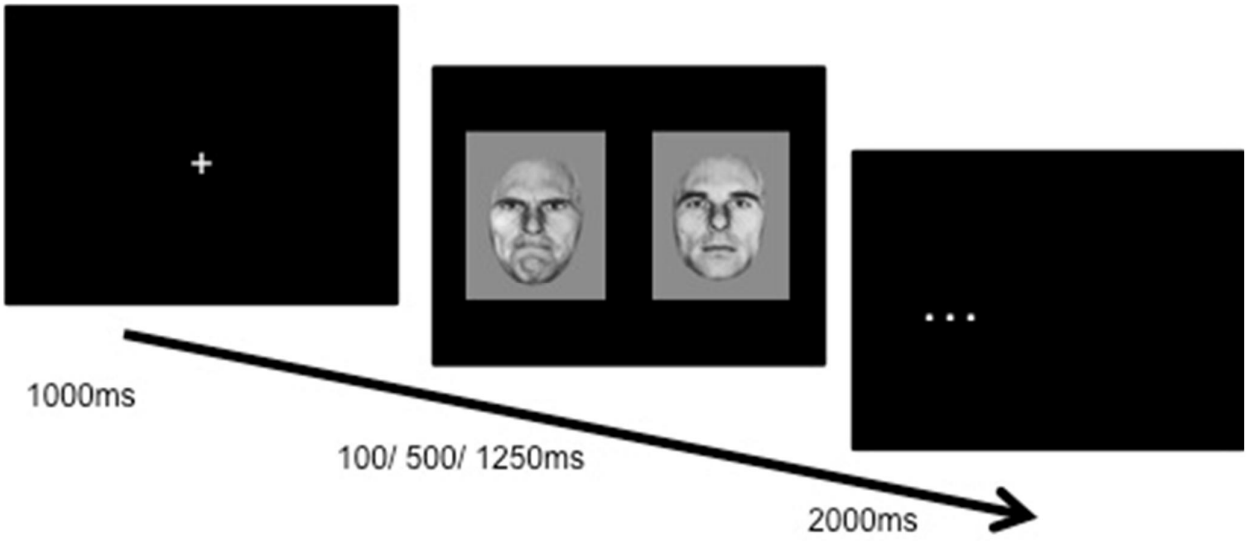

Figure 3.5. Trial sequence of dot-probe task in Study 5. Trial onset was indicated by a fixation cross. This is followed by the presentation of the face-pair (in this example, an angry face paired with a neutral face). Next, a probe replaces the location occupied by one of the faces. Participants then indicate using labelled keys on the keyboard whether the probe was horizontally or vertically orientated.

Next, participants completed the Brief Mood Introspection Scale (BMIS; Mayer & Gaschke 1988), the Contingencies of Self-Worth (CSW; Crocker, Luhtanen, Cooper, & Bouvrette, 2003), and the Adult-Rejection Sensitivity Questionnaire (A-RSQ; Downey & Feldman, 1996). The BMIS consist of 16 adjectives (Ŭ = .60), measuring current emotional state relative to the pleasant-unpleasant and arousal-calm dimensions. Participants are asked to rate how well each adjective describes their present mood using 4-point Likert scales ranging from 1 (*definitely do not feel*) to 5 (*definitely feel*). The CSW is a 35-item scale (Ŭ = .91) assessing seven contingencies on which people typically base their self-worth on: Appearance, Othersô Approval, Academic Competence, Godôs Love, Competition, Virtue, and Family Support. Each domain subscale consists of five items, which were completed on a 7-point Likert scale ranging

from 1 (*strongly disagree*) to 7 (*strongly agree*). Participants also completed the A-RSQ (see Study 1) (Ŭ = .83). The order of the questionnaires was counterbalanced across participants. Upon completion, participants were checked for suspicion, carefully debriefed, paid and thanked.

Results and Discussion

Manipulation check. As described in Study 1, participants perceived position on the social ladder served as the manipulation check scores. Participants in the high-status condition reported significantly greater perceived status position (M = 6.40, SD = 1.82) compared to participants in the low-status condition (M = 4.32, SD = 1.32), $t(40) = 4.27$, $p < .001$, d = 1.35. This indicates that the status manipulation was successful.

Reaction times. The data analysis for this task was based on RTs for correct responses. Individual outliers, defined as RTs that deviated more than three *SD* from the individual mean RT, were removed. Data from trials with errors and outliers were discarded and not analysed further. Error rates did not differ across status conditions, p = .460. Errors and outliers accounted for 4% of the data.

To test the main hypothesis of a difference in selective attention allocation to angry facial expressions across status conditions, mean RTs were first subjected to a 2 (Face type: angry, happy) x 2 (Congruency: congruent, incongruent) x 3 (Face presentation time: 100ms, 500ms, 1250ms) x 3 (Status: high, control, low) repeated measures ANOVA with status as the between-subjects factor. This analysis yielded a significant main effect of presentation time, $F(2, 116) = 9.72$, $p < .001$, $\eta_p^2 = .14$ such that RTs were fastest when the stimuli was presented for 100ms (M = 606.57, SD = 86.16), followed by 1250ms (M = 617.38, SD = 85.41), and finally by 500ms (M = 623.95, SD = 86.74). This main effect was qualified by a marginally significant four-

way interaction between congruency, emotional face type, presentation time, and status, $F(4, 116)= 2.26$, $p = .067$, $\eta_p^2 = .07$.

Further analyses were conducted for high- and low-status and control participants separately to gain a better understanding of the nature of this 4-way interaction. High-status and control participants did not show differential allocation of attention across face types across the presentation durations, $F(2, 38)= 2.03$, $p = .15$ and $F(2, 36)= .18$, $p = .84$ respectively. In contrast, for low-status participants the expected three-way interaction between face type, congruency and time was significant, $F(2, 42) = 3.36$, $p < .05$, $\eta_p^2 = .14$.

To establish attentional biases, RTs on congruent trials were subtracted from RTs on incongruent trials (MacLeod & Mathews, 1988). A positive bias score reflects attention towards the emotional face (i.e., vigilance); a negative bias score reflects attention away from the emotional face (i.e., avoidance) (See Table 3.3).

Table 3.3

Mean Attentional Bias Scores and Standard Deviations (in ms) as a Function of Face Type and Status at 100ms, 500ms, and 1250ms Presentation Durations in Study 5

Status	Face type	Presentation duration (ms)	Attentional bias scores (*SD*)
Low	Angry	100	- .910 (32.51)
		500	-8.69 (45.47)
		1250	16.99 (37.52)
	Happy	100	-3.56 (25.88)
		500	3.60 (30.38)
		1250	-6.92 (34.28)
Control	Angry	100	.68 (37.83)
		500	-11.37 (59.11)
		1250	- .15 (33.21)
	Happy	100	10.23 (38.29)
		500	4.76 (40.59)
		1250	6.74 (43.29)
High	Angry	100	12.53 (31.61)
		500	11.94 (33.05)
		1250	-1.18 (32.82)
	Happy	100	-2.23 (20.67)
		500	4.73 (43.54)
		1250	11.49 (38.42)

To investigate the time-course of attention to emotional faces, three 3(Status: high, low, control) x 2(Face type: angry, happy) repeated measures ANOVAs, with face type as the within subject factor, were performed on the attentional bias scores, for each face presentation time condition separately. Using one-sample *t*-tests, the bias scores across all conditions were also compared with zero (zero = no attentional bias) to

assess the significance and direction of an attentional bias. To further examine the specificity of attentional bias, paired *t*-test was carried out for each status condition separately.

100 ms and 500ms. The 3 x 2 ANOVA on attentional bias scores revealed no significant main or interaction effects

1250 ms. In this condition, the 3 x 2 ANOVA on attentional bias scores revealed a significant interaction between status and face type, $F(2, 58) = 3.34$, $p < .05$, $\eta_p^2 = .10$. (See Figure 3.6). Of interest, this interaction showed the predicted pattern of attentional bias for angry faces with low-status participants demonstrating positive attentional bias ($M = 16.99$, $SD = 37.52$), while participants in the high-status ($M = -1.18$, $SD = 32.82$) and control conditions ($M = -.15$, $SD = 33.21$) showed negative attentional bias towards angry faces. In contrast, low-status showed negative attentional bias ($M = -6.92$, $SD = 34.28$), while participants in the high-status ($M = 11.49$, $SD = 38.42$) and control conditions ($M = 6.74$, $SD = 43.29$) showed positive attentional bias towards happy faces. A positive attentional bias score suggests a vigilance pattern of attentional bias, whereas a negative attentional bias score suggest an avoidance pattern of attentional bias. In order to determine whether the vigilance and avoidance pattern observed was significant or not, the attentional bias scores were compared against zero in a one-sample *t*-test for each status condition respectively. Comparison of the bias scores against zero indicated a significant vigilance pattern for angry faces in low-status, $t(21) = 2.12$, $p < .05$, $d = .93$. No effects were found for the high-status and control condition. The lack of biases found for control and high status participants using the dot-probe task is not uncommon (e.g., Mogg & Bradley, 1999). Overall, the results indicate that low-status participants showed enhanced vigilance to angry cues,

and that this vigilance was not automatic but was a result of an effortful top-down control of attention.

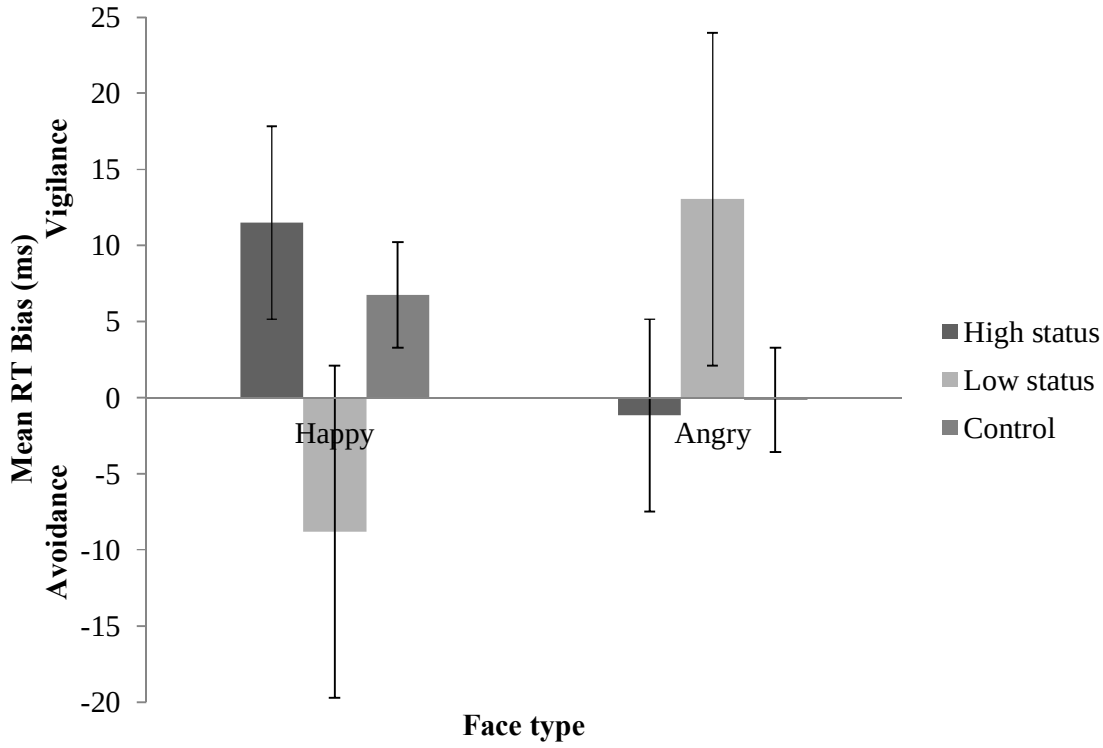

Figure 3.6. Mean attentional bias scores (ms) as a function of face type and status conditions at 1250ms presentation duration in Study 5; error bars representing the standard error of the mean.

Note: A positive bias score reflects attention towards the emotional face (i.e., vigilance); a negative bias score reflects attention away from the emotional face (i.e., avoidance).

To test whether the observed findings were due to changes in mood, feelings of self-worth, or rejection sensitivity, ANOVAs with status as the independent measure were conducted on the scores of the BMIS scale, the Contingencies of Self-Worth Scale and the A-RS scale respectively. Results revealed no significant differences between the status conditions across the pleasant-unpleasant dimension ($p > .2$) and the arousal-

calm dimension ($p > .5$) of the BMIS scale. There were also no differences on the contingencies of self-worth (all $ps > .1$). Participants across status conditions also did not differ in terms of rejection sensitivity ($p > .6$). These findings suggest that the effects of low-status on vigilance towards angry faces were not due to differences in emotional experience, feelings of self-worth and rejection sensitivity.

To summarise, a low-status position was associated with attentional vigilance to angry faces, even when these faces competed for attention with other faces. This pattern was not observed for high-status participants or participants in the control condition. Furthermore, the responses of high-status and control participants did not differ from one another, demonstrating that the effects of status on attentional biases to threatening faces derive from being in a low-status position. Furthermore, consistent with the results of Study 4, low-status participants displayed an increasing pattern of vigilance towards angry faces that involved motivated, strategic processes (1250ms) rather than an automatic, initial shift in attention (100ms, 500ms). Past studies have suggested that the presentation duration of 1250ms is long enough for strategic processes to occur, such as allocating attention away from threat or recovering from interference (Schrooten & Smulders, 2010; Lonigan & Vasey, 2009). Moreover, the attentional biases of low-status individuals occurred for the neutral- and angry-face pairs and not for the neutral- and happy-face pairs. This result was particularly important given that in Study 3 low-status participants showed increased sensitivity to both angry faces and happy faces. The current result suggests that low-status participants prioritised the processing of angry faces, given that they showed a bias in the attentional processing of angry faces (vs. neutral) faces, but not in the processing of happy (vs. neutral) faces.

3.4 Study 6

Study 6 was designed to further investigate the components of visual attention towards angry faces found in Study 5. Study 5 did not incorporate dual neutral face pairs (i.e., trials that consist of two neutral faces presented side-by-side). Therefore, it was not possible to compare attention to angry and happy faces to attention to neutral faces. This comparison is necessary to distinguish whether low-status participants had elevated awareness of social threat in the environment or greater difficulty in disengaging attention from social threat upon encountering it (Koster, Crombez, Verschuere, Van Damme, & Wiersema, 2006).

Posner and colleagues (e.g., Posner & Peterson, 1990) have demonstrated that attention to a new stimulus consists of three distinct operations: (1) an initial orienting of attention to the stimulus (i.e., shift component); (2) focusing of attention on the stimulus (i.e., an engagement component); and (3) directing attention away from the stimulus (i.e., a disengagement component). The first two operations have been associated with attention capture processes, whereas the third operation has been linked to the ability to shift attention away from the stimulus (Fox, Russo, Bowles, & Dutton, 2001). The present study separates these components of attention to better understand the motives triggered by a low-status position.

A stronger engagement or attentional focus on targets displaying angry expressions (see Koster et al., 2006) would indicate elevated awareness of hostile social stimuli in the environment. This elevated awareness is akin to an activation of the threat detection system, which may predispose an individual to detect threat in ambiguous social situations (MacDonald & Leary, 2005). It would be an adaptive response consistent with the greater base rates of hostility that low-status individuals usually encounter in the environment. Given the links between status and aggression across

species, such attentional pattern could derive from longstanding evolutionary pressures (Cummins, 2005).

Alternatively, low-status individuals may have more difficulty than other individuals in disengaging attention from signals of anger upon encountering them. Patterns of impaired ability to disengage from threat are not adaptive and are common in clinical cases, such as in highly anxious individuals (Koster, Crombez, Verschuere, & De Houwer, 2004). Given the debate regarding the association between low-status and negative affect (Adler, Epel, Castellazzo, & Ickovics, 2000), as well as reduced self-esteem (Crocker & Major, 1989), it would be possible that a low-status position leads to a dysfunctional pattern of attentional sensitivity to social threat. Importantly, the excessive dwelling on threatening stimuli that comes with disengagement difficulties would slow down behavioural responses necessary for necessary adaptation to a hostile environment. It would hinder the allocation of attention needed to initiate defensive action required to overcome this threat.

Engagement and disengagement patterns of attention have been found in a variety of conditions (Koster et al., 2006; Maratos, 2011; Van Damme, Crombez, Eccleston, & Koster, 2006). To illustrate, threat related states, such as those caused by anxiety, pain, or phobia, vary in attentional patterns of vigilance. These variations are proposed to be related to different priorities and adaptive strategies that follow engagement and disengagement processes. For example, through studying hypervigilance to pain in healthy individuals, Van Damme et al (2006) found that attentional vigilance to pain signals emerges as a result of enhanced processing (engagement) once a pain signal is detected, rather than rapid initial shifting to the pain signal. This result suggests that the anticipation of pain plays a central role in pain processing, which evolved from evolutionary pressures and has a protective function.

On the other hand, socially anxious individuals initially orient attention toward threat but then quickly shift attention away to alleviate anxious mood (Mogg et al., 1997; Mogg, Matthews, & Weinman, 1989).

In the context of social status, I predicted that a sense of low social regard triggers a motivation to detect and respond to objective social hostility potentially present in the environment. Low-status individuals should therefore show increased alertness and hypervigilance to angry faces, reflected in a greater ability to focus attention (i.e., in enhanced engagement) on signals of social threat. Low-status individuals should not show maladaptive attentional patterns, in particular an avoidant pattern of attention to angry faces. This hypothesis is consistent with the results of Studies 3, 4 and 5, indicating that low-status did not primarily associated with negative emotional dwelling, low self-esteem or fear of rejection.

To identify whether the attentional strategies observed in Study 5 were driven by attentional engagement or disengagement processes, Study 6 employed a similar dot-probe task, with the addition of trials that contained two neutral faces. By including pairs of neutral faces I created a baseline comparison that allowed us to distinguish between engagement and disengagement processes. Attentional engagement to angry faces would be indicated by faster response times on congruent angry-neutral face trials (i.e., trials in which the probe followed the angry face in the same location) compared to dual neutral baseline trials. In contrast, difficulty in disengaging attention from angry faces would result in slower response times for incongruent angry trials due to the time needed to shift attention from the threatening to the neutral location (Koster et al., 2004).

Study 6 also examined the contributions of the need to belong (Leary, Kelly, Cottrell, & Schreindorfer, 2012) and general trust (Yamagishi, 1998) to the effects on

attention. Individuals with low social status based on race and ethnicity tend to have higher levels of belonging uncertainty (Walton & Cohen, 2007) and tend to be less trusting of others compared to higher status individuals (Gheorghiu, Vignoles, & Smith, 2009). These factors could account for the present results.

Method

Participants and design. Seventy-five adults recruited from UCLôs departmental subject pool participated in this study and were compensated for their time. Six participants were excluded from the data analyses because of overall mean accuracy rates lower than 3 *SD* of the sample (n =5) and for suspicion of the status manipulation (n = 1). The analyses were based on the remaining 69 participants (51 females, 18 males, M_{age} = 23.56). Participants were randomly assigned to either a high-status (*n* = 24), low-status (*n* = 25) or control condition (*n* = 20). The study employed a 3 (Status: high, low, control) x 2 (Face type: angry, happy) x 2 (Congruency: congruent, incongruent) x 3 (Stimulus presentation time: 100ms, 500ms, 1250ms) mixed-model design, with repeated measures on the last three factors. There were no effects of participant gender, which are not discussed further.

Materials and procedure. The stimuli and procedure used in the current study were similar to that of Study 5. The only change pertains to the face pairs used in the experimental task. In the current study, participants were randomly presented with angry-neutral face pairs, happy-neutral face pairs, and neutral-neutral face pairs.

Upon completion of the dot-probe task, participantsô completed the Need to Belong Scale (Leary et al., 2012), which measures individual differences in belonging needs (Ŭ = .81). This scale asks participants to indicate the extent to which they agree with 10 statements on 5-point scales (1 = *strongly disagree* to 5 = *strongly agree*). Participants also completed the General Trust Scale (Yamagishi, 1998) (Ŭ= .70), which

consists of six items in which they are asked to indicate how much they think that others can be trusted on a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*). The order of the questionnaires was counterbalanced across participants. Upon completion, participants were checked for suspicion, carefully debriefed, paid and thanked.

Results and Discussion

Manipulation check. As described in Study 1, participants perceived position on the social ladder served as the manipulation check scores. Participants in the high-status condition reported significantly greater perceived status position (M = 5.83, SD = 1.43) compared to participants in the low-status condition (M = 4.80, SD = 1.87), $t(47) = 2.16$, $p < .05$, $d = .63$. This indicates that the status manipulation was successful.

Reaction times. Error rates did not differ across status conditions, $p > .1$ Errors and outliers (RTs that deviated more than three SDs from the individual mean RTs) were discarded from the analyses. Errors and outliers accounted for 8% of the data.

To test the main hypothesis of a difference in selective attention allocation to angry facial expressions across status conditions, mean RTs were first subjected to a 2 (Face type: angry, happy) x 2 (Congruency: congruent, incongruent) x 3 (Face presentation time: 100ms, 500ms, 1250ms) x 3 (Status: high, control, low) repeated measures ANOVA with status as the between-subjects factor. This analysis yielded a significant main effect of presentation time, $F(2, 132) = 12.27$, $p < .001$, $\eta_p^2 = .16$ such that RTs were fastest when the stimuli was presented for 100ms (M = 590.93, SD = 70.29), followed by 1250ms (M = 596.98, SD = 75.58), and finally by 500ms (M = 612.14, SD = 75.80). This main effect was qualified by a significant four-way

interaction between congruency, emotional face type, presentation time, and status, $F(4, 132)= 2.58$, $p = < .05$, $d_p^2 = .07$.

Similarly to Study 5, attentional bias indices were calculated for each face type by subtracting response latencies on congruent trials from response latencies on incongruent trials (MacLeod & Matthews, 1988). A zero score indicates no attentional bias, a positive attentional bias score indicates attention towards the emotional face, and a negative attentional bias score indicates avoidance of the emotional face. These scores were subjected to a 2 (Face type: angry, happy) x 2 (Congruency: congruent, incongruent) x 3 (Face presentation time: 100ms, 500ms, 1250ms) x 3 (Status: high, control, low) repeated measures ANOVA with status as a between-subjects factor. This analysis yielded several main effects which were qualified by a significant three-way interaction between emotional face type, presentation time, and status, $F(4,132) = 2.58$, $p < .05$, $d_p^2 = .07$ (see Table 3.4).

In order to clarify the source of this interaction, three 2 (Status: high, low, control) x 2 (Face type: angry, happy) repeated measures ANOVAs with face type as a within subject factor were performed on the attentional bias scores for each face presentation time condition separately. Using one-sample t-tests, the bias scores across all conditions were also compared with zero to assess the significance and direction of an attentional bias.

Table 3.4

Mean Attentional Bias Scores and Standard Deviations (in ms) as a Function of Face Type and Status at 100ms, 500ms, and 1250ms Presentation Durations in Study 6

Status	Face type	Presentation duration (ms)	Attentional bias scores (*SD*)
Low	Angry	100	2.47 (59.87)
		500	12.56 (62.42)
		1250	17.83 (34.57)
	Happy	100	13.02 (50.29)
		500	-1.93 (45.7)
		1250	-4.15 (57.49)
Control	Angry	100	40.54 (62.42)
		500	-2.24 (68.96)
		1250	-.94 (49.07)
	Happy	100	2.9 (65.2)
		500	-2.09 (79.3)
		1250	16.87 (70.14)
High	Angry	100	6.83 (44.86)
		500	4.97 (54.81)
		1250	-7.11 (40.15)
	Happy	100	12.13 (48.67)
		500	-8.82 (45.92)
		1250	26.8 (43.42)

Crucially, the current study aimed at extending the previous findings by identifying which components of visual attention contributed to the observed attentional bias of Study 5. To this end, I compared RTs on neutral face pairs with RTs on trials that contained an angry face. This comparison allowed us to test if vigilance

towards angry faces (i.e., preferentially holding attention at the hostile location) was due to enhanced attentional engagement or difficulty in disengagement.

100 ms and 500ms. The 3 x 2 ANOVA on attentional bias scores revealed no significant main effects or interactions.

1250 ms. The 3 x 2 ANOVA on attentional bias scores revealed the expected significant interaction between status and face type, $F(2, 66) = 3.83$, $p < .05$, $\eta_p^2 = .10$. (See Figure 3.7). Replicating the results of Study 5, low-status participants had a positive attentional bias, indicative of an attentional vigilance pattern, ($M = 17.83$, $SD = 34.57$). High-status ($M = -7.11$, $SD = 40.74$) and control ($M = -. 94$, $SD = 49.07$) participants had a negative attentional bias towards angry faces, typically associated with an avoidance pattern of attention. Comparison of the bias scores against zero indicated significant vigilance to angry faces in low-status participants, $t(24)= 2.58$, $p < .05$, $d = 1.1$. The negative attentional bias scores shown by high-status, $t(23)= - .86$, $p > .4$, and control, $t (23)= -.09$, $p > 9$, participants were not significant. In sum, once again low-status participants showed attentional vigilance towards angry faces only at 1250ms.

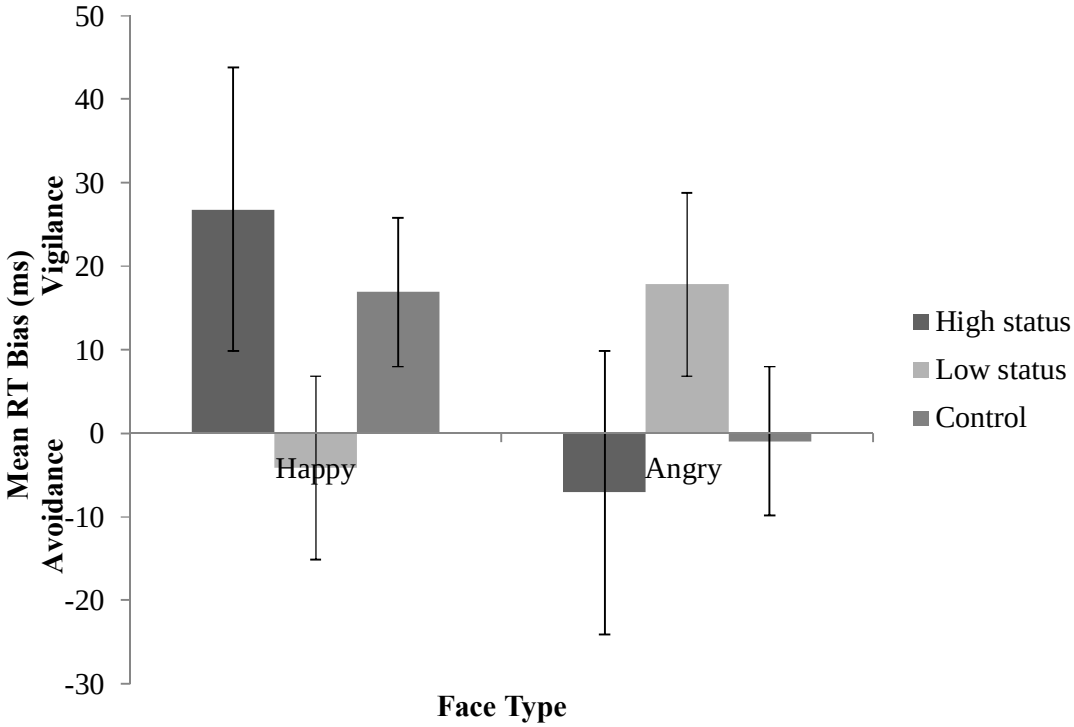

Figure 3.7. Mean attentional bias scores (ms) as a function of face type and status conditions at 1250ms presentation duration in Study 6; error bars representing the standard error of the mean.

Engagement and disengagement scores. In Study 6, RTs on congruent and incongruent angry face trials were compared to RTs on neutral trials to determine whether the attentional bias scores reflect enhanced attentional engagement or a difficulty to disengage attention. As predicted, in the low-status condition RTs on congruent angry face ï neutral trials (*M*= 566.08, *SD* = 71.68) were significantly faster than RTs on congruent dual neutral trials (*M*= 581.89, *SD* = 71.71), $t(24) = 2.08$, $p < .05$, $d = .85$.

For high-status participants, a one-sample t-test against zero revealed a significant positive bias scores for happy faces at 1250ms (*M*= 26.8, *SD* = 43.42), $t(23) = 3.02$, $p < .01$, $d = 1.26$. Furthermore, RTs on incongruent happy ï neutral faces at

1250ms trials (*M*= 608.90, *SD* = 72.11) were significantly slower than RTs on dual neutral trials at 1250ms (*M*= 587. 4, *SD* = 51.28), *t*(23) = -2.14, *p* < .05, *d* = .89. This result indicates that attentional bias towards happy faces at 1250ms was due to difficulty in disengagement from happy faces.

For control participants a significant positive bias scores for angry faces emerged at 100ms (*M* = 40.54, *SD* = 62.42), *t*(19) = 2.90, *p* < .01, *d* = 1.33. This indicates that these participants had a pre-attentive sensitivity to threat. This result is consistent with claims that threatening information can be processed automatically (Öhman et al., 2001). Furthermore, RTs on congruent angry ï neutral faces at 100ms trials (*M*= 590.50, *SD* = 56.12) were significantly slower than RTs on dual neutral trials at 100ms (*M*= 622.20, *SD* = 88.52), t(19) = -2.63, *p* < . 02, *d* = -1.21. This indicates that the attentional bias towards angry faces at 100ms was due to enhanced engagement in control participants.

As expected, participants in the low-status condition showed significant positive bias scores for angry faces at 1250ms (*M*= 17.83, *SD* = 34.57), *t*(24) = 2.58, *p* < .02, *d* = 1.05. Furthermore, RTs on congruent angry ï neutral trials (*M*= 566.08, *SD* = 71.68) were significantly faster than RTs on dual neutral trials (*M*= 581.89, *SD* = 71.71), *t*(24) = 2.08, *p* < .05, *d* = .85. (See Figure 3.8). This indicates that attentional bias towards angry faces at 1250ms was due to enhanced engagement.

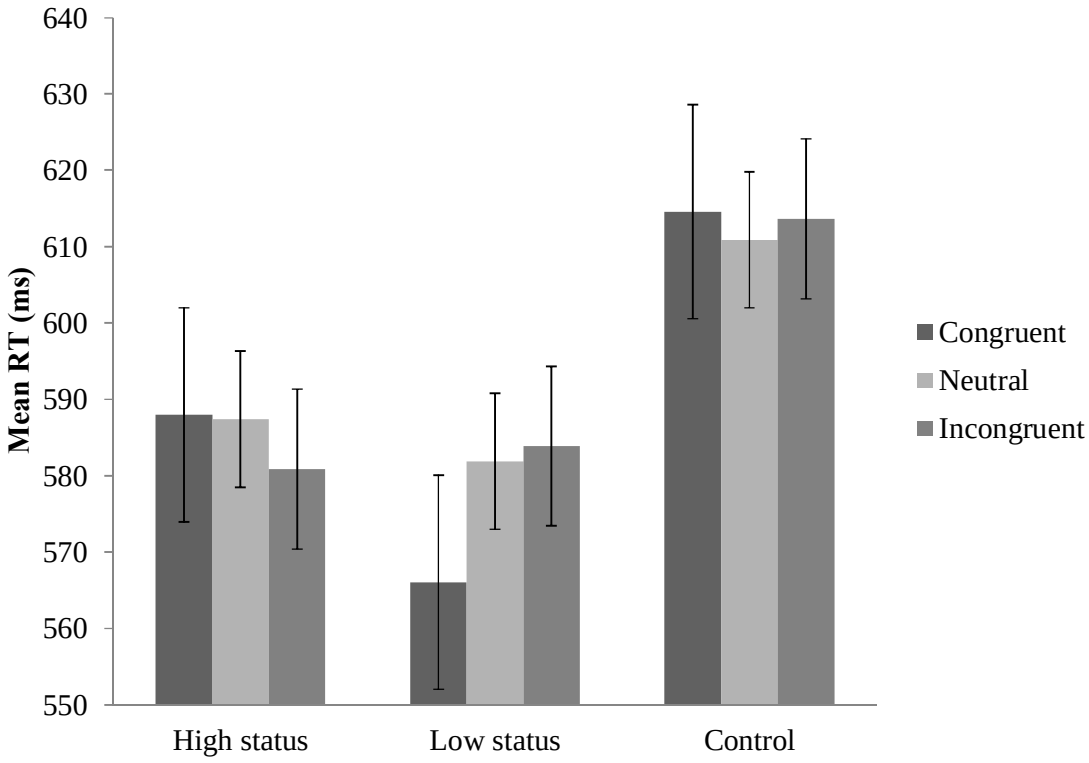

Figure 3.8. Mean RTs (ms) and standard errors on neutral, congruent and incongruent angry face trials as a function of status condition at 1250ms presentation duration in Study 6; error bars representing the standard error of the mean.

To test whether the observed findings were due to changes in need to belong or trust, two one-way ANOVAs were conducted on the scores of the Need to Belong Scale and General Trust Scale. Results revealed that status did not significantly affect need to belong, $F(1,48) = 2.71$, $p > .1$, and general trust, $F(1,48) = .43$, $p > .5$. These results suggest that the observed enhanced strategic engagement towards angry faces in low-status participants was not due to differences in trust or the need to belong.

While emotional attention is a common feature of normal human cognition (Vuilleumier, 2005), it has been proposed that psychological factors such as anxiety may increase this innate tendency to exaggerate the processing of threatening

information (Cisler & Koster, 2010; Yiend, 2010). The findings from Studies 5 and 6 contribute to this body of evidence in documenting the effects of social status on the processing of angry emotional expression. Specifically, the psychological experience of losing social status appears to increase the tendency to strategically focus attention towards threatening social cues.

The current findings showed that when faced with an angry expression, low-status individuals are motivated to maintain attentional engagement towards the angry face, which would suggest an enhanced awareness of social threat and a greater preparedness to respond to the angry target. In sum, instead of a maladaptive difficulty in disengaging attention from angry cues, the effects observed in the current study seem to be driven by a causal effect of low-status that derives from a top-down strategic orienting of attention to angry cues. On the other hand, high-status participants oriented attention strategically to happy faces and had difficulty disengaging from these faces. This suggests that high-status individuals dwell on happy faces, presumably because of the increased reward value of these faces for them (see O'Doherty et al., 2003).

3.5 Study 7

Traditionally, research on emotion perception has often been based upon the assumption that emotions on an individualsô face can be perceived as easily as words are perceived from a page such that inferring the meaning from a facial expression can simply be determined by the particular structural arrangement of facial features and actions (Barrett, Mesquita, & Gendron, 2011). However, mounting evidence has shown that perception of faces and detection of facial emotions may be biased by various kinds of top-down influences, such as the affective state of the perceiver (Niedenthal & Halberstadt, 2003). For example, people may perceive emotions in others that are functionally related to their own emotional states. That is, when a specific emotion (and its allied motivational state) is aroused, a perceiver may be especially likely to detect in othersô faces whatever emotions could inspire goal-consistent reactions on the part of the perceiver. Sometimes those functionally relevant emotions may be similar to their own (e.g., the arousal of some affiliative affective state may motivate perceivers to detect a similar affiliative emotion in others), other times, the functionally relevant emotion may be qualitatively different.

It has also been suggested that the emotions we feel can determine how long we see similar emotions last on someone elseôs face. Using a novel method, Niedenthal, Halberstadt, Margolin, and Innes-Ker (2000) had participants watch a short movie showing a personôs face expressing a specific emotion (e.g., happiness) that gradually changed to a second emotion (e.g., sadness). Participants in the emotion induction condition were asked to indicate when the initial expression dissipated. Results showed that emotion congruent expressions (e.g., perceiving happiness after being induced with happiness) were perceived to last longer than emotion incongruent expressions (e.g.,

perceiving sadness after being induced with happiness). This suggests that specific emotional states can enhance the perceptual processing of similar emotions in others.

In addition to that, Barrett et al., (2011) reviewed recent evidence demonstrating the role of context in affecting the perception of emotions from faces. In particular, they highlighted three types of context effects namely: stimulus based context, perceiver based context, and cultural context. For the purposes of this discussion, I will focus on the stimulus-based and perceiver-based context.

The stimulus-based context refers to the context in which a face is physically presented alongside other sensory input that is of informational value. In particular, evidence suggests that perceiversô judgements of facial expressions can be influenced by descriptions of the social situation (Carroll & Russell, 1996). For example, descriptions of danger have been shown to increase the likelihood of a scowling face (posed, exaggerated display of anger) being perceived as fear (Carroll & Russell, 1996, Study 1). Additionally, these situational descriptions exert an even stronger influence when the facial expressions are ambiguous rather than exaggerated (Carroll & Russell, 1996, Study 3).

The perceiver-based context relates to the top-down processes within the perceiverôs such as motivation or dispositional orientation that can influence emotion perception. For example, relational concerns have been proposed to affect the amount effort and depth of social information processing. That is, greater processing effort is allocated to targets with whom we expect to develop a relationship with, as opposed to those with whom we do not expect to interact with (Devine, Sedikides, & Fuhrman, 1989). The same holds true for individuals whom we are committed to, such that they receive greater processing effort compared to individuals whom we are not committed to (Beach & Tesser, 1988). Finally, it has been suggested that the cognitive system

favours the processing of those with whom we feel we have in common with as opposed to strangers. For example, past studies have shown the tendency of a bias in the evaluation and attributions of interaction partners or ingroup members such that they are viewed more positively compared to strangers (Fletcher & Fitness, 1996).

In relation to that, interdependent individuals more accurately read othersô emotions relative to their more independent counterparts (Graziano, Habashi, Sheesh, & Tobin, 2007). Given that lower class individuals are more engaged with others and are more reliant on othersô emotions (Kraus & Keltner, 2009), it is plausible that low-status individuals would be more sensitive to individuals they interact with. Additionally, cognitive processing tends to be reserved for targets of higher subjective relevance (Fiske, 2004). Therefore it is possible that low-status individuals would perceive interaction partners as a valuable social resource and consequently be more motivated to direct cognitive resources to processing facial expressions of those targets. Specifically, I hypothesised that low-status individuals would be more focused on processing the facial expressions of targets they expect to interact with compared to strangers they do not expect to interact with, because they are more reliant on the former.

A secondary aim of the current study was to investigate how status influences the perception of dynamic facial affect. People have the innate ability to decode intense, unambiguous and overt non-verbal facial expressions (Ekman, 2003). However, differences across individuals arise when the expressions are subtle and ambiguous. In addition, although mixed emotions occur frequently in social life (e.g., Scherer & Ceschi, 1997), we know little about the perception of dynamic facial expressions (i.e., facial expressions that change from one to the other). The bulk of research, including the previous studies reported in this chapter, has focused

predominantly on the study of prototypical emotions and the perception of static expressions (Scherer, Clark-Polner, & Mortillaro, 2011).

The ability to identify changes in emotion expressions is important for the coordination of social interactions, for the assessment of othersô attitudes, and for emotion regulation (Salovey & Mayer, 1990). Indeed, the way a face changes over the course of an expression can provide as much information about emotion as does the end state (Wehrle & Kaiser, 2000). Therefore, the current study aimed to investigate to what extent status influences individualsô ability to identify changes in emotion expressions, in particular, angry emotional expressions. Moreover, the design in the current study also aimed to account for the potential ceiling effects that may occur if participants are only presented with extreme prototypical static emotions, as used in the previous studies in the current chapter. In addition, dynamic expression increases face recognition, affect discrimination and affect intensity (Hill & Johnson, 2001). Therefore they tend to elicit stronger responses compared to static expressions. For example, participants were presented with video clips that showed a neutral expression digitally morphing into an angry or fearful expression in a neuroimaging study. Compared with static presentation of these emotional expressions, dynamic presentation of expressions resulted in greater activation in face representation regions such as the fusiform gyrus and in the emotional processing regions, such as the amygdala (LaBar, Crupain, Voyvodic, & McCarthy, 2003).

To test the hypothesis that status influences perception of changing facial emotion expressions, participants watched natural faces morphed from one facial expression to another. I constructed brief movie clips in which the targetsô facial expressions morphed from unambiguous threatening to unambiguous neutral expression. Participants watched four of such movies and indicated when the initial

threat expression offset (i.e., was no longer perceptible). The movie clips were constructed such that, while the facial displayed changes, there was a substantial period in each movie where the targetôs expression was ambiguous, somewhere between hostile and neutral. In addition, the current study also manipulated the social context in which the targets were presented. Specifically, two short descriptions, which described the participantsô encounter with the targets, were created. These short descriptions either entailed an interaction or no interaction between the target and the participant. As outlined in Chapter 1, loss of social status puts an individual in a vulnerable position. In addition, extending from the previous findings in this chapter, I predicted that low-status individuals would be hypervigilant towards facial cues of anger, and that this hypervigilance will also lead to a biased perception of dynamic expressions of anger. Anger emotion offset is used in the current study as a measure of the extent status triggers differential top-down effects on the perception of anger cues in ambiguous facial expressions. Specifically, low-status individuals should take longer time to detect anger emotion offset on targets they expect to interact with compared to targets they do not expect to interact with. This differentiation between targets should not be evident in high-status individuals. Importantly, this bias will only be evident with targets low-status individuals expect to interact with.

Method

Participants and design. Forty-two adults recruited from the UCL online subject pool participated in this study and received monetary compensation for their time. Two participants were excluded from the data analyses because they expressed confusion about the instructions for the emotion change detection task. The analyses were based on the remaining 40 participants (23 females, 17 males, M_{age} = 20.75).

Participants were randomly assigned to either a high-status condition (n = 21), or low-status condition (n = 19). The study employed a 2 (Status: high, low) x 2 (Context: interaction, no-interaction) mixed-model design, with repeated measures on the last factors. There were no effects of participant gender, which are not discussed further.

Materials. Two sets of emotional facial displays were selected from the Karolinska directed emotional faces (KDEF) Database (Lundqvist et al., 1998) to be used as visual stimuli. The first set that was used in the trial session included two female faces (Caucasian) and two male faces (Caucasian), all posing neutral expressions. For the experimental phase, a second set of stimuli was selected that contained faces displaying anger and neutral from four female faces (Caucasian) and four male faces (Caucasian).

Facial stimuli were digitally morphed using Morpheus Photo Morpher to create 200-frame movies. For the trial session, a movie was prepared in which a face morphed from female to male, and vice versa. For the experimental phase, the movies showed a face initially expressing anger that gradually morphed into the same face identity with a neutral expression. The morphing movies obtained were 13.3 seconds in duration at 15 frames per second, and were displayed at a size of 800 x 560 pixels. The resulting clip showed a natural looking, dynamically moving face. The presentation order of the eight morphing movies was fully randomised.

Procedure. After providing informed consent, participants completed the entire experiment in individual cubicles. The study was described as an experiment designed to investigate social perception of emotion change and social factors that may influence this process. More specifically, the study ostensibly investigated the relationship between the different types of social interactions people have in their daily lives and perception of dynamic emotional expressions.

Status manipulation. The status manipulation procedure for the high-status and low-status conditions was identical to Study 1.

Emotion change detection task. Before the critical emotion change task, participants viewed a practice trial in which a female face morphed into a male face. Participants viewed each movie twice. The first time, participants saw the whole morphing movie in order to become familiarised with the full range of facial movements. The second time, participants were instructed to press the space key on the keyboard to indicate the moment at which they no longer saw traces of the original gender.

After the task familiarisation (practice) phase, participants viewed a second series of morphing movies, this time showing faces morphing from angry facial expression to a neutral facial expression. Prior to each trial, participants were provided with a brief description of the social context in which the participant would encounter the target. Two different social contexts were created, namely the Interaction and No-interaction condition. In both conditions, the participant was asked to imagine queuing up at a coffee shop. Crucially, in the interaction condition participants were told that they saw a fellow course mate (the target), and they intended to interact with them. In the no-interaction condition, participants were told that they saw a stranger (the target) passing by and there was no interaction between them Participants were allowed to read these social context descriptions at their own pace and were instructed to press the spacebar to begin the movie presentation. Participants were instructed to press the spacebar to indicate the moment at which they no longer saw traces of the original emotion expression. The frame number at which the morphing movie was stopped was recorded. Upon completion, participants were checked for suspicion, carefully debriefed, paid and thanked.

Results and Discussion

Manipulation check. As described in Study 1, participantsô perceived position on the social ladder served as the manipulation check scores. The manipulation check scores were subjected to an independent samples *t*-test. Participants in the high-status condition reported significantly greater perceived status (M = 6.86, SD = 1.01) compared to participants in the low-status condition (M = 5.53, SD = 1.58), $t(38)$ = 3.21, $p < .01$, d = 1.04. This indicates that the status manipulation was successful.

Number of frames elapsed. To test the hypothesis that low-status participants would take longer to perceive angry emotion offset on targets they expected to interact with compared to targets they do no expect interaction with, the mean number of frames that elapsed before participants stopped the video (no longer perceived the hostile emotion) was subjected to a 2 (Context: interaction, no-interaction) x 2 (Status: high, low) repeated measures ANOVA with status as the between-subjects factor. There was no main effect of status (p = .47), and context (p = .14). This analysis yielded the predicted significant two-way interaction between context and status, $F(1,38)= 5.46$, $p < .05$, $\eta_p^2 = .126$. (See Figure 3.9). Separate analyses found that high-status participants did not differentially perceive anger cues across both interaction and no-interaction context, $F(1, 20)= .357$, p = .557. In contrast, low-status participants showed the expected main effect of context, $F(1,18)= 7.05$, $p < .02$, $\eta_p^2 = .281$ such that they perceived anger cues on the ambiguous faces for significantly longer period when they expected to interact with the target faces (M = 183.92, SD = 61.84) compared to when they did not expect to interact with the target faces (M = 150.32, SD = 61.23).

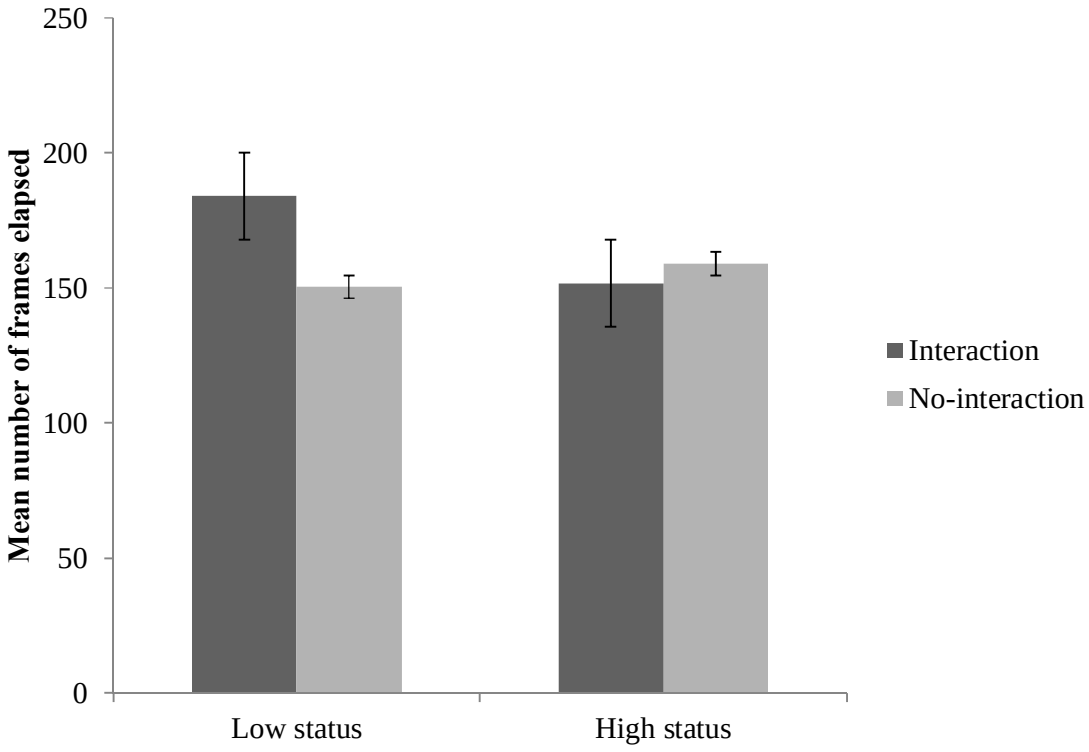

Figure 3.9. Mean frame of angry facial expression offset in the interaction and no-interaction context as a function of status condition in Study 6; error bars representing the standard error of the mean.

In the current study, low-status participants tended to perceive anger cues for a longer time on targets they expected to interact with compared to targets they did not expect to interact with. This pattern was not evident in high-status participants. From a motivational perspective, the longer time taken to detect anger offset observed in low-status participants may reflect greater motivation to fixate and focus attention on anger cues thereby leading to the perception of anger despite ambiguous nature of the facial expression as it was morphing from angry expression to neutral expression.

The current study differed from Studies 3,4, 5 and 6 in the current chapter such that it looked at perception of ambiguous emotional facial expressions rather than prototypical static emotions. The use of these ambigious stimuli in the current study

provides us with a more complete understanding of the how status influences perception of emotion from faces. Specifically, given the nature of the morphing videos, all participants typically responded somewhere during the middle section of the video during which the facial expression is neither angry nor neutral. Therefore, most judgements were made while the facial expressions were ambigious. Past research proposed that some individuals perceive ambiguous stimuli as threatening and this biased perception triggers a withdrawal response (e.g., avoiding unfamiliar others in a social setting). Other individuals, however, deal with ambiguous stimuli with a sense of curiosity and this triggers an approach response (e.g., taking the initiative in making new acquaintances). In addition, it has been proposed that biases in interpretation of othersô facial expressions may lead to a biased mental representation of the individual (perceiver) themselves (Coles, Heimberg, & Schofield, 2008). Therefore, to the extent that low-status individuals are biased towards interpret ambiguous facial expressions as threatening, or to selectively focus on threat-related features within facial expression, their mental representation of themselves may also be negatively biased.

In addition, past research has proposed that faces that are of low subjective and functional relevance may simply be disregarded (e.g., Maner et al., 2003; Rodin, 1987; Wright & Sladden, 2003). The current findings revealed that high-status individuals did not differ in their perception of anger emotion offset according to whether or not they expected an interaction with the target or not. This suggests two possibilities. First, it is possible that high-status individuals do not value the potential functionality of others as much as low-status individuals because they are in control of their social outcomes and are less reliant on others compared to low-status individuals. Second, it is also possible that the anger emotion is deemed less relevant to high-status individuals because they are better able to cope with potential threats compared to low-status individuals. On

the other hand, interaction partners may be deemed more functionally relevant for low-status individuals. Therefore the perception of emotion offset in those targets was modulated by top-down motives such that low-status individuals are especially sensitive to anger cues (perceived anger cues on ambiguous faces for longer) when they are expecting an interaction with the target.

Another important contribution of the current study to the previous 4 studies in this chapter is that it demonstrates an additional processing bias in low-status individuals. This suggests that low-status participants are not only selectively vigilant to angry faces (Studies 5 and 6), but there is also a potential interpretation bias of anger cues as low-status participants perceive the anger-cues as persisting for longer in ambiguous faces in interaction partners compared to targets they do not expect to interact with. Similar pattern of findings have been obtained in the social anxiety literature. For example, individuals with social anxiety have a tendency of perceiving othersô facial expressions as more negative than do low-anxious individuals (Winton, Clark, Edelmann, 1995). It has been proposed that highly-anxious individuals are not characterised by their inability to perceive emotions from faces, instead the maintenance of their anxiety may be due to biases in their perception of the meaning (the intensity of negative valence) of such faces (Coles et al., 2008). Similarly, while I obtained evidence for motivated processing (Studies 3 and 4) and selective attention to angry facial expressions (Studies 5 and 6) in low-status participants, based on the results in the current study it is possible that low-status individuals are also characterised by biases in their perception of social threat from ambiguous faces.

Finally, it is worth noting that the some studies on dynamic expressions generally use video clips that morph from a neutral expression to an emotional expression (e.g., Biele & Grabowska, 2006; Sato & Yoshikawa, 2004). Additionally, it

has also been found that angry faces that returned to a neutral blank state appeared somewhat amused, whereas happy faces that returned to a blank state appeared annoyed (Marian & Shumamura, 2013). Furthermore, some studies have suggested that videos displaying a target changing from one emotional face to another are better than one that changed from an emotional face to a neutral face because of the potential bias towards judging neutral faces as negative (Arce et al., 2009). However, I chose the current design in which an emotional face morphed into a neutral face, as it was best suited for the purposes of my research aims. To reiterate, the current study aimed to examine if the strategic vigilance demonstrated by low status participants toward angry cues (Studies 5 and 6) would lead to a bias in which anger cues are perceived to still be present even when it is no longer there.

3.6 Summary and Conclusions

The studies in the current chapter tested several hypotheses. Firstly, I hypothesised that angry faces would cause greater interference during focal task performance for low-status individuals. I did not expect high-status individuals to demonstrate this pattern of response. Low-status individuals should also allocate more attentional resources towards the processing of angry faces. Low-status individuals should also more readily orient their attention towards threatening faces present in the environment (i.e. they should be more vigilant to expressions of anger) compared to individuals who are not in a low-status position. I expected these effects to occur for angry faces and not for other negative expressions, such as fear and sadness. I also inspected whether status affects attention to positive facial expressions. Additionally, I inspected whether increased vigilance towards angry faces depended on automatic or voluntary control of attention, and whether it involved engagement with threatening cues or difficulty in disengaging from threatening cues. Finally, low-status individuals should take longer to detect the offset of angry emotion in targets they expect to interact with.

Five studies supported my hypotheses. Together, the results of these studies provide a complete and coherent understanding of the ways status affects the early-stage processing of threatening facial expressions. In Study 3, low-status participants suffered greater interference on the performance of the focal task (categorising words) when an irrelevant angry face background was presented, compared to a neutral face background. High-status participants did not show this selective interference effect. An enhanced processing was not observed for other negative expressions such as expressions of sadness and fear. In Study 4 the perceiversô status affected the

identification accuracy of angry faces. When identification was difficult (i.e., when the faces were inverted) and enough encoding time was provided, low-status perceivers more accurately identified angry faces compared to high-status perceivers. I reasoned that this was possible because low-status perceivers were motivated to allocate more attentional resources to the identification of inverted angry faces. High-status participants did not show this pattern of enhanced motivation to process angry faces. Once more, greater effort was found for the processing of angry faces but not for the processing of sad or fearful faces. Study 5 used an attentional cuing task and found greater attentional bias towards angry faces for low status participants. High-status participants did not demonstrate attentional bias towards angry faces. Enhanced vigilance was found when the faces were presented for 1250ms, and not when they were presented for 100 or 500ms. Study 6 replicated the findings of Study 5 with greater vigilance to angry faces in the low-status condition for 1250ms, but not for shorter durations. This finding suggests that status affects later-stage, strategic focus of attention towards angry faces rather than automatic attention orienting to angry faces. Finally, using a dynamic emotion detection task in which an angry facial expression morphed into a neutral expression, Study 7 demonstrated that low-status participants are biased to perceived hostile cues on ambiguous faces when they expect to interact with that target. Thus, low-status individuals do not seem to have acquired an automatic expectation of social threat in the environment; instead the results suggest that they are vigilant to cues of social hostility, once these cues have appeared in their environment and sufficient time is provided to strategically orient attention to them. These findings demonstrate increased readiness to mobilise attention and effort in the presence of angry expressions. Additionally, this effect is further pronounced when the target is an interaction partner.

The absence of effects for sad and fearful faces denotes that low-status individuals did not have generalised sensitivity to negative social information. Furthermore, given that fearful faces signal potential threat in the environment and have been often used as threatening stimuli across a wide range of studies (e.g. , Fitzgerald et al., 2006; Marsh, Adams, & Kleck, 2005), the present findings suggest that a low-status position defined in terms of social respect and prestige is not associated with sensitivity to threat in general but only to aggressive cues. However, because fearful faces only indirectly suggest threat in the environment this result needs to be considered with caution. This will be discussed in more detail in Chapter 5.

Across these studies I examined whether status affects attentional strategies towards positive facial expressions (happy faces). Low-status participants showed interference from happy faces in Study 3, however this result was not sustained across the remaining studies. Furthermore, a relative processing advantage for angry faces was systematically found when happy faces were pitted against angry faces (Studies 5 and 6). On the other hand, high-status individuals showed an increased sensitivity towards happy faces in Studies 3 and 6. In Study 6, high-status individuals had difficulty in disengaging attention from happy faces, which could derive from an amplified sensitivity to the rewarding properties of smiling, happy faces (OôDoherty et al., 2003)

Emotional expressions can elicit either a similar or complementary emotional response in perceivers (Marsh, Ambady et al., 2005). For example, when confronted with an angry expression, people may have a greater desire to escape rather than respond with anger (Blairy, Herrera, & Hess, 1999). Study 6 showed that low-status participants *focused attention* on threatening faces rather than *directed attention away* from threatening faces. That is, low-status individuals engaged with threatening faces instead of avoiding them (see Lonigan & Vasey, 2009). Facilitated attentional focus to

threatening stimuli reflects elevated awareness of threat in the environment (Koster et al., 2006). Therefore, the current findings show that when faced with an angry expression, low-status individuals have an enhanced awareness of impending social aggression, and are motivated to maintain an attentional engagement towards the angry target, and a greater preparedness to respond to it.

The influence of several factors that could potentially be related to enhanced sensitivity to threatening faces was examined. Individuals have a core need to be valued by others, and a challenge to this need can have far reaching consequences (Sedikides, Skowronski, & Dunbar, 2006). Social status challenges the need to be valued (Fiske, 2009). It is therefore possible that status may have broader effects on the ways individuals construe the self and their social relations. The attentional biases of low-status individuals found here could be derived from negative affect, low self-esteem, feelings of exclusion, lack of trust or rejection sensitivity. However, in the current context these factors did not play a role in low-status individualsô heightened sensitivity to social threat. Low-status individuals did not engage in self-handicapping strategies that magnify threat and prevented them from adaptive responses to social threat. I interpreted the present results as indicative that status has direct effects on attention to social hostility, and that these effects are driven by prior experience and may be an attempt to respond to and to negotiate the challenges they face from their hostile social environment.

Chapter 4 Perception of Subtle Threat from Untrustworthy Facial Expression

The current chapter was interested in whether the heightened sensitivity towards overt signals of threat from angry faces demonstrated by low-status individuals would persist when the threat cues are presented subtly on a universally positive facial expression: a smiling expression. Duchenne and non-Duchenne smiles were used as the facial stimuli in this study as non-Duchenne smiles are indicative of untrustworthy affiliation intent, whereas Duchenne smiles have been proposed to reflect genuine felt happiness. Targets displaying non-Duchenne smiles may be perceived as relatively more threatening compared to targets displaying Duchenne smiles. I aimed to complement findings from the previous chapters by providing novel empirical evidence on how status influences processing of facial expressions indicative of subtle threat. I also aimed to examine the subsequent effects of attentional vigilance to social threat cues in faces on the social evaluation judgements of these faces. Additionally, building specifically from Study 7, which highlighted the role of social interaction, I aimed to further investigate how the expectation of social interaction influences threat vigilance in low-status individuals.

To address these research questions, Studies 8 and 9 compared responses to Duchenne and non-Duchenne smiles. Specifically, these studies were interested in how status influences the implicit and explicit ability to discriminate untrustworthy and unreliable indicators of affiliation signals from non-Duchenne smiles compared to Duchenne smiles. Duchenne smiles are also known as genuine smiles and it is typically understood as a automatic reflection of concurrent positive affect. On the other hand, non-Duchenne smiles are also known as fake smiles and are generally believed to be

under much more volitional control compared to Duchenne smiles (Gunnery, Hall, & Ruben, 2013). For the remainder of this section, I will give a detailed account on how these two variants of smiles differ. Then, I will outline the relevance of the distinction between these two types of smiles in the context of social interactions.

4.1 Duchenne and non-Duchenne smiles

It is generally accepted that smiling serves as a prominent communicative signal in regulating social exchanges (Soussignan, 2002). However, the view that smiling reflects inner positive emotion remains controversial. While some studies report that activity of zygomaticus major is correlated with the perception of a variety of pleasant stimuli (Cacciopo, Petty, Losch, & Kim, 1986), other studies show that positive emotions (e.g., pleasure, happiness) is not a necessary prerequisite for smiles (Fernandex-Dols & Ruiz-Belda, 1997; Fridlund, 1994). In line with that, smiling has been shown to occur in social contexts that lack in positive feelings (e.g., submissiveness, embarrassment), and may also reflect underlying negative emotion during deceitful interactions (Keltner, 1995; Lafrance & Hecht, 1999).

As outlined in Chapter 1, (Krumhuber et al., 2007), there are two variants of human smiles: Duchenne (genuine) smiles, and non-Duchenne (fake) smiles (Ekman & Friesen, 1982). According to Duchenne (Duchenne, 1862/1990), the two variants of smiles can be distinguished by considering two facial muscles. The first muscle is the *zygomaticus major* which pulls the lip corners obliquely. The second muscle is the *orbicularis oculi*, which is responsible for pulling the skin from the cheeks and forward toward the eyeball. Of interest, unlike the *zygomaticus major*, which can be controlled voluntarily, the *orbicularis oculi* can only be automatically activated by ñtrue feelingsò.

The ability to discriminate between the two variants of smiles should be especially important to low-status individuals, as they will be able to identify targets that are likely to harbour dishonest intentions. In the next subsection, I will discuss the relevance and functionality of considering the distinction between these two smile variants in the context of social interactions and how it contributes to the my overarching research question.

4.2 The role of social interactions

Successful social interactions are a highly dynamic process that requires constant interpersonal adjustments based on our understanding of those whom we are interacting with. In other words, the ability to accurately infer nonverbal emotional information from facial expressions plays a crucial role to the development of adaptive and functional interpersonal skills. This is because emotions expressed on others faces can act as rich sources of information, indicating, for example, whether they intend to harm us, hide from us, or befriend us (Ekman & Friesen, 1969). This is especially important in times of high uncertainty as the rapid discrimination between friend and foe would ensure the appropriate response to cope with potential threats.

An underlying theme in the interpretation of the current results was in the context of social interactions. However, notwithstanding Study 7, which manipulated the relationship between the participant the target (interaction partner, no-interaction stranger), Studies 1 to 6 relied on participantsô RT across different tasks that involved presentation of a static facial expression in determining enhanced processing or attentional resources towards social threat. Therefore, in the next study, in order to create a social interaction context, participants were asked to specifically imagine the

target that they will be presented with as a partner whom they will work alongside with on a project.

Finally, while Studies 8 and 9 aimed to complement the findings from the previous studies, these two studies differs from the other studies in the current research such that anger faces will not be used. Instead, dynamic smiling facial expressions will be used, as it is one of the most universally used nonverbal signals used in the interactions between humans (Kraut, & Johnston, 1979). Furthermore, the notion that anger expressions are generally disapproved and hence suppressed in Western culture (Parkinson, Fischer, & Manstead, 2005; Lee & Wanger, 2002). Importantly, anger is also frequently deemed as a socially proscribed emotion that signals low affiliative intent (Hess & Bourgeois, 2010)

To sum up, the current chapter presents two studies aimed at investigating the notion that low-status individuals are faced with high uncertainty in their social environment, therefore they are motivated to make rapid identification of facial cues that are indicative of unreliable and untrustworthy affiliation intent. It was hypothesised that low-status individuals are more sensitive to subtle facial cues indicative of threat, including those that differentiate Duchenne from non-Duchenne smiles. Hence, they would be better than high-status individuals at discriminating between genuine and fake smiles. This hypothesis was tested in two studies. Studies 8 and 9 examined participantsô implicit and explicit ability, respectively, to discriminate subtle social threat cues present in non-Duchenne smiles (untrustworthy indicators of affiliation) as opposed to genuine affiliation cues present in Duchenne smiles respectively.

4.3 Study 8

One of the frequently asked questions on the interconnections between emotional and attentional processing is how and which emotional stimuli are selected for prioritised processing given the limited capacity system. Evidence from neuroscience research suggests that this selective process occurs at two-stages. First, emotional significance of a particular stimulus is evaluated preattentively by a subcortical circuit involving the amygdala. Second, stimuli that are deemed emotionally and motivationally significant are given priority in the allocation of attentional resources. The second stage mainly involved top-down influences from the frontal lobe regions involved in goal setting (Compton, 2003).

Assuming that goal setting typically drives top-down influences, the secondary goal of the current study was to investigate how low-status individuals negotiate the goal between creating promising relationships and the goal of protecting themselves from social threat that may result in further social devaluation. Indeed, it would be a costly error for low-status individuals to direct their scarce resources towards individuals faking affiliative displays as this pose a high risk for further social devaluation. At the same time, it would also be highly valuable for low-status individuals to accurately identify targets who have genuine intentions as these targets may provide valuable social resources.

The responses of low-status individuals to social discrimination and hostility can be diverse, and seem to depend on context (see Fiske et al., 2002). Previous findings indicated that low-status individuals can respond in hostile ways (Kubzansky, Kawachi, & Sparrow, 1999). For example, mothers from low SES backgrounds tend to report more hostile emotions and a greater likelihood of suppressing their non-hostile

emotions in response to hypothetical stories of their childôs anger (Martini, Root, & Jenkins, 2004).

It is possible that hostile reactivity in low-status individuals is potentiated by an enhanced awareness of social threat in the environment as demonstrated in the previous chapter. This pattern could lead to an escalation of negativity in intergroup relations such that low-status individuals respond to anger with hostility, which could further decrease their social status, creating a self-perpetuating vicious cycle of negative social relations. However, recent evidence suggests that an alternative strategy to cope with a threatening social environment is to engage in affiliative behaviours that builds cooperative social support system to overcome challenges (Taylor et al., 2000).

A full understanding of the reactions of low-status individuals requires the consideration of the social context (Fiske et al., 2002). Study 7 from the previous chapter provided preliminary indication of the importance of the targetôs relation, specifically whether the target is simply a stranger or someone whom the individual expects to interact with. This findings merits further investigation on how status influences social evaluative judgements in a potential social scenario that involves an interaction between the perceiver and the target.

Finally, a recent study by Babbit and Sommers (2011) highlighted the importance of framing for interracial interactions. The researchers noted that past studies investigating interracial interactions often found negative outcomes. However, these studies have typically focused on social contexts. In their study, interaction context was manipulated such that Black and White participants worked together with instructions that shifted the context to be either focused on social objectives or task objectives. They found that Black participants reported less vigilance towards perceiving prejudice in an imagined interracial interaction with a task focus instead of a

social focus. This study further emphasises the importance of specifying the nature of the experimental task. Specifically, it is possible that the attentional tasks used in Chapter 3 inadvertently created a task focus context. Therefore, Study 8 explicitly created a social focus context by instructing participants to imagine the targets they are presented with as potential project partners.

Methods

Participants and design. Fifty-three Psychology undergraduate students from UCL (29 females, M_{age} = 21.1 years) were recruited through opportunity sampling method. Participants were randomly assigned to either a high-status condition (n = 24), or low-status condition (n = 29). The study employed a 2 (Status: high, low) x 2 (Smile: Duchenne, non-Duchenne) mixed-model design with repeated measures on the last factor. There were no effects of participant gender, which are not discussed further.

Materials. The status manipulation task involved an article that had ostensibly been written by the UCL Monthly newsletter. The article consisted of a passage followed by a ranking table. All participants read that UCL recently published a departmental ranking table that was based on professional success (professional position, annual income, and social prestige) attained by graduates from different departments. Participants in the high-status [low-status] conditions read that the Psychology department had been ranked #2 [#8] out of nine departments (e.g. Economics, Law, Engineering) (see Appendix VI).

To ensure effectiveness of status manipulation, participants were asked to respond to the following questions, all of which began with ñBased on the UCL Monthly report, to what extent do you think that Psychology students from UCLò (1 = not at all, 7 = very much): (1) will have prestigious professional positions in the future

compared to students from the other departments at UCL? (2) will have high social recognition in the future compared to students from the other departments at UCL? (3) will attain financial success in the future compared to students from the other departments at UCL? All three questions were averaged to assess perceived status (α = .886).

The facial stimuli used were video clips extracted from the BBC Science website (http://www.bbc.co.uk/science/humanbody/mind/surveys/smiles). Participants were presented with a total of 20 videos, 10 Duchenne smiles video and 10 non-Duchenne smiles videos (each lasting approximately 4seconds) one at a time. The videos depicted an individual shifting from an initially neutral facial expression to a smiling facial expression that then returns to a neutral facial expression (Bernstein, Sacco, Brown, Young, & Claypool, 2010; Bernstein, Young, Brown, Sacco, & Claypool, 2008). Presentation order was counterbalanced such that participants were presented with one of two possible stimuli orders.

Procedure. After providing informed consent, participants completed the entire experiment in individual cubicles. Participants were told that the current experiment was ostensibly designed to investigate the factors underlying the varying success that differed according to the departments UCL students graduated from. Participants were asked to carefully read the status manipulation article so as to get a better understanding of the background of the current experiment. Once participants completed the manipulation check questions, they were told that they would watch a series of videos of individuals. Participants were asked to imagine that the person in each video as a potential partner for a project they will be working on. Participantsô task was to indicate on a 7 point Likert-scale (1 = not at all; 7 = very much) how much they would like to

work with each person for all 20 videos. Upon completion, participants were probed for suspicion, thanked and thoroughly debriefed.

Results and Discussion

Manipulation check. The manipulation check scores were subjected to an independent-samples *t*-test. Participants in the high-status condition reported significantly greater perceived status ($M = 7.15$, $SD = 1.12$) compared to participants in the low-status condition ($M = 5.35$, $SD = 1.27$), $t\ (51) = 5.45$, $p < .001$, $d = 1.53$. This indicates that manipulation of status was successful.

Preference scores. The current study aimed to investigate whether status influenced the desire to work with targets exhibiting Duchenne and non-Duchenne smiles. Two separate preference scores for targets with true smiles and those with fake smiles (averaged across each smile type) were computed for each participant. These averaged scores were subjected to a 2 (Status: high status, low status) x 2 (Smile: Duchenne, non-Duchenne) mixed-modal ANOVA with status as the between-subjects factor.

There was no main effect of status ($p = .133$), and smile type ($p = .262$). As predicted, there was a significant interaction between status and smile type, $F(1,51) = 4.99$, $p < .05$, $\eta_p^2 = .09$. (See Figure 4.1). Participants in the low status condition showed significantly less desire to work with targets exhibiting non-Duchenne smiles ($M = 4.176$, $SD = .691$) versus Duchenne smiles ($M = 4.47$, $SD = .75$), $t(28) = 2.32$, $p < .05$, $d = -.413$. High status participants, however, showed no significant difference in their preference to work with targets exhibiting non-Duchenne smiles ($M = 4.69$, $SD = .79$) versus Duchenne smiles ($M = 4.59$, $SD = 1.01$).

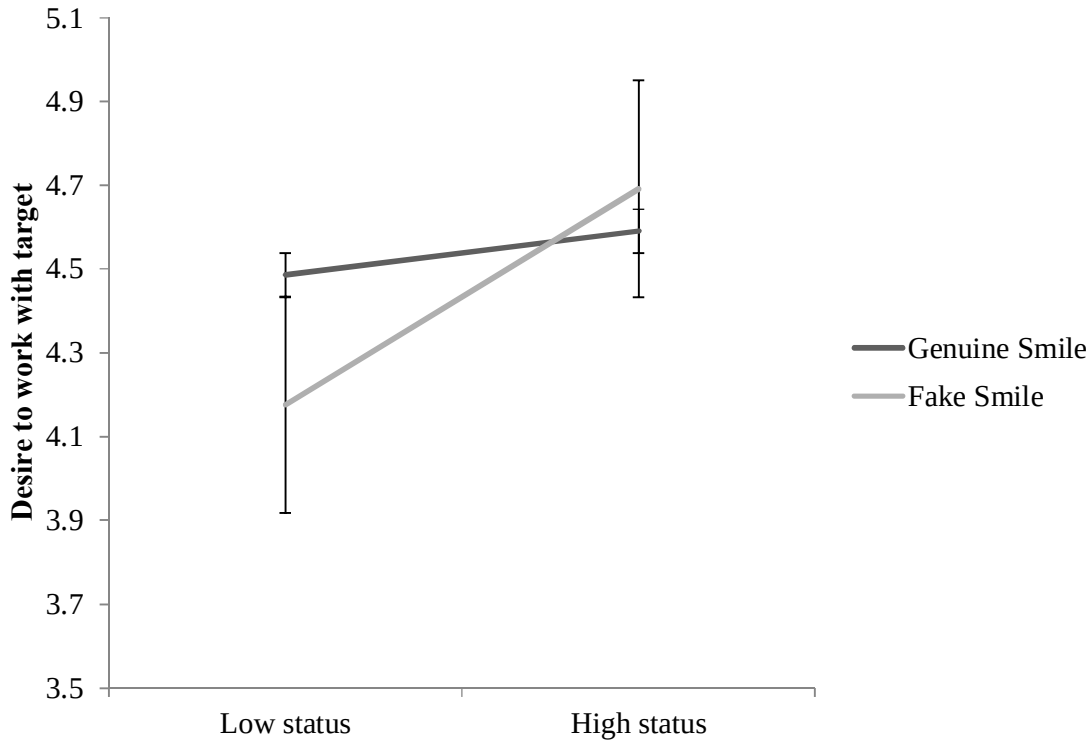

Figure 4.1. Preference score on desire to work with targets exhibiting real and fake smiles as a function of status condition; error bars representing the standard error of the mean.

Non-Duchenne (fake) smiles primarily function to mask some unknown intent by feigning positive affect. Therefore, individuals displaying non-Duchenne smiles may be perceived as threatening as they exhibit signals of unreliable and untrustworthy affiliation intent. Based on the previous findings in the current research that low-status individuals are highly sensitive towards signals of social threat, I predicted that they should show greater desire to avoid targets displaying non-Duchenne smiles. The current findings supported this hypothesis as it demonstrated that low-status participants have a lesser desire to work with targets displaying fake smiles, compared to high-status participants. Crucially, participantsô attention was not drawn to the fact that the smiles varied in its veracity. Therefore, the results show that low-status participants spontaneously and implicitly made judgements disfavouring non-Duchenne

smile targets. In other words, non-Duchenne targets elicit an avoidance motivation in low-status individuals.

In this study, participants were asked to imagine the target as a potential partner on a project. This was intended to create a context that was social in nature. As Babbit and Sommers (2011) demonstrated the significant role of context in interracial interaction, such that interracial interaction differs as a function of whether the interaction took place in the social context or a task context. The purpose of the next study is twofold. Firstly, Study 9 aimed to examine whether the observed avoidance of non-Duchenne smiles target by low-status individuals was driven by an explicit ability to discriminate between the two variants of smiles. Secondly, it also aimed to investigate this explicit ability in a task focus context.

4.4 Study 9

Past studies have shown that some evidence that Duchenne smiles can reliably be distinguished from non-Duchenne smiles. For example, targets displaying Duchenne smiles tend to be rated more positively across various social dimensions such as extraversion, likeability, and trustworthiness (Frank. Ekman, & Friesen, 1993; Johnston, Miles & Macrae, 2010). Extending from that, the current study aimed to investigate whether status influences explicit ability to distinguish between the two variants of smiles. More specifically, it hypothesised that low-status individuals would be more sensitive to subtle differences between Duchenne and non-Duchenne smiles. This would be reflected in their increased ability to explicitly discriminate between the two smile types.

Methods

Participants and design. Forty-seven Psychology undergraduate students from UCL (females = 38, males = 9, M_{age} = 21.51) were recruited through opportunity sampling method. Participants were randomly assigned to either a high-status (n = 15), low-status (n = 17) or control (n = 15) condition. The study employed 3 (Status: high status, low status, control) x 2 (Smile: Duchenne, non-Duchenne) mixed-model design with repeated measures on the last factor. There were no effects of target or participant gender, which are not discussed further.

Materials and Procedure. The stimuli and procedure used in the current study were similar to that of Study 8. However, instead of indicating preference to work with the targets, participantsô task was to indicate, on a response sheet in front of the

computer, whether the smile was ñgenuineò or ñfakeò. Upon completion, participants were probed for suspicion, thanked and thoroughly debriefed.

Results and Discussion

Manipulation check. The manipulation check scores were subjected to an independent-samples *t*-test. Participants in the high-status condition reported significantly greater perceived status ($M = 7.14$, $SD = 1.00$) compared to participants in the low-status condition ($M = 4.80$, $SD = 1.91$), $t(51) = 5.45$, $p < .001$, $d = 1.53$. This indicates that manipulation of status was successful.

Discrimination scores. The current study aimed to investigate whether status influences the explicit ability to discriminate between Duchenne and non-Duchenne smiles. A signal detection measure, dô (Green & Swets, 1966) was calculated to examine this discrimination ability. This measure takes into account both hits (correctly identifying a non-Duchenne smile as fake), and false alarms (incorrectly identifying a Duchenne smile as fake) in the calculation.

The resulting dô scores were subjected to a one-way ANOVA with status as the between-subject factor. There was no main effect of status, $F(2,44) = .633$, $p = .536$. Low-status participants and high-status participants did not differ significantly in terms of their explicit ability to discriminate between true and fake smiles.

The current findings revealed that low-status participants did not have the enhanced explicit ability to determine whether the targetôs smiling facial expression was genuine (reliable indicator of affiliative opportunity) or fake (untrustworthy display of positive affect and affiliative intent). The current findings suggest that loss of social status did not increase participantsô ability to explicitly identify subtle signals of social threat. However, given the previous findings in the current research which showed

processing and attentional bias towards social threat cues, it remains possible that low-status individuals are simply not aware of this sensitivity at a higher-order level such as the explicit discrimination measure used in the current study.

Furthermore, unlike Study 8, which has a social context, Study 9 had a task-focused context. It is possible that the social nature of the task triggers the motivation to detect subtle cues of untrustworthiness. Without the social context, high- and low-status individuals may not be motivated enough to discriminate between both types of smiles. It is also possible that high- and low- status individuals are equally able to discriminate between the two variants of smiles. Such a finding would not be surprising given that past studies have shown that even children age 9-10 show some form of discrimination ability such that they attribute more happiness to Duchenne compared to non-Duchenne smiles (Gosselin, Perron, Legault, & Campanella, 2002).

4.5 Summary and Conclusions

The functionality of facial expressions in social interactions is well documented (Andrew, 1963; van Hooff, 1972; Waller & Dunbar, 2005). It has also been suggested that the variety and flexibility of facial expressions evolved as a result of the ever-increasing pressures of social complexities (Preuschoft & van Hooff, 1997). This would imply that the expression and perception of facial expressions may be used to negotiate various aspects of social interactions in a given situation (see also Hinde, 1985; Schmidt & Cohn, 2001).

Study 8 showed that low-status individuals were implicitly able to discriminate between targets displaying Duchenne compared to non-Duchenne smiles. In particular, low-status individuals showed an avoidance motivation such that they did not want to work with those displaying non-Duchenne smiles on a project. However, this implicit ability was not evident when participantsô attention was drawn to the veracity of the smiles and they were simply asked to indicate if each target displayed a true or fake smile. Taken together, there are two possible ways to reconcile these findings. Firstly, it is possible that the enhanced motivation to detect untrustworthy and unreliable indicators of affiliation (subtle social threat) is only triggered under a social context for low-status individuals. Therefore, when the context was task-focus in Study 9, high- and low- status individuals did not differ in their ability to explicit discriminate between the two types of smiles. Secondly, it is also possible that both high- and low-status individuals are equally able to discriminate between both variants of smiles. However, high-status individuals are not motivated to avoid those who are displaying false indicators of positive affect and affiliation because they have sufficient social resources to cope with such targets.

Chapter 5 General Discussion

In this chapter, I will first provide an overview of all the main findings. I will subsequently discuss and interpret the findings according to several broad themes. Additionally, some suggestions for future studies will also be briefly discussed where appropriate in these sections. Specifically, in Chapter 5.2, I will interpret the current findings in light of one of the overarching aims of the current research, which is how status influences the selective attention to angry faces. Then, I will take a broader perspective in further interpreting how the current findings fit into the existing literature by discussing them in the context of an adaptive threat regulation system in Chapter 5.3, and with reference to trustworthiness in Chapter 5.4. In Chapter 5.5, I will review the possible limitations of the current research and suggest how future studies could rectify them. Finally, Chapter 5.6 and 5.7 will describe the theoretical contribution and practical implications of the present research and discuss future directions for this line of work.

5.1 Overview of findings

The overarching hypothesis in the current research was that oneôs subjective sense of status triggers functionally distinct social motives such that loss of social status leads to attentional vigilance and enhanced processing of both overt- and subtle threat related cues in facial expressions. Angry faces signalled overt threat, whereas the untrustworthy indicators of affiliative intent in non-Duchenne smiles signalled subtle threat.

Chapter 2 presented two studies aimed at providing novel evidence that loss of status in the domains of prestige and respect heightens the accessibility of social threat

and improves memory for targets associated with social threat. Using the lexical decision task in which paricipants were presented with social-threat words, non-social threat words, and neutral control words, Study 1 tested the hypothesis that status triggers differential motivations, which then heightens the accessibility of motivationally relevant concepts. Specifically, it predicted that loss of social status triggers the motivation to process social-threat. Therefore compared to high-status individuals, low-status individuals should show heightened accessibility of social-threat words. The results revealed that low-status participants showed heightened accessibility for social threat words compared to neutral words, and this pattern was not evident in high-status participants and the control group. Study 2 sought to extend the findings from Study 1 in investigating whether the motivation to process social threat as a result of loss of status also extends to face memory. In this study, neutral expression target faces was presented alongside a description that was created either a social-threat context or a general negative valence context. Utilising a surprise face recognition task, low-status participants showed better memory for targets that were presented in a social-threat context, compared to high-status participants. In addition, no memory difference was found between status conditions for targets associated with general negative events. This suggests that low-status triggers heightened selective processing of social-threat related information, and this effect was not due to a general negative valence priming effect.

Chapter 3 presented five studies that tested the notion that low-status individuals should show heightened processing and attentional biases towards angry faces. I hypothesised that angry faces would cause greater interference to the performance of the focal task for low-status individuals compared to high-status individuals. Low-status individuals should also be motivated to allocate more

attentional resources to the processing of angry faces. Moreover, low-status individuals should be more ready to direct their attention towards angry faces compared to individuals not in a low-status position. The attentional bias to angry faces should be driven by enhanced engagement rather an inability to disengage from threat-related cues that occurred at a more strategic level of attentional processing. Finally, low-status individuals should also demonstrate biased perception of threat-related cues such that they take longer to detect angry emotion offset (point at which they no longer saw the angry face) on ambiguous faces. I expected that these effects would be specific to angry faces and not to other negative emotions such as sadness and fear.

The five studies presented in Chapter 3 supported my hypotheses. Study 3 investigated participants ability to ignore distractor emotional faces (i.e., angry, sadness, fear, and happy) while performing a focal task of categorising words. Low-status participants suffered greater interference on the focal task when they were presented with an irrelevant angry face in the background. High-status participants did not show this selective interference effect. Furthermore, this effect was specific to angry faces and was no observed for other negative expressions such as sadness and fear. Extending from Study 3, Study 4 aimed to obtain stronger evidence for an effortful, motivational component for the biased processing of angry faces in low-status individuals. A face-inversion paradigm was used to investigate emotion identification accuracy. Results revealed that compared to high-status participants, low-status participants compensated for the increased difficulty in identifying inverted angry by utilising the processing resources afforded by the additional encoding time. That is, low-status participants were motivated to allocate the additional processing resources to accurately identifying angry faces. Similar to Study 3, this effect was specific for angry faces and was not evident for other negative facial expression, sadness and fear.

While Studies 3 and 4 provided evidence to support the hypothesis that low-status individuals have a processing bias for angry faces, in both these studies, the faces were presented in the centre of the screen. Therefore, both these studies did not provide a robust account of selective attentional bias as the angry faces did not compete with other stimuli for attentional resources. Therefore, Studies 5 and 6 utilised one of the most commonly used selective attention measure, dot-probe task to investigate the type and direction of attentional biases to angry and happy faces. In addition, Studies 5 and 6 also aimed to investigate whether the observed attentional biases occurred in the early and/or late stages of attentional processing. To that end, the presentation duration of the facial stimuli was varied (100ms, 500ms, and 1250ms). As predicted based on the proposed motivational account of the effects of status, both studies showed that low-status participants had late-stage attentional vigilance (1250ms, but not 100ms or 500ms) to angry faces, as a result of a strategic top-down control of attention. Study 6 revealed that this heightened vigilance towards angry faces was due to enhanced engagement processes rather than an inability to disengage attention from angry faces. Finally, Study 7 aimed to further explore the extent to which processing bias for static angry faces shown in the previous studies extended to dynamic emotional expression (facial expressions that changed from one emotional state to another). Study 7 was also interested in investigating the role of social interaction. Specifically, this study manipulated the relationship the targets had with the participants such that the targets were either described as someone the participant was going to interact with, or a stranger they were not going to interact with. Study 7 used an emotion change detection task to test the hypothesis that status would affect the amount of time taken to detect anger emotion change in target faces. This study hypothesised that low-status individuals would take longer to detect anger emotion interaction partners but not with

strangers whom they do not intend to interact with. Results supported the hypothesis such that low-status participants tended to perceive angry cues as persisting longer in targets they expected an interaction with compared to targets they did not expect to interact with. This pattern was not observed among high-status participants. In sum, the studies in this chapter demonstrated the increased motivation to mobilise attentional and processing effort in the presence of angry faces. Low-status individualsô vigilance towards angry faces is not due to an automatic orientation towards cues of overt threat. Instead, the results suggested the possibility that due to prior experiences with aggressive targets, low-status individuals strategically focus their attention towards cues of social hostility, presumably to better protect themselves from further social devaluation, especially from interaction partners.

Lastly, Chapter 4 presented two studies, which aimed to complement the findings from the previous chapters by providing novel empirical evidence on how status influences processing of facial expressions indicative of subtle social threat cues and the subsequent effects on the social evaluative judgements of these faces. Additionally, building specifically from Study 7, which highlighted the role of social interaction, I aimed to further investigate how the expectation of social interaction influences threat vigilance in low-status individuals. To address these research questions, Studies 8 and 9 measured participantsô ability to implicitly and explicitly discriminate between Duchenne and non-Duchenne smiles respectively. In both studies, participants were presented with videos of targets that were either displaying a Duchenne smile or a non-Duchenne smile. Both studies hypothesised that low-status participants would be able to detect untrustworthy indicators of affiliation intent and positive affect in non-Duchenne smiles. Study 8 measured implicit discrimination ability by asking participants to state their preference to work with each of the targets

on a project. Study 9 measured explicit discrimination ability by asking participants to simply indicate if the smiles were genuine or fake. Results revealed low-status participants expressed a decrease in desire to work with targets displaying non-Duchenne smiles compared to targets displaying Duchenne smiles. However, this tendency to avoid potentially threatening targets could not be attributed to an enhanced explicit ability as high- and low- status individuals did not in terms of their explicit ability to differentiate between the two variants of smiles. Put together, this result suggests that the attentional vigilance towards social threat facial cues observed in the previous studies may have contributed to an implicit ability that could be driven by an avoidance motivation for potentially threatening targets, rather than a superior explicit ability to detect subtle facial cues of untrustworthiness compared to high-status individuals.

In sum, across Chapters 2, 3, and 4, the present results show that the effects of status are not limited to social inference but can also be observed in non-social domains such as visual perception. It also sheds some light as to why low-status individuals have heightened accessibility for social threat, are more motivated, and have strategic vigilance towards angry faces. Low-status individuals are in a perilous position where they lack the buffer necessary should they encounter someone threatening. Therefore, this enhanced awareness of potential sources of social threat is beneficial for them. This is because it allows them to be better prepared to avoid these targets. Importantly, the motivation to avoid potentially threatening targets may have a top-down influence on more low-level processes such as selective attention rather than the higher-level processes involved in explicit ability.

An important strength of this research is that different types of dependent measures converged in showing how the psychological construct of oneôs subjective

perception of their own status, can influence social information processing and face perception independent of pre-existing objective measures of status. By including these varied dependent measures, the current research was able to demonstrate that status influences selective attention, motivated processing, and social evaluative judgements on facial expressions indicative of overt and subtle cues of threat. Furthermore, this research provided evidence for an adaptive system that may have evolved according to oneôs position in the social hierarchy. Specifically, the enhanced sensitivity towards social threat demonstrated by low-status participants supports the notion that social-cognitive processes are adaptive to the perceiverôs situationally activated social goals (Smith & Semin, 2007), and that these social goals vary as a function of oneôs social status. This notion will be discussed in more depth in Chapter 5.3.

In short, the current research suggests that the hypervigilance towards threatening social cues may be specialised (in the sense that it is differentiated between high and low status groups) and functional such that it is in service of motivations that stem from onesô perceived status. For the remainder of this section, I will discuss the general finding that low-status individuals have selective attention towards angry faces with reference to the psychological experience of uncontrollability and hostile attribution bias. On the broader perspective, I will also explore the notion of an adaptive threat regulation system, with reference to the self-fulfilling prophecy. Following that, the current findings will also be applied to the theoretical framework of trustworthiness. Finally, I will highlight the limitations of the current research and conclude with the implications of the current research and further studies.

5.2 Selective attention toward angry faces

It has been demonstrated that status affects social attention. Low-status humans and nonhumans pay more attention to their superiors, and are more attentive to their surroundings (Fiske, 2010). For example, low-status individuals develop more diverse and complex perceptions of high-status individuals than of similar group members (Guinote, 2001; Lorenzi-Cioldi, 1993). However, research has so far not identified which aspects of social information receive priority in processing. In Studies 3,4,5,6, and 7, I showed, for the first time, that loss of social status in the domains of prestige and respect is capable of differentially directing attention to non-verbal signals of social aggression as displayed on angry faces.

One of the underlying rationales for the current researchôs hypothesis was that low-status individuals are often targets of unprovoked aggression and these repeated experiences may lead to the expectations of hostility and hence a hypervigilance for cues signalling social threat, such as those present in angry expressions. However, it should be noted that people tend to expect high-status individuals to experience more anger than low-status individuals (Mendoza-Denton, Downey, Purdie, Davis, & Pietrzak, 2002; Page-Gould et al., 2008; Panksepp, Herman, Conner, Bishop, & Scott, 1978; Tiedens et al., 2000; Williams, 2007). For example, participants perceived anger to persist longer and appear sooner on faces of high-status compared to low-status targets across a series of studies (Ratcliff et al., 2012). In other studies, participants assigned a job candidate to a higher status position and a higher salary if the candidate described him or herself as angry as opposed to sad (Tiedens, 2001). Furthermore, it has also been proposed that low-status individuals pay closer attention to their superiors

and develop more complex social representations than their high-status counterparts (Fiske, 2010; Lorenzi-Cioldi, 1993).

Therefore, an alternative explanation as to why low-status individuals are vigilant towards angry faces is the possibility that angry faces are perceived as high-status targets. Past evidence suggest that the expression of anger is overtly expressed down the status hierarchy ladder and suppressed upward (Allan & Gilbert, 2002). Individuals may have a higher tendency for approaching (anger-out related behaviour) a lower-status target, whereas low-status individuals may display higher levels of anger-in and avoidance related behaviour towards a higher-status target. In other words, people are generally more likely to display overt angry behaviour towards a low-status target (Carlson, Marcus-Newhall, & Miller, 1990), whereas suppress an aggressive response when the target is of higher status (Fitness, 2000). Furthermore, empirical research by Maner, DeWall, and Gailliot (2008) has also shown that people preferentially attend to dominant individuals (especially powerful men) in early-stage cognition (see also DeWall & Maner, 2008).

In addition, evidence suggests that individuals may react aggressively towards those who have rejected them (Buckley, Winkel, & Leary, 2004). This is not surprising as a rejected individual is likely to view the ócauseô of their exclusion as unreliable sources of positive social contact. Furthermore, the psychological pain that they may have experienced from being rejected may serve as an intense form of punishment. Therefore, rejected individuals are more likely to perceive those that have rejected them in a hostile light, and may desire to avoid them. Given that anger has been associated with high-status individuals, it is possible that low-status individuals may perceive angry facial expressions as representing high-status individuals (Ratcliff et al., 2012; Tiedens, 2001). By social comparison, an individual only experiences being in a low-

status position when there are others occupying the higher status positions. Therefore the current findings in which low-status individuals showed selective bias towards anger cues may simply reflect an effort by low-status individuals to be vigilant towards to high-status individuals even at an early-stage attentional level. This is because, high-status individuals may be perceived as the ócauseô of their unfavourable status comparison, which also results in negative judgements of relative rank.

Whilst the findings obtained in Chapter 3 provided evidence for biased processing and perception of cues related to social threat in facial expressions in low-status individuals, it did not investigate the emotional and behavioural reaction low-status individuals experienced upon encountering these angry facial expressions. Kuppens, Van Mechelen, and Meulders (2004) investigated how and which situational characteristics influenced the occurrence of the different types of behavioural response to anger. Anger is generally viewed as an interpersonal emotion (Averill, 1983; Fehr, Baldwin, Collins, Patterson, & Benditt, 1999; Siegel, 1986; Smith & Lazarus, 1993). In other words, the experience and reaction of anger is largely dependent upon the relationship between the expresser and the target of the anger. To that end, Kuppens and colleagues applied the interpersonal framework that is based on perceived status and liking of the other person to investigate how these characteristics may influence anger behaviour. The authors found that anger does not necessarily always lead to aggression. More specifically, anger may motivate prosocial behaviour depending on the individual and the type of relation (on the liking and status dimension) the individual has with the target of anger. Therefore, taking the current findings into consideration, future research should consider the possibility the heightened vigilance to angry faces displayed by low-status individuals might necessarily influence their subsequent anger behaviour.

Additionally, while aggression is often studied as the behavioural consequences of anger (Baron & Richardson, 1994; Berkowitz, 1993; Huesmann, 1994), past studies have shown that overt aggressive behaviour only occurs in a small proportion of anger incidents Kassinove, Sukhodolsky, Tsytsarev, & Solovyova, 1997). Covert aggressive impulses are often suppressed and expressed through more socially adapted actions (Berkowitz, 1993; Dodge, 1993; Harris, 1976; Lemerise &Dodge, 2000). Given that it is often the case that society dictates the social norms for onesô behaviour such that the society may have certain expectations of how others should behave based on factors such as social status, it is possible that low-status individuals are chronically suppressing their aggressive impulses. To elaborate further, it is possible that the social threat vigilance demonstrated by low-status individuals may lead to aggressive tendencies. However, instead of displaying overt aggressive behaviours, they may express it in more socially defined status-appropriate manner.

In relation to that, individuals from low SES backgrounds often have to deal with increased stress in their close relationships (Gallo et al., 2005) and violence in their homes (Staggs, Long, mason, Krishnan, & Riger, 2007). Being chronically subjected to such challenging environments, it may be quite intuitive to expect low-status individuals to focus on their individual needs over the welfare of others. However, emerging evidence suggests that this is not always the case. That is, while low-status individuals may experience more life stressors than their high-status counterparts, they are still more dependent on others to achieve their desired goals (Domhoff, 1998). As a result, they may be beneficial for them prioritise the needs of others too (Kraus & Keltner, 2009; Kraus, Piff, & Keltner, 2009). For instance, a recent study by Kraus et al. (2010) demonstrated across three studies using measures of objective and subjective SES, that low social class individuals scored higher on

standardised questionnaire measures of empathy and judged emotions of a stranger more accurately. The observed association between emphatic accuracy and social class was due to a contextual-orientation.

Having shown that compared to high-status individuals, low-status individuals appear to be able to implicitly discriminate between subtle cues of social threat in faces (Study 8), the current findings partially complements the results obtained by Kraus et al. However, the main finding across Studies 3, 4, 5, and 6 that low-status individuals are more motivated to process and identify angry faces specifically does not support Kraus et alôs finding that low status individuals are more emphatically accurate in judging emotions of other people. That is, low-status individuals have higher emphatic accuracy that is not specific to emotions related to anger or threat compared to high-status individuals. Having said that, it should be noted that Kraus et al. (2010), considered a much wider range of secondary emotions such as amusements, compassion, and hope. Importantly, a composite score was obtained collapsing across these different positive and negative emotions. The current research only looked at basic emotional expression such as angry, fear, sadness, and happiness; each of these emotional expressions were looked at individually. Therefore, I would argue that while low-status individuals are generally more emphatically accurate, they are motivationally biased to process angry faces more extensively.

Findings from Studies 5 and 6 have shown that low-status individuals are motivated to maintain enhanced vigilance towards social threat cues. This state of enhanced vigilance could have contributed to a bias in perceiving social threat cues in ambiguous interaction partners (Study 7) and also led to the tendency to avoid targets displaying subtle cues of threat, such as untrustworthiness (Study 8). Considering the findings from the perspective of selective attention to social threat and biased

perception of threatening cues may explain low-status individualsô risk-adverse approach in avoiding targets displaying non-Duchenne smiles. It is possible that these processes may explain the general finding in natural settings that low-status individuals favour smaller, more close-knit social networks. Indeed, a recent study by Piff et al, (2010) supports this idea. They found that lower SES individuals tend to prioritise the needs of others. Importantly, they suggested that this prosocial behaviour in the form of generosity, charitable giving, being trusting and helpful acts as a means to adapt to their more hostile environments (Piff, Kraus, Côté, Cheng, & Keltner, 2010).

Finally, the current findings shed some light on the on-going debate about the functions of emotional facial expressions. On the one hand, Fridlundôs (1994) and Frijdaôs (1995) theory argues that facial expressions have evolved primarily to signal behavioural intent. Drawing from Darwinôs (1872) seminal writings, this theory states that facial expressions evolved specifically to forecast the behavioural intentions and consequences of the expresserôs emotion to others. For example, anger conveys to an observer a readiness to attack another. In other words, this view suggests that facial expressions fundamentally have a socio-communicative signal value and need not be directly associated with underlying emotions. On the other hand, the alternative theory put forward by Ekman (1972) proposed that facial expressions are a direct result of felt emotion and hence primarily functions to express emotions, and not necessarily to communicate intentions. The current research found that low-status individuals were motivated to selectively direct their attention towards threatening targets. Moreover, instead of the desire to approach promising targets that displayed trustworthy social cues, low-status individuals expressed the desire to avoid untrustworthy targets that displayed unreliable indicators of positive affect and affiliation intent. Put together, this would suggest that low-status individuals are more sensitive towards the socio-

communicative value of potentially hostile behavioural intent as signalled by social threat cues in facial expressions, rather than simply the underlying anger emotion conveyed by the expresserôs facial expression. Hence, offering support for the theory proposed by Fridlund (1991a,b, 1992) that facial expressions are used in social communications to inform intentions and possible future actions.

I have argued that fundamental attentional processes involved in the perception of social threat from angry faces vary as a function of oneôs subjective sense of status. Specifically, I proposed that the loss of status in the specific domains of prestige and respect represents a significant form of threat to the social self. Furthermore, given the increased exposure to hostility and aggression, low-status individuals should show heightened vigilance towards social threat cues, such as those present in angry faces. I examined the role of attention in angry face perception and provided support for my hypotheses. However, notwithstanding the possible attentional mechanisms suggested by the current findings, there are at least 2 other possible underlying cognitive mechanisms that may account for why low-status individuals are biased in their perception of angry faces. Specifically, the notion of uncontrollability and hostile attribution bias. These factors were briefly reviewed in Chapter 1, however, in light of the findings obtained, they warrant further discussion. Therefore, for the remainder of this subsection, I will discuss the possible role of uncontrollability and hostile attribution bias in explaining the current findings.

5.2.1 Uncontrollability

Uncontrollability could impede oneôs efforts in improving social status (Dickerson & Kemeny, 2004). This is because in an uncontrollable situation, it is uncertain whether a behavioural response would lead to a favourable outcome (Averill,

1973; Levine & Ursin, 1991; Thompson, 1981; Weiner, 1992). It is possible that confrontation with a threatening target triggers a sense of uncontrollability in low-status individuals due to the lack of social resources to buffer against potential harms. As a result, the perception that the situation is uncontrollable creates a condition in which people are unable to achieve positive end-states, despite their best efforts. In other words, because little can be done to avoid a negative outcome, uncontrollability greatly amplifies the perception of the severity of the source of social threat. This then feeds back into a vicious cycle of being biased to perceiving threat even when the situation is ambiguous. This notion was supported in Studies 7 and 9. Low-status individuals showed delayed anger emotion offset detection when the target was described as someone they would interact with. Additionally, they also showed decreased preference to work alongside targets with non-Duchenne smiles compared to Duchenne smiles despite not having a superior explicit ability of discriminating between the two variants of smiles.

Moreover, it has been proposed that when an individual loses social support and respect from others, they are likely to experience anxiety and fear (Mackie et al., 2000). Given that Studies 7 and 9 involved a social context in which the target was a interaction partner, it is possible expecting an interaction with an individual creates a greater sense of uncontrollability compared to individuals whom no interaction is expected because the latter can be avoided. However, if low-status individuals perceive that they are in a situation where social interaction cannot be avoided, they may be biased to overly ruminate on their relative lower social standing compared to their interaction partner and therefore generates expectations of hostile intent. This would further intensify feelings of anxiety and fear in low-status individuals. Indeed, past studies (e.g, Kollack-Walker et al., 1997; Shively et al., 1997) have shown that acute or

chronic threats to oneôs social status leads to an increase in cortisol activity, importantly, these effects are augmented when conditions are perceived as uncontrollable.

5.2.2 Hostile Attribution Bias

The ability to accurately perceive othersô feelings and to respond accordingly is critical to ensure optimal social functioning. In general, angry facial expressions may serve as a warning or social punishment that is capable of prohibiting the observer from his/her current desired end state (Blair, 2003; Fairchild, Stobbe, Van Goozen, Calder & Goodyer, 2010). Low-status individuals may be predisposed to chronically perceive such cues of direct social threat. This may contribute to a vicious cycle of maladaptive social interaction in which low-status individuals develop a lack of trust towards others and greater cynicism. Constantly perceiving others as having hostile intentions towards them may also explain the higher occurrences of aggressive and violent behaviour among those from low SES backgrounds.

As mentioned in the Chapter 1, hostile attribution bias refers to the tendency to attribute hostile intent to otherôs behaviour when their true intentions are ambiguous (Dodge, 1980). Hostile attribution of intent has been shown to correlate with reactive aggression. Importantly, this pattern most clearly presents in low status groups (ethic minorities; low SES). Based on the current findings, it is possible that low-status individuals preferentially attend to hostile cues during the encoding and representation phase while high-status individuals encode benign and hostile cues equally. Importantly, if the observed hypervigilance to social threat is due to previous experiences and memory structures, then greater effort needs to be put into addressing these as the current results show that the chronic experience of hostility may affect

information processing even at attentional level. This bias to perceive social threat cues even when the situation is ambiguous could have far reaching consequences that may ultimately jeopardise low-status individualôs chances at improving their social position.

Emotional facial expressions are often useful as an indicator of the affective disposition of others. However, what cannot be determined from othersô facial expressions is the underlying intent behind the particular emotional expression. Emerging evidence suggests that early-stages of face perception can already be influenced by implicit attributions made by the perceiver about the targetôs intentions. Applying this notion to the findings in the current research, it is possible that low-status individuals selective vigilance towards angry faces may be due to implicit attributions made about the targetôs intentions. In particular, it is possible that low-status individuals may have a hostile attribution bias towards othersô because of their prior experiences with threatening targets. Importantly, the selective vigilance towards angry faces observed in Studies 5 and 6 occurred at a strategic level of attentional control. This demonstrates the motivational component of the selective attention process. Furthermore, in Study 3, low-status individuals did not display the typical inversion effect (disruption in recognition performance caused by the inversion of faces) for angry faces when they were provided with sufficient processing resources. This further highlights that low-status individuals are motivated to extensively process and accurately recognise angry faces.

Drawing parallels with the existing evidence that biased processing of information in the environment may be responsible for the maintenance of social-related disorders such as social phobia (Clark & Wells, 1995) and social anxiety; the current research suggests the possibility that biased processing of social threat related

cues in faces may impede low-status individualsô efforts at regaining a positive sense of social prestige and respect.

5.3 Adaptive threat regulation

It is well established that threatening stimuli such as snakes, spiders and angry faces hold a special status in human perception such that biased rapid detection of these threats remain consistent from early childhood into adulthood (LoBue & Rakison, 2013). However, it has been suggested that these privileged biases do not work in the absence of other contributing factors that might amplify or downplay the threat value and personal significance of these proposed evolutionary threat. The current research provided convincing evidence that the loss of status could be one of the contributing factors, which moderates the privileged processing of evolutionary threats such as angry faces.

In addition to that, despite the abundance of evidence suggesting that humans and even non-humans primates have an innate perceptual bias for the rapid detection of evolutionary threats, the exact mechanism that drives this phenomenon remains unclear. Some researchers have suggested that it is the threat-relevance that captures attention (Calvo & Esteves, 2005; Eastwood, Smilek, & Merikle, 2003). For example, some studies have shown a direct relationship between how negatively adults rated threatening stimuli and their speed of detecting it (Beaver, Mogg, & Bradley, 2005). Other studies have shown the search advantage for threatening faces is significantly reduced when the simple features on the threatening faces are scrambled or when they are presented in a non-face-like context (Schubo, Gendolla, Meinecke, & Abele, 2006; Tipples, Atkinson, & Young, 2002).

The current findings offer support for the notion that it is the personal threat-relevance that drives selective attention. More specifically, given the more frequent exposure to hostility and daily stressors, angry faces may be of particular relevance to low-status individuals. Therefore, low-status individuals were more motivated to

process and identify targets with angry faces. The alternative proposition mentioned in the earlier paragraphs on the possibility that angry targets are often perceived to be high-status targets would also suggest that it is the personal relevance of angry faces to low-status individuals that is likely to be responsible for the results. This general pattern of findings was shown across the studies presented in Chapter 3.

The present results are also consistent with extant literature on the social determinants of threat sensitivity. It has been proposed that humans have evolved a threat detection system that can be triggered by physical and social threat. When this adaptive system is activated, for example, by social exclusion, it triggers cognitive processes (for a review, see MacDonald & Leary, 2005), in particular attentional vigilance, that increases the likelihood of detecting threat in ambiguous situations (Pickett & Gardner, 2005). Here, I demonstrated that the social threat detection system could also be activated by loss of social prestige and respect.

It is traditionally assumed that activation of the threat detection system generates fight-or-flight responses. Past evidence has shown that when subjected to threat, aggressive individuals often chose to fight, whereas anxious individuals tend to flee. Nonetheless, it has also been proposed that despite the different behavioural responses, both aggressive and anxious individuals share a common attentional bias towards threat-related social information (Lake, Baskin-Sommers, Li, Curtin, & Newman, 2011).

The current research suggests that low-status individuals share the similar attentional bias toward facial cues signalling social threat. The activation of a social threat detection system in low-status individuals could be derived from repeated learning of associations between lack of social respect and experiences of social hostility. Over the course of their lives individuals learn associations of events that have

an adaptive value (Schaller et al., 2007). These associations are archived in long-term memory, and can be selectively accessed in order to solve social problems. They provide fitness-optimising solutions to recurrent problems that individuals encounter in social life, functioning as cognitive algorithms (Schaller et al., 2007). Based on the findings obtained in the current study, I argue that individuals may have well-learnt structures of the social implications of status differentials. That is, they may anticipate status specific social problems and automatically adopt attentional strategies that could help them prevent and cope with these problems. In the case of low-status individuals, increased awareness and focus of attention towards social threat cues may serve as an adaptive means to manage the actual threats they perceive in their social environment. It could also serve as means to regulate their biased expectation of being exposed to threats due to the prior experiences.

For the remainder of this section, I will discuss how the self-fulfilling prophecy could potentially contribute to low-status individualsô biased expectations for social threat and hence, account for why low-status individuals have heightened motivation to allocate attentional resources to social threat cues.

5.3.1 Self-fulfilling prophecy

Being social animals, our well-being and survival are highly dependent on others. However, despite our best efforts to seek approval from others, we are at risk of rejection, which may have aversive consequences. Past research has shown that the perceived social threat from the prospect of rejection alone is enough to shape our social behaviour (Baumeister & Leary, 1995; Eisenberger, Lieberman, & Williams, 2003; Panksepp, 1998; Seymour, Singer, & Dolan, 2007). However, there is a great amount of variability between individuals as to which cues are identified as socially

threatening and in how they respond to them (Downey & Feldman, 1996; Mogg, Philippot, & Bradley, 2004).

The current findings demonstrate that individual differences in terms of subjective sense of status may be one possible explanation underlying this variability in which cues are perceived as socially threatening. In Study 1, I compared the accessibility between social threat and non-social threat. Low-status individuals showed heightened accessibility for social threat words compared to neutral words, whereas the accessibility for non-social threat words did not differ from the neutral control words. This pattern was not evident in the high-status group. In Study 2, I compared memory for targets associated with a social threat context or a general negative valence context. Face memory was used as an indication of the amount of processing directed to the targets during the encoding stage. Results revealed that compared to high-status individuals, low-status individuals remember the targets associated to the social threat context better than the targets that were associated with the negative valence. Studies 3 and 4 investigated readiness and motivation to direct attentional and processing resources towards angry faces compared to sad, fearful and happy faces. Including fearful faces was of particular interest and importance to the current research because fearful faces and angry faces are commonly categorised as threatening stimuli in other studies (e.g., Fitzgerald et al., 2006; Marsh et al., 2005). However, fearful faces are related to undetermined source of potential danger in the environment (Adams et al., 2003); whereas angry faces signal overt and direct threat, which is often used in face-to-face encounters to exert dominance (Blanchard & Blanchard, 2003). Moreover, angry faces are also more relevant to social interactions (Ewbank et al., 2009). Therefore, given the rationale outlined in Chapter 1 that low-status individuals might be biased to social threat related cues due to their increased exposure to aggression and

hostility, I proposed that low-status individuals would be motivated to process angry faces and not fearful faces. As predicted, results showed that low-status individuals suffered greater interference on a focal task when an angry face was present as a background (Study 3). Low-status individuals were also more motivated to redirect additional processing resources to accurately identify inverted angry faces (Study 4). These effects were not observed with fearful and sad faces and were not present in the high-status group. Taken together, these findings denote that low-status individuals do not have a generalised sensitivity to negative social information, or non-social threat information. In addition, it also suggests that enhanced sensitivity to social threat pertains only to direct and overt threat cues such as those present in angry faces.

It has also been shown that resistance to extinguish conditioned responses to threatening stimuli such as snakes, spiders, and angry faces, is associated with maladaptive emotional responses including anxiety and phobia (Carlsson et al., 2004; Öhman & Mineka, 2001; Milad, Rauch, Pitman, & Quirk, 2006; Myers & Davis, 2002). Extending from that line of research, it is possible that low-status individuals are faced with similar difficulties in updating and adjusting their conditioned response. That is, their frequent exposure to unprovoked hostility may cause them to not expect any changes in the contingency between social threat cues and feared outcomes. Low-status individuals may be stuck in the vicious cycle of the self fulfilling prophecy where they are predisposed to expect signs of social threats in others, this then increases their readiness to perceive it, and when the signs of social threat is detected, they react in ways that will only confirm and reinforce their expectations. In other words, the social threat vigilance observed in the current research could be due to actual experiences of unprovoked hostility and aggression. However, the adversity towards it may be

partially maintained through this self-fulfilling prophecy, adhering to the saying óonce bitten, twice shyô.

Such a pattern of self-fulfilling cognitive mechanism has also been proposed to account for individual differences in rejection sensitivity (RS). Given the robust link between RS and relationship difficulties, great amount of effort has been put into understanding the development and maintenance of RS. To that end, it has been proposed that RS operates according to the abovementioned self-fulfilling prophecy with individuals high on RS having greater expectations of rejections which creates an anxious readiness to perceive it and to react to it in ways that will only increase the likelihood of them experiencing the feared rejection. This then confirms and reinforces the initial rejection expectation (Downey, Freitas, Michaelis, & Khouri, 1998). With reference to learning mechanisms involved in conditioning, Olsson and colleagues found that individuals high in RS demonstrated a resistance to extinction of the conditioned response to angry faces, but not to neutral faces or non-social stimuli in a classical fear-conditioning task. The authors highlighted the role of the self fulfilling prophecy in biasing the flexible updated of acquired expectations for threat (Olsson, Carmona, Downey, Bolger, & Ochsner, 2013).

Of interest, members of low-status groups are generally aware of the societyôs low regard for them and of the negative stereotypes associated with their group (Crocker, Major, & Steele, 1998; Heatherton, Kleck, Hebl, & Hull, 2000). Such awareness has also been proposed to contribute to a self-fulfilling prophecy (Steele & Aronson, 1995). Inzlicht, Kaiser and Major (2008) showed that individuals who chronically expect to be treated prejudicially are biased toward perceiving rejecting emotions in faces of outgroup others. Targets of prejudice are aware of their groupôs stigmatized social identity, including the awareness that their group has a lower status

(Frey & Tropp, 2006). For example, many African Americans recognise that others hold negative beliefs about their groupôs academic ability and penchant for aggressive behaviour (Mendoza-Denton et al., 2002). This awareness can lead to the expectation of being the target of prejudice and discrimination. When operating with a prejudice expectation, people survey their surroundings to determine whether they are in a potentially threatening environment (Inzlicht & Ben-Zeev, 2000) and become sensitive to cues communicating that their groupôs stigmatised social status may be rejected (Kaiser et al., 2006).

In the context of the current research, the findings obtained fit into the greater body of research on the mechanisms of social threat detection. Specifically, I argue the possibility that low-status individuals are faced with the same self-fulfilling prophecy with respect to their perception of social threat. Furthermore, the current findings contribute to the broader research area of consequences of social threats. In particular, it suggests that loss of social status in the domains of respect and prestige may threaten the social self in a similar manner as rejection sensitivity and anxiety. Of interest, given that the findings in the current studies were not explained or moderated by rejection sensitivity or affective/mood states (Chapter 3), it is possible that the underlying mechanism for each of these social threats may be functionally distinct and this warrants further research.

In sum, the present findings indirectly support the growing evidence of deep-rooted links between status and aggression in humans (see Mackie et al., 2000; Tiedens, 2001). Across social species, those at the top of the hierarchy are more likely to aggress, while those at the bottom are more often the targets of hostile acts, and have fewer outlets to displace aggression. At the same time, humans have evolved a need to be valued by others (Sedikides et al., 2006), and generally attempt upward social

mobility to achieve higher status (see Boehm & Flack, 2010; Ellemers, van Knippenberg, & Wilke, 1990; Tajfel & Turner, 1979). The motivation to attain higher status could derive, in part, from a desire to avoid the perils of being in a low-status position.

5.4 Trustworthiness

We often face a choice of whether to pursue short-term interest (working individually), or to rely on others (trusting others) to maximise collective interests. There are definitely potential gains if mutual cooperation is achieved. However, there are also risks that those who take advantage of our trust may exploit us. Indeed, trust has been shown to be vital in the development of cooperation (Ross & LaCroix, 1996). We are made vulnerable to others when we make the risky decision to trust others. That is, by not granting this initial trust, we eliminate the risk of being exploited, however we also forgo the possibility of creating a rewarding relationship. This highlights the importance of understanding how and which social signals are reliable indicators of trust and consequently genuine cooperative behaviour.

In trust related contexts, facial expressions have been shown to provide reliable behavioural and situational information especially in terms of signalling emotional states (Ekman, 1982) and to communicate our intentions to others (Keltner & Haidt, 1999). In theory, the two-way function of facial expressions would ensure successful social exchanges. However, not all facial expressions are genuine signals of underlying emotions and intentions (Ekman, 1985). A smile can be put on to appear trustworthy for the purposes of being granted access to resources that would otherwise be denied (Krumhuber et al., 2007). Discrimination between genuine and fake smiles is especially important in the identification of cooperative partners because it would reduce the likelihood of being exploited by individuals skilled in social deception (Brown & Moore, 2002).

The perceptual skill to spot people who are likely to be cheaters is especially valuable for those in the low-status position because thereôs a bigger cost to misjudging

an untrustworthy person, as opposed to misjudging a trustworthy person (Hamamura, 2012). Study 8 and 9 investigated how status influenced the implicit and explicit ability to detect subtle cues of untrustworthiness in non-Duchenne smiles, which signals unreliable affiliation intent and positive affect compared to Duchenne smiles, which has been proposed to reflect genuine felt happiness by the expresser. The results revealed that low-status individuals were motivated to avoid targets displaying non-Duchenne smiles as indicated by their decrease in preference to work with targets displaying non-Duchenne smiles compared to Duchenne smiles. High-status individuals did not show this avoidance motivation for non-Duchenne targets (Study 8). However, both high- and low- status individuals did not differ in their explicit ability to discriminate between both types of smiles (Study 9). Intrepretation of these results needs to be considered with caution as there are two possibilities as to why low-status individuals appear to have an implicit ability to discriminate between Duchenne and non-Duchenne smiles, yet they do not show superior explicit discrimination ability compared to high-status individuals.

Having said that, trustworthiness may be especially adaptive under conditions in which individuals experience decreased capacity resources (negative life events), when they are unable to effectively advertise these qualities to others, and when reliable social support is most essential. Low-status individuals may prefer forming small social network, as this would justify their allocation of genuine investment behaviours (requiring time and empathy) in building reliable relationships (Geary, Byrd-Craven, Hoard, Vigil, & Numtee, 2003). In contrast, high-status individuals may have evolved the tendency to express higher levels of aggressive behaviours in order to attract the affiliation of potential coalition members and avoid interactions with potentially dangerous adversaries. In addition, aggression may cause others to distance themselves

and thus enabling them to demonstrate the ability to protect themselves in times of stress. The current findings seem to suggest that subtle detection and selective response to threat may be specialised and functional for facilitating the formation of strategic relationships in humans. Specifically, low-status individualsô heightened sensitivity to social threat may be due to the underlying motivation of creating fewer, but reliable relationships.

The current findings are in some ways in line with the boundary conditions proposed in the social reconnection hypothesis (Maner et al., 2007). In particular, while the threat of being socially excluded may motivate social reconnection, the theory also states that excluded individuals would tend to respond favourably only to those who are perceived as reliable sources of social reconnection. In Studies 3, 4, 5 and 6, I included happy faces as they represent one of the most socially rewarding stimuli (Guastella, Mitchell, & Matthews, 2008) and a common nonverbal signal of affiliation (Hess, Adams, & Kleck, 2009). The happy/smiling face stimuli were included to explore the possibility that status may differentially trigger heightened sensitivity to both threat-related and affiliation-related cues. This was of special interest since threat and affiliation represents the spectrum along which the failure and success of building social relations lie. In Study 3, both high and low status individuals showed the greatest interference effect when presented with a happy face background compared to the other emotional expressions. However, past studies have shown that the visibility of the teeth is a distinctive feature of happy facial expressions and it captures attention in a bottom up manner (Calvo & Nummenmaa, 2011). Therefore, this result was treated with caution, as I was unable to determine whether the observed interference effect was due to top-down effects of status, or bottom-up effects from the happy faces. Therefore in the subsequent studies that used happy faces, the selection of stimuli was done more

carefully to control for the saliency of the smiles. As predicted, loss of social status led to strategic enhanced attentional awareness of angry faces, but not happy faces. This effect was not observed in high-status or control group.

Based on these findings, I argue that while threats to the social self might heighten the need to reconnect with others, low-status individuals are more concerned with detecting targets that may be threatening. In other words, threats to the social self in the domains of prestige and respect may lead to an avoidance motivation of threatening targets, instead of a approach motivation for potential affiliation partners because it prevents them from wrongfully allocating their limited social resources on those who are likely to be threatening.

Finally, some evidence also suggest that social exclusion may lead individuals to behave aggressively towards individuals whom they do not expect to have face-to-face interaction with (e.g., Twenge, Baumeister, Tice, & Stucke, 2001; Twenge & Campbell, 2003). In Study 7, it was found that low-status individuals tended to perceive hostile cues in ambiguous faces longer when they expected to interact with the target, as compared to when the target was a stranger whom they had no interaction with. This appears counterintuitive, as one would expect low-status individuals to be vigilant towards individuals they are not familiar with, and to respond with more positive and optimistic attitude when interacting with individuals they are familiar with. Indeed, it has been shown that there are individual differences in the tendency to perceive others from a positive or negative light. For example, those who chronically fear the psychological pain from being negatively evaluated tend to be more hesitant and hypervigilant to the potential of further social harm (e.g., Beck, Emery, & Greenberg, 1985). People who are generally worried that others will evaluate them negatively

develop the biased expectation that even novel social interactions may do more harm than good (e.g., Maddux, Norton, & Leary, 1988). Low-status individuals are generally more conscious about their relative low social standing compared to others in their daily social interactions that they may develop the same negative expectations to perceive interaction partners as sources of further social devaluation rather than opportunities for promising affiliations.

5.4.1 Generalised trust

Generalised trust is risky because it exposes one to the possibility that the trustee has harmful intentions. There are two theories on the relationship between status and trust. The first theory suggests that the risk of trusting a stranger is greater for low-status individuals because they are more concerned about meeting basic living needs. Therefore even a single interaction with a cheater would be devastating. In contrast, higher social status individuals are embedded in a more secure environment (more savings, extensive social security and insurances) that buffers the risks of generalised trust. Therefore, an interaction with a cheater would still be painful, but it would not be devastating. The current findings are in agreement with this theory in so far as high-status individuals did not show any selective biases for a particular emotional expression, angry faces or other negative facial expressions such as sad and fear, included in Study 3 and 4.

The second theory suggests that people tend to form social relationships with others of a similar social standing (Putnam, 2000). This pattern of social relationship formation may not be beneficial for low-status individuals as interactions within a small social network tends to involve a larger degree of overlap in information and resources known to each member. Crucially, when low-status individuals befriend others from

their status group, they are likely to have similar distrusting beliefs about others. Therefore, this repeated contact would only further strengthen their lack of generalised trust. In contrast, in a wider social network, due to less frequent social encounters and interaction, there tends to be less overlap in resources and information shared among the members. As a result, members that are part of wider social networks are more exposed to novel resources and information (Granovetter, 1973). Presumably this exposure would be beneficial in oneôs quest to gain or maintain social standing. In other words, low-status individuals may fuel each otherôs lack of trust of outside their social group. This may be maladaptive because interaction with strangers exposes one to novel information and resources that are not available within close relationships. This exposure may bring about opportunities that could improve social standing. There is evidence suggesting that individuals with higher levels of trust tend to be wealthier, better educated and happier compared to those with lower levels of trust (Delhey & Newton, 2003). The current findings contributes to the second theory such that it demonstrates that while it may be useful for low-status individuals to expand their social network, they may refrain from doing so because of their strategic vigilance towards social threat signals, and hence leading them to perceive targets as unreliable sources of affiliation.

In conclusion, it is possible that differential sensitivity towards trustworthiness and threat regulation between status groups underlie our ability to successfully navigate hierarchical social interactions and thereby supporting the emergence and maintenance of social hierarchies. That is, the current findings suggests that the attentional processes involved in the processing of facial expressions of threat may play a contributing role to the pervasiveness of status hierarchy.

5.5 Limitations and future studies

Given that all the empirical studies conducted in the current research involved manipulated status, I interpreted the effects obtained as a result of loss of subjective sense of status in the domains of respect and prestige. However, despite including self-report manipulation check questions as an indicator of whether the manipulation successfully shifted participantsô subjective sense of status temporarily, I did not implicitly measure if the loss of status was the only underlying motivation that triggered the effects I observed. For future studies, it would be good to include an implicit measure of status, for example by using a social evaluation IAT in the domain of respect and prestige. Such a task could potentially capture and pinpoint the relevant underlying processes and would allow us to rule out other possible mediating variables.

Additionally, in the current research social status was defined solely from the perspective of the relative degree of social prestige and respect. However, the Dominance-Prestige account of hierarchy differentiation (Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013) highlights the evolutionary duality of our species in relying both on coercive dominance and also shared knowledge and cultural learning in attaining social rank in human societies. Therefore, further research should take both accounts of status differentiation into consideration. In particular, it would be of great value to investigate if status concerns in domain of dominance would elicit the same top-down influences on the processing of emotional faces as status concerns in the domain of prestige

The overarching aim of the current research was to consider the role of attention in the processing of threatening faces, and how this varies as a function of oneôs subjective sense of status. The most robust evidence for an attentional bias was

demonstrated in Studies 5 and 6, in which low-status individuals were strategically vigilant towards angry faces. In those two studies, a dot-probe task was used to measure attention. However, it should be noted that it has been claimed that different attentional paradigms measure different ótypesô of attention. (VanRullen, Reddy, & Koch, 2004). In other words, different attentional requirements from different paradigms are likely to result in different effects. For example, it has been shown that some stimuli that ñpop-outò in visual search task are not discriminated in dual task paradigms (e.g., the paradigm used in Study 3). On the other hand, some stimuli that can be discriminated in dual task paradigms do not ñpop-outò. Therefore, a greater understanding of the exact nature of attentional resources allocation and the specific conditions which they operate is needed before any conclusions can be drawn with regards to the underlying mechanism responsible for the enhanced processing of threatening faces in low-status individuals.

In addition, all the morphing videos used in the Study 7 displayed a targetôs expression morphing from an angry facial expression to a neutral facial expression. These videos were created, in that order, because I was interested in whether the hypervigilance to threat cues demonstrated by low-status participants in the previous studies, would lead to a bias to perceive threat-related cues in ambiguous faces for longer than high-status participants. While I did find support for my hypotheses, the narrow range of stimuli used that did not incorporate different emotions may limit the generalisability of my findings. This is because, the likelihood of encountering an individual whose dynamic expression changes from angry to neutral, is equally likely as the expression changing from neutral to angry in our daily lives. The nature of the way the emotional expression changes across time carries contrasting meaning and therefore future studies should investigate if low-status participants are more likely to

perceive threat-related cues sooner than high-status participants when watching a neutral expression change to an angry one. Furthermore, in everyday experiences, facial expressions almost always appear within a rich contextual environment and depending on the context, facial expressions may signal different social-emotional information. Therefore, further studies should incorporate a wider range of stimuli, specifically those that morph from neutral expression to other emotional states, and the context in which these stimuli are presented could also be manipulated.

In the current research, low-status individuals consistently showed attentional and processing biases towards social threat signals, in the form of angry faces and untrustworthy faces. I deduced that this is driven by psychologically stressful position low-status individuals are in as a result of their chronic experiences of social discrimination and hostility. Additionally, the current findings provided evidence that low-status individuals tend to avoid targets displaying unreliable indicators of social affiliation (such as those signalled by non-Duchenne smiles). Put together, these findings gives reason to propose that the initial attentional bias towards social threat cues contributed to the motivation to avoid targets displaying subtle cues of untrustworthiness, rather than that of genuine affiliative opportunity. Furthermore, given that low-status individuals did not show a superior explicit ability to differentiate between the Duchenne and non-Duchenne smile, it is possible that the avoidance motivation was driven by the lower-level selective attentional processes. However, in order to establish the causal role of selective attention in guiding later-stage decision making, future studies would need to incorporate measures of basic social perceptual processes and higher-order cognition sequentially within a single study.

Finally, the primary function of perceptual input is to guide motor behaviour to navigate the social environment, manipulate external objects and interact with others.

However, the bulk of the studies in the current research has looked at attentional and early-stage perceptual processes and did not incorporate suitable measures of motor behaviour to investigate how the biased processing of angry faces influenced subsequent motor behaviour.

5.6 Implications

The current findings shed light on the underpinnings of social status as a psychological factor rather than purely a social structure that organises humans in the social hierarchy. It has a range of implications potentially relevant to the health, clinical and organisational domains. In addition, the current findings also reveal potential determinants as to why status hierarchies are pervasive. Finally, it also sheds light on the conundrum of why low-status individuals are both the victim of unprovoked hostility and the perpetrator of violence.

It has been proposed that within a social hierarchy, there are multiple valued dimensions along which people are rank ordered such that individuals or groups possessing more of the valued dimensions are ranked higher than those who are lacking in these dimensions. Importantly, more than one of valued dimension can be in play at any given time, and the context will determine which dimension is most relevant for hierarchical differentiation during that time (Magee & Galinsky, 2008). In other words, an individual may experience a loss in social respect and prestige at any given moment, and that this sense of perceived status is a transient one. The findings obtained in the current research is in agreement with the notion as findings demonstrated that temporary activation of loss of social prestige and respect can lead to effects in the information processing, attentional, and social evaluation domains.

The current research highlights the vital role selective attentional processes have in influencing subsequent behavioural responses in social interactions. Attentional bias towards social threat cues in low-status individuals was associated with perceiving anger cues for a longer time on ambiguous faces of interaction partners and the subsequent avoidance of targets displaying non-Duchene smiles. Therefore, one

potentially useful means of addressing this issue of greater conflict in relationships among individuals from low SES backgrounds could be to resolve early-stage attentional and processing biases. For example. the repetitive training attentional task, a simple task that involves continuously searching for affiliation while ignoring social threat, has been shown to successfully reduce the hypervigilance to social threat. It has been shown that this method successfully reduced studentôs stress and anxiety about their final exam. Furthermore, the students also feel more competent in their school ability. In a workplace context, this training method has also been shown to result in improvement in work performance, higher self-esteem and self-confidence, and lower self-reported stress and cortisol (Dandeneau et al., 2007).

The idea that attentional biases can be experimentally manipulated has been explored in a few studies. For example, low self-esteem participants that were asked to perform a repetitive task involving locating a single smiling face amongst other frowning later showed reduced attentional bias towards rejection words (Dandeneau & Baldwin, 2004). Other studies have also shown that experimentally manipulated processing biases can influence emotional vulnerability (MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002; see also Mathews & MacLeod, 2002; Wilson, MacLeod, Mathews, & Rutherford, 2006). In particular, MacLeod et al. (2002) used a modified visual probe task to induce attentional bias away from threatening information (toward neutral information). The basic principles of this task is similar to the dot-probe task used in Studies 5 and 6, in which participants are presented with a pair of simuli and their task is to identify the probe that replaces one of the two stimuli. Crucially, in the attend-neutral training condition, the probe always replaced the neutral stimuli (e.g., thereby) instead of the threatening stimuli (e.g., violent). The authors compared the attentional biases produced by participants in the attend-neutral and attend-threat

training conditions and found that there was a significant difference between the two groups. More interestingly, all participants also completed a very difficult anagram task as a measure of emotion reactivity at the end of the visual probe task. Participants in the attend-neutral condition reported significantly lower levels of negative mood, and there was a significant correlation between the differences in attentional biases and emotional reactivity to the stress induced by the anagram task. This line of work is promising as it shows that not only can attentional biases be modified, its modification could also have direct causal effects on emotional reactivity. In the context of low-status individuals, such attentional modification may enhance their possibility of forging genuine relationships with others. That is, it is possible that the hypervigilance towards social threat is costing low-status individuals the flexibility of spotting promising affiliative opportunities. Furthermore, their high emotional reactivity and cynicism may further reduce their willingness to prioritise the possibilities of new relationships. In other words, this line of work could modify low-status individualôs maladaptive attentional patterns to social threat and could improve the chances of low-status individuals identifying targets who could provide valuable social resources they lack.

In a meta-analysis that reviewed 208 laboratory studies of psychological stressors, Dickerson and Kemeny (2004) highlighted the stressful effects of social-evaluative threats. Specifically, how these threats influence critical evaluation, interpersonal conflict, and dominance hierarchy that negatively affect employee morale in the modern workplace. Notably, different individuals experience social threats in different ways, and their subsequent coping response depends on the initial cognitive appraisal of the social situation (Dandeneau et al., 2007). This cognitive appraisal process involves two levels. The primary appraisal involves a careful consideration of what is at stake in the particular social exchange, whereas the secondary appraisal

involves the assessment of what can be done to cope with the social exchange (Lazarus & Folkman, 1984). The current findings suggest that perception of threat could be modified in the primary appraisal stage before the stress induced flight or flight response is triggered (Gross, 2002). Indeed, much of the work of the effects of psychological stressors has looked at how it negatively impacts individuals on myriad domains of their personal and professional lives. However, the most effective means of addressing this issue is still largely debatable. The current findings suggest that efforts to reduce the stressful impacts of social-threats may benefit from considering the initial cognitive appraisal of the social situation. For example, attentional modification of how angry facial expressions are perceived may potentially be useful for tackling issues of increased interpersonal conflicts in low SES communities.

The significant influence of hierarchical rank on social interactions (Cummins, 2000) suggests that neural mechanisms exist to process social information, which in turn reinforces the status hierarchy. Indeed, a central question in the field of social neuroscience is to determine adaptive neurobiological systems in the human brain responsible for the maintenance of hierarchical social interactions (Chiao et al., 2009). The current research opens up the possibility of the involvement of a system that is sensitive to social-threat. Indeed, a limbic system sensitised to threat has been theorised to be responsible for hypervigilance (Compton, 2003) across different types of threatening stimuli, including visual images and words (Bradley, Mogg, Falla, & Hamilton, 1998; Ellenbogen, Schwartzman, Stewart, & Walker, 2006; MacLeod et al., 1986). Furthermore, this hypervigilance to threat has been suggested to stem from brain structures in the right hemisphere, including the amygdala. This finding that the right hemisphere plays an important role in the processing and interpretation of threat has been supported by a wide range of studies such as dichotic listening and functional

magnetic resonance (Compton, 2003; Compton, Wilson, & Wolf, 2004; Fox, 2002; Gruzelier & Phelan, 1991; Nitschke, Heller, & Miller, 2000; Van Strien & Heijt, 1995). Following this line of work, it is possible that low-status individuals may have an overactive limbic system which is at least, in part responsible for the well-documented link between reported criminal violence and low-income neighbourhoods.

Building from the hypothesis that expectancy may modulate subjective perception and neutral processing of aversive stimuli (e.g., Sarinopoulos, Dixon, Short, Davidson, Nitschke, 2006; Wager et al., 2004). Diekhof et al., (2011) conducted an fMRI study to explore how emotional perception is modulated by stimulus-specific anticipatory imagery. In particular, the researchers examined how anticipatory mental imagery of a mildly fearful face biased the perception of highly fearful faces and generated a false sense of reduced fearfulness. Results from this study highlighted the critical role expectancies play in the interpretation of sensory input. Specifically, how the heightened sensitivity towards social threat may be in part due to the underlying expectation of being confronted with threatening targets. Furthermore, it is also in line with the idea that mental imagery serves an ôemotional amplifierô (Holmes, Geddes, Colom, & Goodwin, 2008). Mental imagery has also been put forward as one of the underlying factors leading to the maintenance of anxiety in individuals suffering from posttraumatic stress disorder and social phobia (Hirsch & Holmes, 2007). Incorporating that line of reasoning to the findings from the current research, encouraging the right types of imagery may help in modulating the attentional bias to social threat demonstrated by low-status individuals. This may in turn help reduce the social anxiety and stress faced by low-status individuals as a result of their preconceived expectation of encountering threat. On a broader perspective, in order to effectively navigate our dynamic social life, people need a regulatory system that negotiates the conflicting

goals of connectedness goals and self-protection goals (Murray, Holmes, & Collins, 2006). Through the selective vigilance towards social threat cues, and the avoidance of untrustworthy targets, the current research provides evidence that low-status individuals prioritise the goal of self-protection as opposed to satisfying connected needs. However, the current research did not look at actual behavioural consequences of loss of social status. Past research has shown that people adjust the display of affect behaviours in relation to social situational factors, such as the perceived social status, group size, and familiarity (Fridlund, 1991; Kraut & Johnston, 1979). When individuals experience events, such as wealth accumulation, that increase their capacity, they are hypothesised to exaggerate dominant behaviours that advertise this added capacity. On the other hand, when individuals experience social and material losses that decrease their capacity resources, they are less able to display capacity. Thus, they are motivated to exaggerate the presentation of submissive and trustworthy behaviours such as expressed vulnerability (Marsh et al., 2005). Research on mating preferences shows that people appraise each otherôs capacity cues in anticipation of immediate or short-term relationships, and appraises each othersô trustworthiness cues in anticipation of long-term relationships (Cottrell, Neruberg, & Li, 2007). In other words, individuals may strategically display capacity and trustworthiness cues selectively, in order to attract short term or long-term relationship partners respectively. At the social network level, capacity cues would be used for maintaining relationships with many, whereas trustworthiness cues would be used for fewer relationship partners. In contrast to demonstrations of capacity, trustworthiness cues (kindness, loyalty and honesty) require repeated interactions to be accurately assessed by others, making these behaviours more efficient for maintaining smaller and more intimate social networks that enable individuals to invest more time in individual relationships. Indeed, larger

social networks are more risky than intimate networks because larger social networks consist of a greater proportion of less familiar and less dependable relationship partners. Such conditions would only seem to be advantageous when individuals can endure the added social risk of potential devaluation.

The current research focused on the way a perceiverôs status influenced the way they perceived social cues. However, given the theoretical framework outlined above, an investigation into how low-status individuals translate their strategic attentional vigilance to social threat cues to strategic behaviour merits further research. Strategic behaviour is conducted contingent upon the anticipated actions of others (Scharlemann, Eckel, Kacelnik, & Wilson, 2001), the current findings suggest that low-status individuals are biased to perceive the intention of interaction partners as hostile. It is therefore of interest to investigate how which strategic behavioural cues they display in order to create smaller, more reliable social networks.

5.7 Conclusions

The dynamics of the natural responses to being in a low-status position are likely to be complex and multifaceted. The devalued position of low-status individuals represents a chronic source of social threat to achieving and maintaining a positive sense of psychological and social worth. Such social threat directly impacts attitudes, beliefs and behaviour (Henry, 2009; 2011).

In an attempt to clarify the nature of these responses, the current research intended to separate these responses into some of their attentional and social evaluative judgement components. In nine studies, the current research utilised several conceptually different measures to investigate the core research question of how status influences face perception. The current research tested whether low social status leads to heightened accessibility of social threat (Study 1), better memory for targets embedded within a social threat context (Study 2), greater interference on performance on a focal task when presented with angry face distractors (Study 3), more motivated to allocate processing resources to identifying angry faces (Study 4), show selective strategic attentional vigilance towards angry faces due to enhanced engagement of angry cues (Studies 5 and 6), perceive hostile cues for a longer time in emotionally ambiguous faces of interaction partners (Study 7), and avoid targets who signal subtle forms of social threat (Studies 8 and 9).

There has been a longstanding interest in social cognition in seeking to understand how we make sense of incoming input from the external social environment. The current research is in agreement with the general assumption in Social Psychology and Social Cognition that the influence of the external environment in guiding attention, perception and subsequent behaviour is limited in so far that its

impact is to a large extent determined by cognitive mechanisms that occur within the dynamic minds. Importantly, these cognitive mechanisms rarely operate in the absence of top-down influences of the perceiving individual.

In conclusion, as Judith Howard aptly stated in her review on the social cognitive conception of social structure, ñSocial structures are continually negotiated and redefined through individual action and interaction. The individual and society are mutually constitutive.ò (Howard, 1994, p. 210). Conceptualising our modern day social structure requires the understanding of how social structure is represented and sustained by cognitive processes of individuals, and how these individualsô internal representations of their social environment shapes social processes. Taking the broadest perspective on the current research, my work has shown that indeed there is a two-way relationship between an individual and the society that they are part of. Specifically, the social environment influences how we make sense of other people and of ourselves. At the same time, our social cognitive processes determine how we interact with our social environment. Importantly, these interactions are a result of our position in the social hierarchy, and simultaneously dictate our position within it. With respect to low-status individuals, being embedded in a hostile social environment and chronic experiences of threat to the social self may have led to a greater motivation to process social-threat cues more extensively. This hypervigilance for threat-related cues may subsequently lead to biased perception of ambiguous interaction partners, which may either lead to an improvement in status position, or deter possible advancements in the social hierarchy. Hence, referring back to what was proposed by Howard (1994), the current research contributed to greater understanding of the dynamic nature of our hierarchical social structure.

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Appendix I

List of social threat, non-social threat, and neutral words used in Study 1.

Social threat	Non-social threat	Neutral	
outsider	outbreak	parameter	salad
scrutiny	symptom	designate	percentage
blamed	carrier	voltage	timber
disliked	diagnosis	audit	plates
excluded	virus	mammal	sculpture
judged	disorder	plaintiff	terrace
harsh	chronic	keyboard	faculty
awkward	bacteria	marbles	camera
boring	needle	hardware	network
horrible	lump	feather	inch
nasty	swollen	junction	steadily
ashamed	agony	collector	landscape
shame	pill	lecturer	farmer
peculiar	fatal	onions	empire
hostile	clinic	merchants	climbed
cruel	exposure	candle	artists
lonely	sickness	implicit	shortly
bother	acute	agenda	identity
ignored	injured	recipe	factory
crazy	infection	employee	maintain
dull	drug	garment	library
unusual	weakness	declare	journey
stupid	procedure	leapt	decade
fail	fever	adapt	holiday
hated	patients	broadcast	branch
fault	emergency	engineer	newspaper
anxious	medicine	panel	length
mistake	nurse	ratio	camp
nervous	illness	ladder	add
guilty	burning	index	adult
unable	dying	delivery	kitchen
worry	disease	topic	clothes

Appendix II

Status manipulation task (low status condition) used in Studies 1, 2, 4, 5, 6, and 7.

Think of this ladder as representing where people stand in your community.

Now, please copmpare yourself to the people at the top of the social ladder. These are the people who are best off - those who are most respected in your community. In particular we'd like you to think about how you are different from these people in terms of your own social prestige.

Recall a recent interaction you had with someone from the top of the ladder. These are the people who are the best off ï those who are most respected in your community.

Please describe the interaction ï what happened, what you did, how you felt etc.

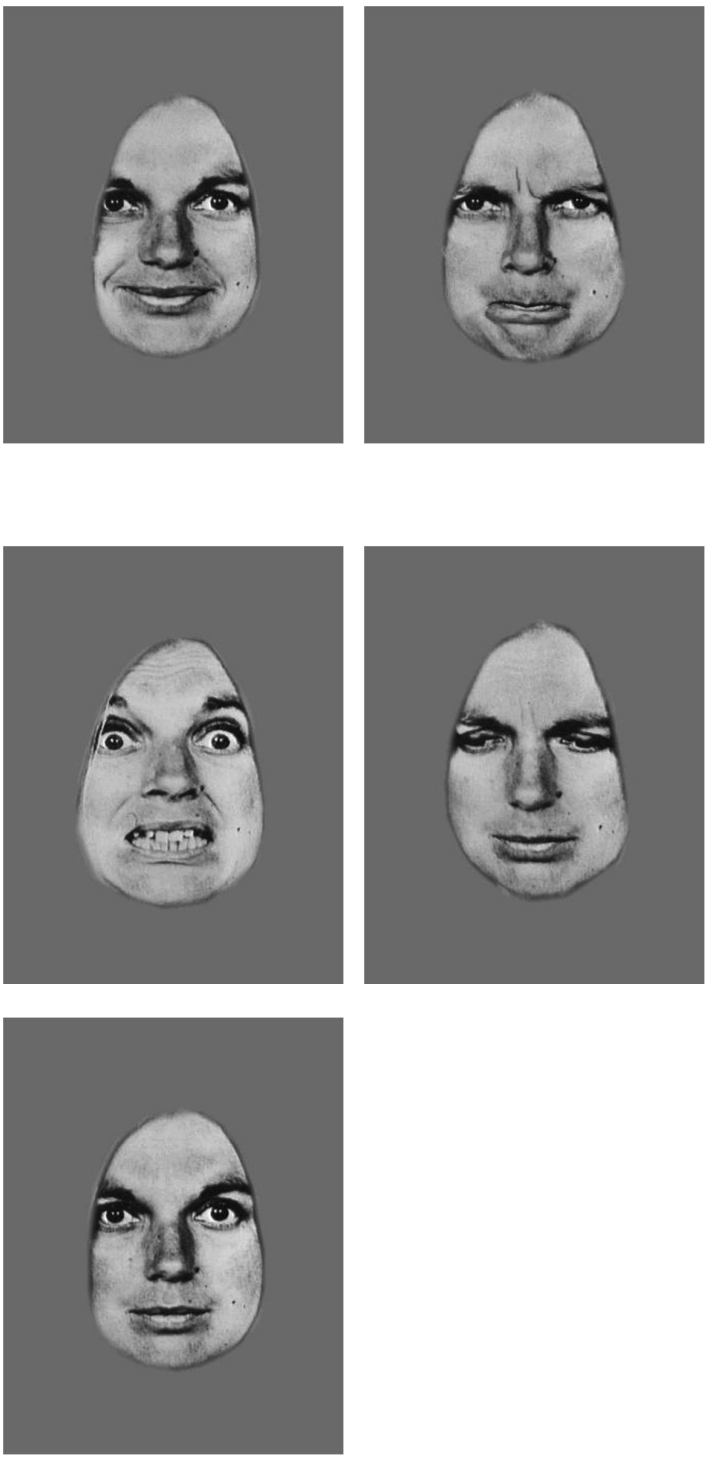
Appendix III

List of social threat events and negative valence social events used in Study 2.

Threat related social events	Negative valence social events
My partner totally flirted with someone else tonight and practically ignored me; I don't know how seriously I should take it.	My society did really terribly in the Society Skit Night – in fact, we probably came in dead last.
My best friend blew me off; we had made weekend plans but I guess they just didn't matter.	I forgot all about my older sister's birthday – I think I really let her down and I don't know if she'll accept my apology.
My Irish heritage is really important to me but when I went to the student Irish association thy acted like I didn't belong there, like they thought I didn't fit in.	I forgot to bring the music for a really important practice session for the Student Choir that I sing in (we're going to competition soon) – boy was everyone mad.
I was reading an editorial in the student paper – it seems that no matter how hard we try; my university just gets no respect in the business world.	My roommate and I got into an enormous fight tonight over the room being such a mess – I don't know if we're ever going to stop fighting about the same old stuff.

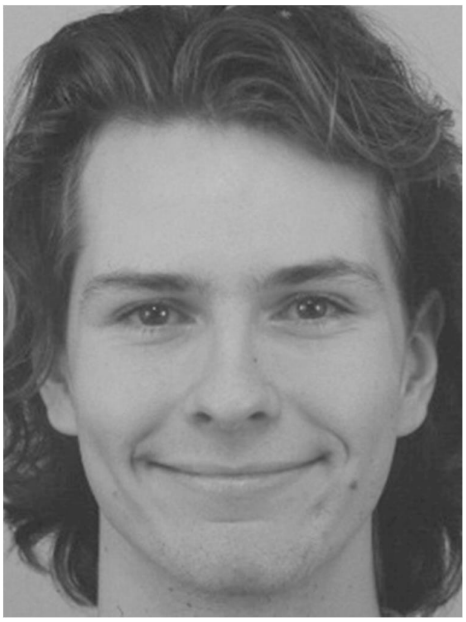
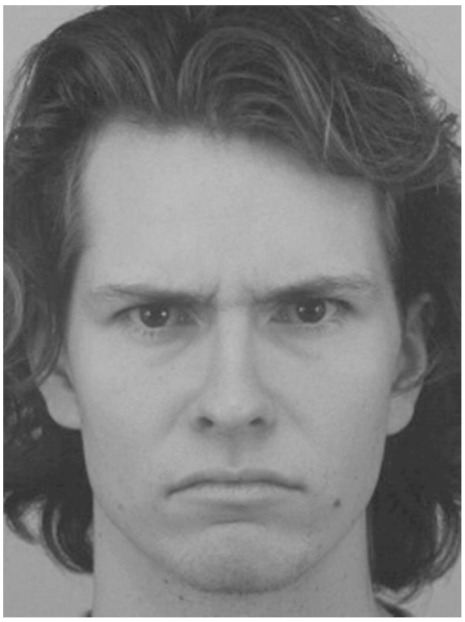
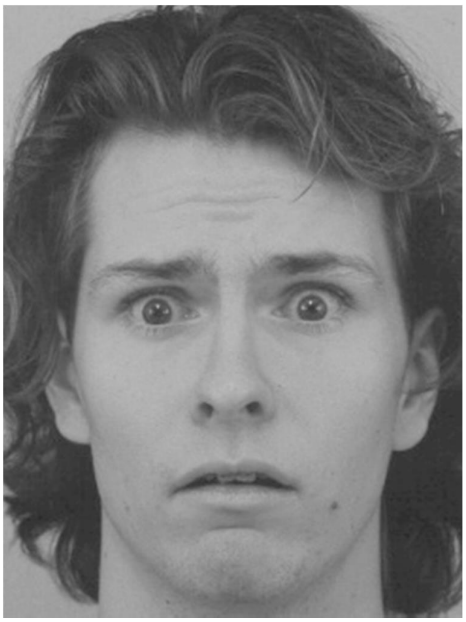
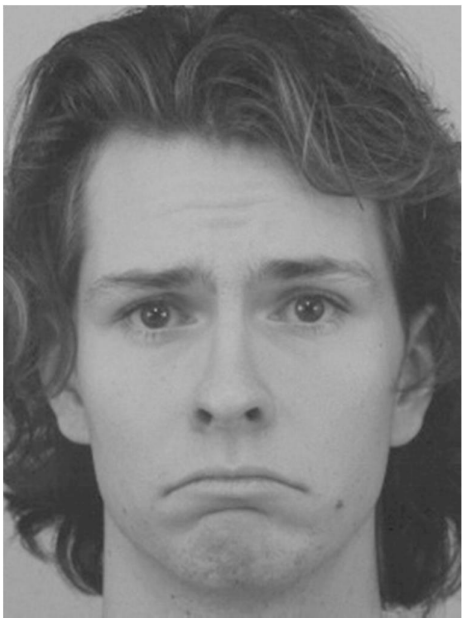
Appendix IV

Examples of emotional facial stimuli (left to right: happy, angry, fear, sad, neutral) from the Ekman and Friesen (1976) dataset used in Studies 3, 5, and 6.



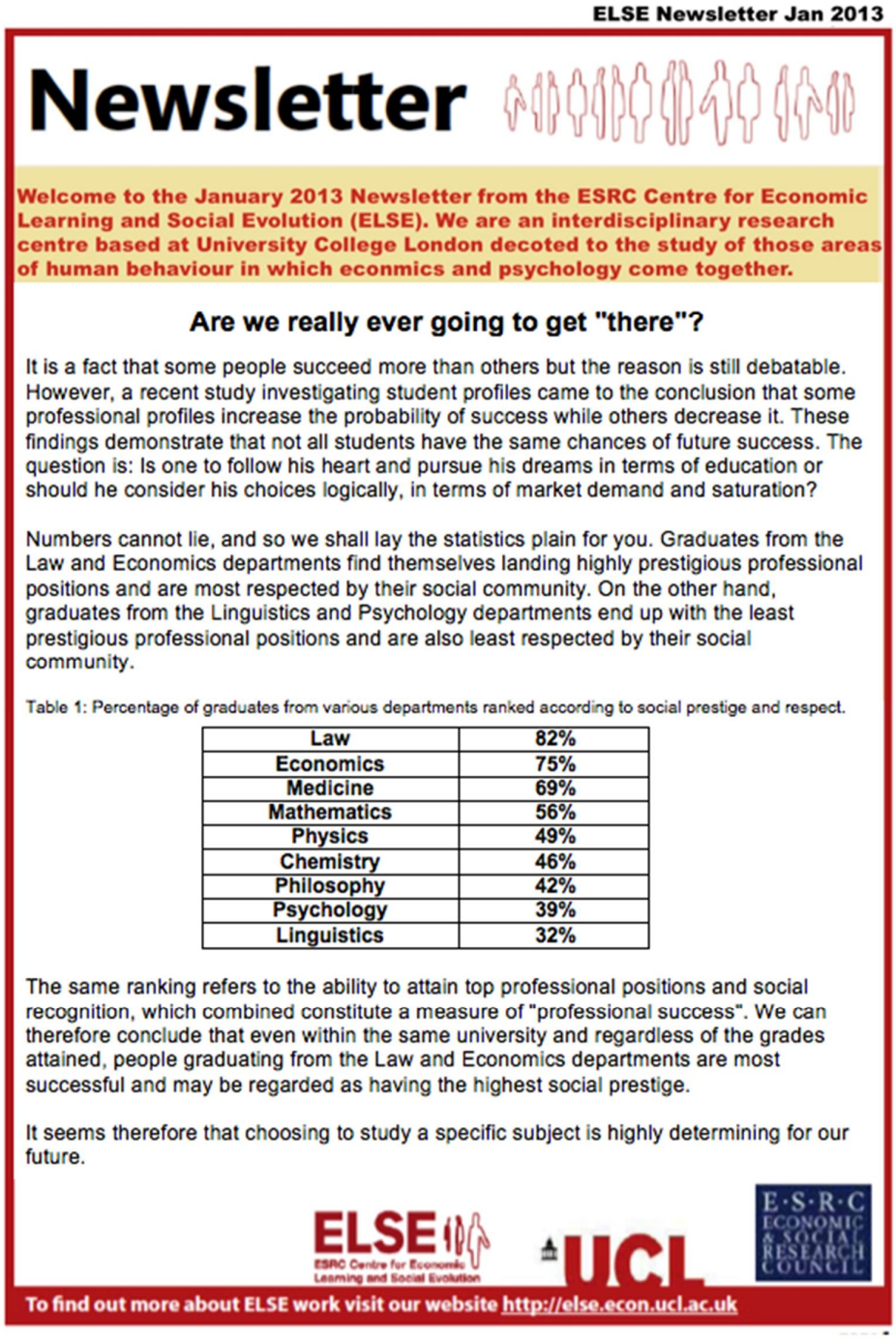
Appendix V

Examples of emotional facial stimuli (left to right: happy, angry, fear, sad) from the Karolinska Directed Emotional Faces (KDEF) database (Lundqvist et al., 1998) dataset used in Studies 4 and 7.

Appendix VI

Status manipulation task (Psychology undergraduates in low status condition) used in Studies 8, and 9.



ELSE Newsletter Jan 2013

Newsletter

Welcome to the January 2013 Newsletter from the ESRC Centre for Economic Learning and Social Evolution (ELSE). We are an interdisciplinary research centre based at University College London decoted to the study of those areas of human behaviour in which econmics and psychology come together.

Are we really ever going to get "there"?

It is a fact that some people succeed more than others but the reason is still debatable. However, a recent study investigating student profiles came to the conclusion that some professional profiles increase the probability of success while others decrease it. These findings demonstrate that not all students have the same chances of future success. The question is: Is one to follow his heart and pursue his dreams in terms of education or should he consider his choices logically, in terms of market demand and saturation?

Numbers cannot lie, and so we shall lay the statistics plain for you. Graduates from the Law and Economics departments find themselves landing highly prestigious professional positions and are most respected by their social community. On the other hand, graduates from the Linguistics and Psychology departments end up with the least prestigious professional positions and are also least respected by their social community.

Table 1: Percentage of graduates from various departments ranked according to social prestige and respect.

Law	82%
Economics	75%
Medicine	69%
Mathematics	56%
Physics	49%
Chemistry	46%
Philosophy	42%
Psychology	39%
Linguistics	32%

The same ranking refers to the ability to attain top professional positions and social recognition, which combined constitute a measure of "professional success". We can therefore conclude that even within the same university and regardless of the grades attained, people graduating from the Law and Economics departments are most successful and may be regarded as having the highest social prestige.

It seems therefore that choosing to study a specific subject is highly determining for our future.

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