The Status-Size Association

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Chapter 1

General Introduction

How Cues of Physical Size and Social Status Influence Each Other

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Every winter, northern elephant seals living on the West coast of the U.S. and Mexico get ready for breeding season by establishing their rank. Pairs of males push themselves up on their front flippers and vocalize individually distinct calls to each other. If neither male accepts a submissive position following this confrontational display, a physical contest ensues. The winner of this fight receives a valuable reward, namely privileged access to mate with female seals. Such physical contests occur on land and mostly consist of pushing and shoving each other, thereby utilizing their own bodyweight. Larger seals are more successful at winning these confrontations, as smaller seals are more likely to retreat or lose an ensuing physical fight. The loser of the contest recognizes his lower rank, and usually for the rest of the breeding season acts subordinately toward the winner (Hayley, Deutsch, & Le Boeuf, 1994). This process, which occurs to a certain degree in many species, establishes a hierarchy where some individuals obtain low status or rank, and others obtain high status or rank. Status or rank refers to the position in a hierarchy where those higher in status have relatively privileged access to fitness-enhancing resources, for instance food, mates, and territory (Henrich & Gil-White, 2001).

In humans, status hierarchies are sometimes formed by winning or losing antagonistic physical confrontations yet more often by less violent means. The biggest, baddest alpha may successfully enjoy high status in some specialized groups - for instance in violent gangs (Campbell, 1984) - but in general our world leaders and billionaires did not get where they are by literally beating up their rivals. Humans have evolved various strategies to climb the ranks, many of which do not involve force, intimidation, and threat. High status is often granted freely to individuals who can somehow benefit the group by for instance sharing culturally relevant specialized knowledge or skill. The result is a status hierarchy based on prestige rather than on dominance as with the elephant seals (see Henrich & Gill-White, 2001; Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013). Despite the fact that human hierarchies seem more flexible we appear to share something in common with other species. Across the human and animal world, bigger seems to be better, at least in terms of status. I refer to the association between cues of physical size and status, either real or perceived, as the status-size association and argue this connection may partially have a biological basis.

In past research, physical stature or height has often been linked to status. Research has shown that taller individuals are seen as higher in status, more dominant (Melamed, 1992), and

more leader like (Blaker et al., 2013). The reverse is also true: High status individuals are judged as taller (Wilson, 1968). In terms of actual outcomes height has several status benefits, and it even provides an advantage in the U.S. presidential elections (Stulp, Buunk, Verhulst, Pollet, 2013). In this introductory chapter I review the status-size relationship in several domains of human social interaction. The status-size connection depends on what size cues are relevant, how status has been obtained, and the sex of the targets. Some questions I address are: How does height affect leadership perceptions in men and women? Are dominant high status males perceived differently from prestigious high status males in terms of perceived size? Do children also associate status with size? Finally, does height affect interpersonal dominance in males?

This dissertation focuses strongly on perceptions of low and high status individuals – with the exception of Chapter 5 (The Napoleon Complex), which focuses on how relative height affects interpersonal dominant and aggressive behaviour. I will begin by defining social status, explaining *why* humans are likely equipped with a mechanism which facilitates automatic and accurate assessment of others' social status relative to their own, and shortly explain prestige and dominance-based status. Secondly, I review literature on height and strength, two elements of human size. What status-related information do these size cues convey to the perceiver? Thirdly, I discuss how size relates to dominance, prestige, and to an important proxy of status, namely leadership. Aside from a literature review, this introductory chapter also gives an overview of the research conducted for this dissertation on a status-size association.

Status Assessment as Evolved Psychological Adaptation

Living in groups brings many advantages for people. For instance, being part of a group means that each individual is not completely reliant on him or herself for finding food and water, fighting off predators, or rearing offspring (reviewed in Rubenstein 1978; van Vugt, Hogan, & Kaiser, 2008). Yet group living also comes with the challenge of managing conflicts, building alliances, coordinating social activities, and negotiating status hierarchies (van Vugt & Kameda, 2012). To reap the benefits and avoid the costs of sociality, animal groups tend to form relatively stable status hierarchies, where some individuals have lower or higher "ranking" than others. In a social hierarchy, high ranking is typically reflected in increased privileges such as

preferential access to more or higher quality resources such as food, territory, and sexual mates. Ranking within the hierarchy is also reflected in how individuals behave toward each other. Those with high status receive more submissive displays from lower ranking members (for instance grooming), while lower status members are more likely to be exposed to dominant displays from higher status members[1]. The consistent affording of privileges and showing of submissive or dominant displays reinforces and maintains relatively stable status hierarchies, where the individuals recognize their own and others' rank. Such knowledge about individuals' relative status facilitates group cohesion by suppressing conflicts over resources.

Resources such as food, territory, and mates are not infinitely available or of the same quality, and dividing these resources among group members is a dilemma consistently faced by many species, including humans (Van Lange, Balliet, Parks & Van Vugt, 2013). In the absence of a social hierarchy there would be disagreement and conflict each time a resource is being shared. Indeed, in the formation stage of a hierarchy there is a lot more conflict than in later stages, when ranking stabilizes and individuals to a large extent accept their own and others' places (Pellegrini & Long, 2003; Pelligrini et al., 2007). Think of receiving a salary at work. Almost every organization has a hierarchy, where lower ranking employees are paid a lower salary than higher ranking employees. This system is generally accepted by the employees, and conflict does not break out every time an employee sees that he or she is receiving a smaller share of money than certain others, perhaps because the employees recognize that some should receive more than others. For instance, it is seen as fair that those in leadership positions generally are afforded a higher salary, or that older employees receive more money because they have more experience. In short, members of a group have a general sense of who ranks where in a hierarchy and this functions as a stabilizing mechanism to facilitate social cooperation and group cohesion.

In order to function in groups with status hierarchies it is imperative that individuals agree to a certain extent who is ranked where. It is thus a requirement that individuals can make informed decisions to assess their own and other's social status and to behave in ways appropriate for their status position. I suggest that in the same way as humans are equipped to

[1]In human hierarchies these may not just be submissive-dominant displays, but also respectful displays. For instance some languages have different pronouns which are used to address individuals with more respect, such as older or high ranking individuals. In French, "tu" means "you" and is used to address peers and can be seen as disrespectful when used to address certain others, while "vous" also means "you" but is used to convey respect or is used in formal situations. This is related to prestige-based status, and will be discussed later on.

make decisions about who to trust (i.e. cheater detection) or which individuals are genetically related (i.e. kin detection) they have also evolved mechanisms to manage status hierarchies (Van Vugt & Kameda, 2012). This status detection system includes mechanisms to extract relevant cues in the environment to assess their status and that of other individuals, mechanisms to behave in ways that are afforded by their status, mechanisms to improve their own relative status, and mechanisms to undermine the status of competitors. Like many other psychological mechanisms, status detection likely has a universal component which has evolved in response to certain selection pressures related to social life, while also being subject to more flexible processes such as cultural learning.

Humans are of course not the only species with a status hierarchy, and status hierarchies evolved a long time before our species did. It thus seems reasonable to conclude that, at least to some degree, the human ability to gauge social status is the result of evolution and should be viewed as a biological adaptation. This does not necessarily mean that we are all simply born with a common knowledge of who is low or high status, but it at least means that we have evolved specific learning mechanisms which allow us to develop a reasonably accurate judgment of others' social status in adaptively relevant environments. As psychological adaptations are generally the result of complex gene-environment interactions I expect that different status cues will be relevant across different situations and even cultures (Tooby & Cosmides, 1992).

Dominance and Prestige

I recognize that for humans there are multiple strategies to obtain high ranking within the hierarchy of a group, most notably via dominance or via prestige (Henrich & Gil-White, 2001). In a dominance hierarchy, status is obtained through force, intimidation, and inducing fear. Individuals accept others' dominant high status because they are afraid of the consequences if they do not submit to the individual in the high status position. Dominance hierarchies are thought to be functional in settling disputes over resources with the minimum amount of physical conflict (which can be very costly in terms of injury or death). Conversely in a prestige hierarchy, those high in prestige-based status attain their ranking by so-called free deference, which means that lower ranking individuals voluntarily accept their place and willingly afford

the higher status individual their ranking. Usually prestige-based status is afforded because the prestigious individual has the potential to confer significant benefits on individuals or groups, for instance because they have a special talent, skill or knowledge which can be transferred to others and used to the advantage of others. Unlike dominance hierarchies, prestige hierarchies are thought to have evolved because they facilitate cultural transmission. Those higher in prestige are leaders or role models who are more likely to be copied than those lower in prestige (Chudek, Heller, Birch, & Henrich, 2012).

Since dominance and prestige are distinct evolved strategies for attaining high status in human groups and may be adaptive in different situations, it is reasonable to assume that their accompanying psychological mechanisms also differ. Being able to accurately assess an individual's dominance is imperative for avoiding physical harm, as it enables you to act submissively toward more dominant individuals who have the potential to overpower you. On the other hand, it also enables you to effectively seize opportunities to gain more or higher quality resources by coercing individuals whom you have the ability to successfully intimidate or beat in a physical confrontation. Accurately detecting highly prestigious individuals is just as important, but for a very different reason. Following prestigious conspecifics implies that you can gain culturally relevant knowledge or pick leaders of the highest available quality.

Accurately assessing others' status is thus an important ability which facilitates group coordination. In this dissertation I propose some specific predictions about the relationship between size and status perception, distinguishing between different aspects of size and whether status is obtained through dominance or prestige. I also consider whether a status-size bias holds across samples of different ages.

Two Components of Physical Size: Height and Muscularity

An effective method for rapidly determining others' position in a hierarchy is to draw information from directly observable morphological traits. Research has shown that we use an array of cues to determine someone's social status, which include voice pitch (Puts, Hodges, Cárdenas, & Gaulin, 2007), facial appearance (Keating & Doyle, 2002), body posture (Cashdan, 1998), nonverbal emotional expressions (Tiedens, 2001; Shariff & Tracy, 2009), and physical attractiveness (Anderson, Keltner, & Kring, 2001; Kalick, 1988). Another important status cue

is physical size; a contribution of this dissertation is to recognize that physical size consists of various components that may convey different status information to perceivers. Humans come in different shapes and sizes, and when we refer to someone as "big" or "small" we can mean several different things. First, humans differ in vertical size – also known as stature or height. Secondly, size can refer to how broad (shoulder to shoulder), muscular, or robust an individual is. Height and muscularity are independent: Given two individuals with the same height, the one with more fat free muscle mass (FFM) will be perceived as bigger. Thirdly, size can refer to the amount of body fat or adipose tissue – however, in the current dissertation I do not focus on this third aspect of human size. Height and muscularity are interesting to investigate together as they are both cues for an individual's physical formidability, which will be discussed more in depth later in this general introduction.

What information does height convey and why do humans vary in height – what causes some individuals to be tall and others to be short? The simple answer is that someone's height is mostly determined by how tall their parents are, but the circumstances they grew up in also have a significant influence (Silventoinen, 2003). Height has a heritability estimate of approximately 0.8 - meaning that 80% of the variation in height is due to genetic influences, while the remaining 20% is determined by environmental factors. High quantity and quality of nutrition during development contribute to increased height, whilst disease during development generally stunts growth (Silventoinen, Kaprio, & Lahelma, 2000; McEvoy & Visscher, 2009). Thus, individuals growing up in wealthy, privileged environments generally have a better chance of reaching their full height potential than those who grow up in impoverished environments. Height may therefore be an honest cue of status *in general,* in terms of access to resources.

Much research has shown that height is positively correlated with actual social status (controlling for gender as men are significantly taller than women across cultures). For instance, height is positively associated with income (for a meta-analysis and review see Judge & Cable, 2004). It is positively related to military rank (Mazur, Mazur, & Keating, 1984) and authority status in the workplace (Gawley, Perks, & Curtis, 2009). Furthermore, individuals in managerial positions are on average taller than individuals in non-managerial positions (Egolf & Corder, 1991), American science professors tend to be taller than the general public (Hensley, 1993), and even the U.S. presidential election outcome is partially predicted by height of the winning candidate (McCann, 2001; Stulp et al., 2013). There is also evidence that being tall facilitates an

individual's upward social mobility (Bielicki & Charzewski, 1983; Bielicki & Waliszko, 1992). Additionally, an individual's own power position affects their perceptions of height; individuals who were made to feel more powerful over-estimated their own height (Duguid & Goncalo, 2012). Moreover, feeling more powerful leads to estimating other people as shorter than oneself, while feeling relatively powerless leads to estimating other people as taller than oneself (Yap, Mason, & Ames, 2013).

Like height, muscle strength has a strong genetic component, though heritability estimates differ greatly between studies – some report an estimate lower than height's 0.8 and some show a similar heritability to height (see Perusse, et al., 1987; Thomis et al., 1998; Huygens, Thomis, Peeters, Vlietnick, & Beunen, 2004). However, its phenotypic expression is strongly dependent on current environmental factors. Muscle mass is determined predominantly by nutrition (specifically the amount of protein in an individual's diet; Deibert et al., 2004), hormonal influences (higher testosterone levels are related to more muscle mass; Griggs et al., 1989), and physical exercise (Jones, Rutherford, & Parker, 1989). Like height, muscularity could serve as a cue of status, as high quality and quantity nutrition is necessary to sustain a large amount of FFM. Yet whereas height cannot be actively manipulated by the individual, muscularity can. Thus, height is perhaps a more honest cue of someone's long-term fitness and social status, whereas muscularity mostly reflects someone's current status as its expression is highly susceptible to environmental influences throughout adult life.

Unlike height, research on muscularity and actual social status is harder to find. There is some evidence that FFM is positively correlated with wages for males – and in some cases females – which is attributed in the literature to a positive correlation of muscle mass with physical health (Böckerman, Johansson, Kiiskinen, & Heliövaara, 2010; Wada & Tekin, 2010; Bozoyan & Wolbring, 2011). However, while it can be concluded to a certain degree that being tall positively affects social status, correlational studies on muscle mass and income do not show that being more muscular leads to actually obtaining higher status. Also, while there have been numerous studies over the past decades on the relationship between perceptions of height and (proxies of) social status for men and women (e.g., Dannenmaier & Thumin, 1964; Wilson, 1968; Lindeman & Sundvik, 1994; Murray & Schmitz, 2011; Blaker et al., 2013), literature on how muscle mass and perceived social status relate to each other appears to be scarce.

Status, and proxies such as power and leadership, are also related to size in a more abstract sense, rather than just specifically to height and muscularity. For instance, larger consumer products are perceived as signaling higher status than smaller consumer products, and individuals acquire larger sized consumer products to signal status (the products being food and drink options; Dubois, Rucker, & Galinsky, 2012). Also, interference effects occur when a more powerful word is combined with a relatively small font size, or when a less powerful word is combined with a relatively large font size – e.g. "Student" vs. "Professor" – suggesting that relative size and power are automatically associated (Schubert, Waldzus, & Giessner, 2009). A similar interference effect was shown for powerful sentences and lower vertical location, while powerful sentences and higher vertical location were seen as congruent – explained by an embodied experience of language, linking power to elevation or verticality (Jiang & Henley, 2012). Schubert (2005) additionally found evidence of power's positive association with higher vertical judgments from an embodied perspective, and ERP evidence supports that power and higher vertical location are experienced as congruent, and high power and low vertical location as incongruent (Zanolie et al., 2012). This body of research thus further supports the association between status and size in general, and particularly contributes to the understanding of status' association with height.

In sum, both height and muscle mass are thus likely to convey status-related information to perceivers, as taller and more muscular individuals have likely been exposed to resource rich environments which are associated with high rank. Next, I break status down into prestige and dominance, and discuss how height and muscularity may relate differently to these status types.

Physical Size and Dominant Status

Dominance hierarchies – hierarchies where rank is established by intimidation, threat, and force – exist in many animal species and evolved long before humans did. I would therefore expect to see certain similarities in human dominance hierarchies and the dominance hierarchies of other species. Physical size has been linked to dominant status in many species. For example, larger male baboons tend to hold a higher dominance rank than smaller male baboons (Johnson, 1987); moorhen that are relatively heavier than conspecifics living near them are more likely to control a larger territory (Petrie, 1984); and larger size predicts winning a dyadic contest in for

instance jumping spiders (Taylor, Hasson, & Clark, 2001) and crayfish (Pavey & Fielder, 1996). The examples provided aim to illustrate the wide spectrum of species that show a correlation between size and dominance-based status.

A general reason why size and dominant status are closely related is because physical size is a proxy of an animal's physical formidability and its resulting Resource Holding Potential (RHP) (Parker, 1974). Physical formidability is the relative ability for an individual to win a contest; either by winning an actual physical conflict or by a display of superior physical dominance which causes the opponent to retreat. Such contests are generally over valued contested resources, such as food, territory, and ultimately mates – hence the term Resource Holding Potential. If larger size contributes to fighting ability, and valuable resources are contested over by several individuals in a group, it follows that a hierarchy will form where the larger individuals gain privileged access to those valuable resources. Subsequently, the members of that hierarchy recognize other individuals' status (partially) on the basis of their size, and act accordingly to prevent incurring costs such as physical injury.

As noted above, physical size has been linked to dominance in numerous species and I therefore would expect, based on arguments of evolutionary consistency (either through convergent evolution and/or by homology) that size also predicts dominance perceptions in humans. Research has shown that humans have the ability to accurately gauge physical formidability – operationalized as physical strength and fighting ability – by judging photos of strangers' bodies and faces. Morphological cues that were used to obtain this information are related to physical size. Both height and muscularity predicted physical formidability ratings *and* actual physical performance (Sell et al., 2009). Because physical size is a highly sexually dimorphic human trait (meaning that it differs between the sexes, and in humans is higher in males), height and muscle mass may be a more salient cue of status when exhibited by males than by females (Sell, Hone, & Pound, 2012). Puts (2010) has pointed out the importance of male-male contest in shaping human psychology during our evolutionary history, and shows evidence that human males likely (physically) contested each other over access to females in ancestral environments. Even if physical contests are relatively rarely used today to settle difference and to decide rank, it could still possibly have an influence on social status (cf. mismatch hypothesis; Van Vugt & Ronay, 2013).

There are many examples of research showing that height and muscularity are related to (perceived) physical dominance. Men who are described as physically more threatening (for instance, because they are holding weapons, or because the perceiver cannot defend themselves) are estimated taller and more muscular (Fessler, Holbrook, & Snyder, 2012; Fessler & Holbrook, 2013a; Fessler & Holbrook, 2013b; Fessler, Holbrook, & Gervais, 2014). Additionally, a study among a small-scale Amazonian society in Bolivia showed that physical size – a composite variable containing height and bicep circumference among other things – was related to assessments of who would win in a dyadic fight (von Rueden, Gurven, & Kaplan, 2008). There is some evidence taller people also behave more dominantly – Stulp, Buunk, Verhulst, & Pollet (2015) recently showed that taller men and women are less likely to yield to shorter same-sex individuals coming their way on a narrow path. Muscular individuals additionally show higher levels of aggression (Gallup, O' Brien, White, & Wilson, 2010), act less egalitarian (Price, Kang, Dunn, & Hopkins, 2011), and act more self-interested (Petersen, Sznycer, Sell, Cosmides, & Tooby, 2013). Muscularity's association to testosterone may partially explain such effects.

Physical Size and Prestige

The above evidence shows that height and muscularity are related to dominance, but could taller and more muscular people also be seen as higher in prestige-based status? Some researchers argue that the so-called "height premium" – the fact that taller people earn more– is not caused by perceptions of dominance but by a positive correlation between height and cognitive ability. Height has been associated with intelligence, IQ, and cognitive ability in several studies (for an overview of this topic, see Case & Paxson, 2006) and these are all desirable, high status qualities in Western industrialized societies. This effect is partially explained by the fact that environmental factors leading to increased height also lead to increased cognitive ability – e.g. low exposure to disease and a sufficient quality and quantity of nutrition during development. Apparently this association is something perceivers pick up on.

For the second chapter of this dissertation (The Height-Leadership Advantage), I analyzed data from an online experiment in which participants had to rate pictures of men and women dressed in formal business wear. Half of the participants saw pictures of a short man

and woman, and the other half saw pictures of a tall man and woman – the people shown on the pictures were identical except for their height, which was manipulated with digital imaging software. Participants were asked to judge the short and tall targets on intelligence, dominance, health, and leadership (e.g. "This person looks like a leader). I found that taller men and women are judged to be more intelligent than their shorter counter-parts– as well as more dominant, healthy and leaderlike (Blaker et al., 2013). However, the results differed for male and female targets. For the female target, only perceived intelligence mediated the effect of height on leader perception, while for the male target perceived intelligence, dominance, and health mediated the effect of height on perceived leadership. Earlier research also showed that taller women are seen as more intelligent (Chu & Geary 2005).

Research on height and person perception suggests that people (in Western countries) tend to attribute several positive traits to taller individuals. These include competence (Young & French, 1996), charisma (Hamstra, 2014), and intelligence; such traits are desirable qualities that may give individuals more prestige. Most research has been focused on perceptions of men, but positive traits are also attributed to tall women, such as being assertive, affluent, and ambitious (Chu & Geary, 2005). A gender difference concerning such positive perceptions is that taller men are seen as more physically attractive, while taller women are not (Kurzban & Weeden, 2005). Additionally, Schumacher (1982) showed that stereotypes people hold about successful individuals in Western society overlap strongly with stereotypes of taller people, suggesting that we generally expect taller individuals to be more successful in society. These results strongly suggest that height may be a cue to prestige, at least in Western societies.

Unlike height, muscularity appears to be unrelated to cognitive ability, but it does predict aggression and antisocial behaviour (Gallup et al., 2010; Price et al., 2011; Petersen et al., 2013). Muscularity may thus produce behaviours which are not always appropriate for high status individuals in a prestige hierarchy in which status is freely conferred. Studies have shown a negative correlation between prestige-based status, and testosterone and aggression (Johnson, Burke, & KirkPatrick, 2007). In most situations I would not expect muscularity to correlate with prestige, or at least to have a stronger relationship to perceptions of dominance than prestige.

Chapter 3 reports data from two scenario studies I conducted in which I described low and high status targets to participants. The targets described in the study had either attained their status via dominant tactics (force, intimidation, threat) or via prestige (having valuable

knowledge and skills, and were freely afforded status by others). In one experiment – conducted in the VU psychology lab with Dutch undergraduate participants – I used a political setting where the low status individual supposedly worked as an assistant while the high status individual was a member of a political party (who either used dominance or prestige tactics to gain his status). In a second online study using U.S. participants recruited via MTurk, I used a more abstract representation of status. I described groups of individuals playing a game where valuable points were distributed amongst the players, which could be earned through force (dominance) or offered to them by other players to help the group (prestige). Two players were described as having earned very few points, while two other players were described as having earned a high amount of points – one by being dominant and the other by having high prestige in the group.

The results confirmed a status-size association. In both experiments, high status individuals (both dominant and prestigious) were generally rated taller and more muscular than those with lower status, but there were differences between the highly dominant and prestigious individuals regarding estimated muscularity. The high status individual who had used a dominance strategy was estimated more muscular than the high status individual who used a prestige strategy. However, as expected, both high prestige and high dominance equally increased height estimations in comparison to the low status individual. Thus, in these studies height was positively related to prestige and dominance in an equal manner, but muscularity was more strongly related to dominance than to prestige.

While previous research suggests a relationship between height and prestige, which my results conducted with Western samples support, there is reason to doubt that this is a universally occurring phenomenon. For instance, a study conducted among people of the Tsimane' –a relatively egalitarian farming-foraging society in the Bolivian Amazon – shows that although individuals agree that taller adults are physically stronger, they do *not* perceive taller people as socially more dominant —that is, when two people have conflicting interests, whose interests are acted upon – or as more knowledgeable (Undurraga et al., 2012). Also, other research conducted in the Bolivian rain forest showed that height did not directly predict community-wide influence (although there was an effect of strength - Von Rueden et al., 2008). Considering that these null effects of height were found in relatively egalitarian societies, they suggest that perhaps a certain level of experience with social inequality is required to associate

height with prestige and good socioeconomic outcomes (see. Stulp, 2013). Perhaps in cases where inequality is less pronounced and variation in height is lower – as was presumably the case in ancestral human societies – individuals do not automatically associate height with prestige (although they may still associate height with physical dominance). Such cross-cultural findings suggest that size-prestige perceptions are more malleable than size-dominance perceptions. This may not be surprising because different cultures value different qualities in people. For instance, among the Inuit being a good fisherman might give someone social status, whereas among the Bedouin it might be an ability to move the group to a waterhole, in the Yanomamo it may be being a good fighter, and in Western Europe having a high IQ. It is likely that contrary to dominance cues, many cues of prestige are culturally learnt over time with implications for the relationship between size and prestige.

To test this idea, I conducted a set of experiments reported in Chapter 4, and gave participants descriptions of low and high status individuals (both high in dominance and prestige). This time, participants were not adults but Dutch primary school pupils aged 6 to 12, and Dutch high school students aged 12 to 17. The children and adolescents were asked to guess how tall low and high status characters in a story were by picking an illustration from a line up of men with differing height and muscle mass – much like the adults did in Chapter 3. The experimenter told the children a short story about an island where two kings lived in their respective castles at each end of the island, along with other people who lived in a few villages in between. The kings each ruled parts of the island. One king was feared by the people on the island and became king because no one dared stand up to him (this character represented high dominance), whereas the other king was supported by the people on the island and they wanted this king to rule (this character represented high prestige). The low status character was a baker, and the high status individuals were the kings.

Consistent with the adult samples in Chapter 2 and 3, children (aged 6 to 12) also rated the dominant high status target as taller and more muscular than the low status target. However, overall the results indicated that the children did not rate the highly prestigious person as taller than the low status target – as adults had done in our two previous studies. Looking at the results per age group we found that two grades (grades 3 and 5) showed an effect of prestige on estimated height. Yet even in these cases the effect was weaker than the effect of dominance on estimated height. These results suggest that while dominance is something humans

automatically connect to size from an early age onward – as previously demonstrated in infants aged 10 to 13 months (Thomsen, Frankenhuis, Ingold-Smith, & Carey, 2011) – the relationship between height and prestige perhaps develops later in life, presumably based on cultural learning and socialization.

The data from the adolescent sample in Chapter 4 supports a learning account of a height-prestige association. I slightly adapted the paradigm from the studies conducted at the elementary schools, and introduced 10 classrooms in a Dutch high school to a low status character (baker), a high status prestige character (respected, chosen king), and a high dominance character (feared, forceful king). Across all age groups, it appeared that dominant status was strongly related to increased height and muscularity estimations. However, height and muscularity were only weakly related to high prestige, similarly to the pre-adolescent sample. Looking at effect sizes per age group, a few clear developments emerge. First, as expected, the difference between height estimation of the low status character and the high prestige character increases with age – older adolescents expect the high prestige character to be significantly taller than the low status character, while the younger adolescents (aged 12-14) do not show this bias as much. Second, the same development happens for prestige and muscularity. Third, differences in height and muscularity estimation between the low and high dominance character actually decreases with age – the difference in height estimation between the low and high dominance character are largest for the youngest adolescents, and smaller for the oldest adolescents. These results show the value of investigating dominance and prestige separately, also when it comes to the development of status processes.

The Napoleon Complex? The Effect of Relative Height on Dominance

In general, increased height appears to be related to increased dominance – taller individuals, with on average higher physical formidability, certainly have the potential to be more dominant. However, asserting dominance over others with the goal to acquire contested resources is a risky strategy. The subordinated person can retaliate, causing risk of physical injury – it then logically follows that acting dominant towards others comes with a lower cost to those higher in physical formidability (including those who are taller), since physical formidability predicts fighting ability as well as the chance of the other retreating and deferring without contest. In

popular culture, often with a reference to Adler's inferiority complex (1956), an opposite prediction is sometimes proposed. According to the so-called Napoleon Complex, shorter males are the ones who act more dominantly, as a result of a need to compensate for their lack of short stature (and the accompanying feelings of inferiority in terms of status compared to taller males). Together with fellow PhD student Jill Knapen, I set out to find whether there was any truth in the Napoleon Complex, or if it was merely an anecdotal theory. The main idea is that shorter males are generally at a disadvantage during interpersonal resource contests, and will compensate for this by taking more resources from their taller opponents under certain (opportunistic) circumstances.

First, we were not trying to go against all previous literature relating increased height to increased dominance – in general, I expect a positive relationship between height and dominance (in terms of perceptions and behaviourally). However, there may be specific situations where it is beneficial for the shorter male to act more dominantly. Research in (theoretical) biology has suggested that there are possible situations where a smaller individual (with lower RHP) would logically act more dominantly or aggressively in a dyadic contest situation. For instance, when the cost of displaying or losing is low enough (and does not exceed the value of the contested resource; Just & Morris, 2003). What situational constraints would cause a shorter human male to act dominantly, or even aggressively, toward a taller male in a dyadic contest over resources?

We expected that under the following specific circumstances, a shorter male would behave dominantly toward a taller male in a dyadic contest over resources. First, there should be no cost for the shorter male to assert dominance over the taller male. With no cost involved, having lower RHP should not deter usually costly dominant behaviour. We created a no cost situation by ensuring that the opponent had no opportunity to retaliate, and made sure the two opponents were strangers to each other. Second, there should be a clear contest over a valuable resource – in our studies we used money as the contested resource. Third, the difference in height should be salient. In two of the three studies, we asked participants to stand face to face for a few seconds approximately a meter apart, in order for them to literally size each other up. In one of those studies, we also measured their height in the presence of their "opponent", saying their measured height out loud. We then had them perform some tasks, framed as a contest against the other participant (their "opponent"). Most importantly, they played a one-

shot Dictator Game – a simple economic game where one person, the dictator, has complete say over the distribution of a shared pool of money without an opportunity for the other to contest the decision. The two male participants played the dictator game in separate cubicles, and were guaranteed they would not see the other again (as we led them out of the lab separately).

The results showed that relatively shorter males kept more money for themselves and gave less away, when faced with a relatively taller opponent. This result was found in two separate studies; one with a smaller sample (n = 42) and one with a larger sample (n = 162). In the smaller study, we also had participants play an Ultimatum Game. In the Ultimatum Game one person divides a shared pool of money, like in the Dictator Game. However, the other person has the opportunity to reject the division (usually when perceived as unfair), resulting in both parties receiving no money. We asked the participant to divide the money, but told them the other person could retaliate by rejecting the division – we framed it as a contest situation where the opponent could strike back. With the possibility of retaliation, and thus a possible cost of acting dominantly, no effect of relative height on behaviour was found. Also, we found no effect of relative height on non-instrumental aggression toward the other – i.e. relatively shorter males did not act more aggressively toward relatively taller males without the promise of a valuable resource as reward.

Overview of the Current Dissertation

Although most data reported in this dissertation has been briefly discussed in this general introduction, I will provide a succinct overview with goals, findings, and conclusions from each chapter.

Chapter 2

In this chapter, I aimed to investigate whether and why taller men and women have an advantage over their shorter counterparts in terms of leadership perceptions. Results showed that taller men and women are perceived as more "leaderlike" than shorter men and women, but that the reason for this advantage may differ between the sexes. The effect of height on leader perception was also found to be stronger for men than women. For men, increased height led to enhanced other-ratings of dominance, health, and intelligence, which in turn led the increased

leader perception. For women, increased height only led to enhanced other-ratings of intelligence, which then led to increased leader perception. The mechanism through which men and women benefit from taller stature may thus be different.

Chapter 3

The goal of this chapter was to gain a more detailed understanding of a status-size association in males by separating two types of status (dominance, prestige), and two physical size cues (height, muscularity). Results of two scenario studies showed that people associate prestige and dominance with height, with more or less equal strength. On the other hand, while people also associated prestige and dominance with muscularity, a dominance-muscularity association was stronger than a prestige-muscularity association. These effects were replicated using culturally relevant low and high status occupations (political assistant versus politician, Study 3.1), and with a more abstract representation of low and high status (having a relatively small or large share of a shared resource pool, Study 3.2) in the experiments' scenarios.

Chapter 4

Because the existence of a dominance-size association and a prestige-size association may be explained by different mechanisms, I aimed to find out how these associations develop across childhood and adolescence. Would I find the same pattern of results across all age groups as I found in my adult samples in Chapter 3, or does a status-size association change with age?
In the first cross-sectional study (Study 4.1), I found that the status-size association is different for children (aged 6 to 12) than for adults – whereas children also showed a strong association between dominance and size (both height and muscularity), there was a much weaker association between prestige and size. Results from the second study (Study 4.2) indicated that adolescents (aged 12 to 17) showed an increasing association between prestige and size, and a decreasing association with dominance and size, as age progressed.

Chapter 5

In the final empirical chapter, I worked together with fellow PhD student Jill Knapen to find out more about the behavioural effects of male height in dyadic situations. Also, a goal was to test whether there is any truth to the popular notion of a Napoleon Complex, which suggests shorter

men behave more dominantly or aggressively than taller men, to compensate for a lack of stature (and therefore a lack of status). Overall the results show that in certain situations, relatively shorter males may behave dominantly toward a taller "opponent", in a contest over resources (i.e. money). In a first pilot study, we show that men (but not women) who indicate "feeling smaller" give less in a Dictator Game (DG). In Study 5.1, results show that men who are relatively shorter than a real opponent keep more money for themselves in a DG (where there is no cost to that behaviour), but did not show this behaviour in an Ultimatum Game (UG – where there is the possibility of retaliation by the opponent). Finally, Study 5.2 replicated the finding from Study 5.1 that relatively shorter men keep more money for themselves in a DG when faced with a taller opponent, and additionally showed that (relative) height does not predict non-instrumental aggression.