



## Social dominance and the Affective Neuroscience Personality Scales



Donné van der Westhuizen\*, Mark Solms

Department of Psychology, University of Cape Town, Rondebosch 7700, South Africa

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### ABSTRACT

The tendency for cohabiting mammals to organise themselves into dominance hierarchies is a well-documented phenomenon and has consistently been linked to the activity of testosterone and cortisol. However, a systematic account of it within the “basic emotion” taxonomy proposed by Panksepp remains uncharted. The Affective Neuroscience Personality Scales (ANPS), developed to measure the influence of basic affective systems on human temperamental variability, were used as a tool through which to dissociate incentives that promote social dominance from other personality stereotypes. 36 Males were assayed for baseline testosterone and cortisol. Dominance, conceptualised as an egocentric incentive for gaining social influence, was found to positively correlate with the testosterone: cortisol ratio but not with any existing subscales of the ANPS. While these findings suggest that trait dominance can be monitored as an independent personality variable according to a distinct bodily hormone pattern, whether this reflects a distinguishable synaptic-neuronal chemical profile remains unresolved.

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### 1. Introduction

Few will disagree that the history of humanity pivots heavily around the concept of *power*. Though it remains a contested concept, great thinkers from a variety of fields including sociology, psychology and philosophy have dedicated themselves to understanding the nature and significance of power – its locus, its sources of legitimisation, what it means to possess it and the social ramifications of asymmetries in power (Adler, 1927/2009; Foucault, 1977; Nietzsche, 1901; Russell, 1938; Webber, 1947/1964). Viewed as a psychological construct, power is thought to reside in the will of individuals, with those in greater possession being regarded as socially dominant and occupying a special status in society. Power is nonetheless a relative term, playing itself out in dyadic and triadic encounters, making social dominance a fundamental concept in interpersonal interactions. There is now a significant body of research within the general neurosciences which supports the notion of an intrinsic dominance ‘drive’ in most mammalian species, and which appears to enable the effective negotiation of access to fitness opportunities. In this paper, we will use the Affective Neuroscience Personality Scales (ANPS) (Davis & Panksepp, 2011; Davis, Panksepp, & Normansell, 2003) as a tool through which to dissociate incentives, which promote social dominance from other putative mammalian personality stereotypes. Here we endeavour to contribute to the ongoing debate regarding the status of dominance in Panksepp’s (1998) established theory of basic emotions, and propose that the neurobiologically relevant variables implicated in social dominance, namely testosterone and cortisol, will relate uniquely to a

\* Corresponding author at: University of Cape Town, PD Hahn Building, Psychology Department, Lover’s Walk, Rondebosch, Western Cape 7700, South Africa. Fax: +27 21 6504104.

E-mail addresses: [Donne.vanderwesthuizen@uct.ac.za](mailto:Donne.vanderwesthuizen@uct.ac.za) (D. van der Westhuizen), [Mark.Solms@uct.ac.za](mailto:Mark.Solms@uct.ac.za) (M. Solms).

scale developed to measure trait dominance. Following a review of the neurobiological literature on trait dominance, we then attempt to situate this disposition in Panksepp's basic emotion framework.

### 1.1. Trait dominance: conceptualisation and neurobiology

The significance of social dominance as a scientific construct in the literature on individual differences is exemplified by the many psychometric instruments and techniques that attempt to measure it. While they vary to some degree in their conceptualisation of trait dominance, most authors have understood it to be a sustained psychological motive geared towards achieving influence in social groups (Gough & Bradly, 2005; Jackson, 1967; Mehrabian, 1996). Not only do trait dominant individuals aspire towards social status, but they are often found to be successful in achieving it and are frequently appraised by others as being competent regardless of their actual level of expertise (Anderson & Kildiff, 2009). An important distinction between dominance scales, therefore, is the extent to which they directly measure the *motivation* for dominance versus other traits that indirectly promote it. Scales measuring trait dominance differ too, then, in the kinds of behavioural strategies they emphasise as a means to achieving social eminence. For instance, Gough and Bradley's (2005) dominance items on the California Psychological Inventory assess a prosocial orientation in which dominance incentives are channelled along socially sanctioned outlets such as leadership, achievement and perseverance. This is in stark contrast to Hamby's (1996) dominance scale, which underscores authoritarianism in trait dominance. Within the Big Five personality structure, dominance is generally understood to be a dimension of Extraversion, or Agenic Extraversion (Zuckerman, 2005) in particular, in which sensation-seeking and nonconformity separate this trait from Extraversion proper. Interestingly, animal studies using an amended version of the five-factor model to include dominance have successfully described chimpanzee personality using this dimension (King, Weiss, & Sisco, 2008), positioning social dominance as a fundamental cross-species, social-relational concept.

There is however some debate in the literature as to whether or not trait dominance can be measured accurately using self-report instruments, since these motivations may operate unconsciously and may therefore be less amenable to introspection (Stanton & Schultheiss, 2009; Van Honk, Peper, & Schutter, 2005). In addition to this, in climates of social equality, individuals may be socialised to regulate their dominance incentives in favour of group needs. This has led some researchers to develop measures of implicit trait dominance, such as in the Implicit Association Test (Greenwald, McGhee, & Schwartz, 1998) and the Picture Story Exercise method developed by Smith (1992), involving coding of imaginative stories in which participants are asked to respond to pictorial cues. These stories are then rated thematically for power imagery. This method has been found to reliably predict dominance behaviour, but it seldom relates to self-report measures of trait dominance (Stanton & Schultheiss, 2009). Other implicit assessment strategies, for example in the study by Demaree, Robinson, and Everhart (2005) in which participants were asked to select from a variety of characters varying in terms of their levels of trait dominance in film clips, one with which they most identified, have managed to find a significant relationship with self-report scales. Those identifying with the dominant character were more likely to be higher in trait dominance, as measured by Mehrabian and Hine's (1978) revised Trait Dominance-Submissiveness Scale. High scores on this scale were in turn positively correlated with positive affect and scores on the Behavioural Activation Scale (BAS) (Carver & White, 1994), which measures reward-responsiveness, fun-seeking and behavioural drive and which has been established elsewhere as a reliable indicator of implicit trait dominance (Terburg, Hooiveld, Aarts, Kenemans, & van Honk, 2011). The BAS may therefore constitute an important self-report resource in identifying trait dominant individuals.

Because of the problems associated with measuring trait dominance via self-report questionnaires, some researchers argue that it is best assessed using biological indices (Leining & Josephs, 2010). As in the animal literature, investigations into the neurobiology of this emotional tendency in humans have consistently implicated the involvement of testosterone (Mazur & Booth, 1998; Mazur & Booth, 2006). Testosterone is one of the major sex hormones regulated by the hypothalamic-pituitary-gonadal (HPG) axis that plays a role in both immediate functions like behavioural reactions and longer-term processes such as in sexual differentiation. The Leydig cells of the testes are the primary site of production in men, while in females, testosterone is produced in the ovaries and adrenal glands (Mazur & Booth, 1998). Males have roughly ten times the amount of circulating testosterone than females, although females tend to be more sensitive to the hormone (Durdiakova, Ostannikova, & Celec, 2011). The picture between testosterone and dominance is, however, somewhat complex and it is likely that the major stress hormone, cortisol, as well as serotonin and testosterone's synthesis to vasopressin and estradiol, have important roles to play (Leining & Josephs, 2010). Recently, the duel hormone hypothesis has gained prominence in explaining the seemingly inconsistent findings regarding testosterone's effect on dominance (Carré & Mehta, 2011; Mehta & Josephs, 2010; Montoya, Terburg, Bos, & van Honk, 2012; Popma et al., 2007; Terburg, Morgan, & van Honk, 2009). In effect, this account argues that, owing to the antagonistic relationship between the hypothalamic-pituitary-adrenal (HPA) axis, which represents a component of the fight-or-flight stress response, and the HPG reproductive axis (Johnson, Kamilaris, Chrousos, & Gold, 1992; Mastorakos, Pavlatou, & Mizamtsidi, 2006), the effects of testosterone on social behaviour are therefore likely moderated by cortisol release because of its strong links to submissive or social avoidance behaviour (Denson, Spanovic, & Miller, 2009; Goldsmiths & Lemery, 2000). Psychological and contextual variables that pertain to stress such as social anxiety (Maner, Miller, Schmidt, & Eckel, 2008), event appraisal (Mazur, Booth, & Dabbs, 1992) and preferences for status (Josephs, Sellers, Newman, & Mehta, 2006) may therefore moderate the effect of testosterone on behaviour, making the study of trait dominance in laboratory settings difficult. Nonetheless, despite fluctuations in hormone levels, basal (baseline) levels of testosterone and cortisol have been found to have good temporal stability with high test-retest reliability

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