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Intellectual Arrogance and Intellectual Humility:
Correlational Evidence for an Evolutionary-Embodied-Epistemological Account

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(Invited article for the *Journal of Positive Psychology*:
Special Issue on Intellectual Arrogance and Humility)

Full word count: 7,658 (text) 11,149 (everything)

Abstract

We outline an Evolutionary-Embodied-Epistemological (EEE) account of intellectual arrogance, proposing that people psychologically experience their important beliefs as valued possessions—*mental materialism*—that they must fight to keep—*ideological territoriality*—thereby disposing them toward intellectual arrogance. Nonetheless, intellectual arrogance should still vary, being higher among people taking a hostile and domineering epistemic stance (rejecting reality, resisting evidence) than among those taking an open and deferential one (embracing reality, respecting evidence). Such variations can be predicted from people's standing on the *communion-agency circumplex* at multiple levels of analysis (i.e., from their social inclusion and status; dispositional warmth and competence; and behavioral amiability and assertiveness). Using pre-validated indices of mental materialism and ideological territoriality, and an argument evaluation task permitting the quantification of rational objectivity and egotistical bias, we obtained consistent correlational evidence that, as hypothesized, intellectual arrogance is highest when agency is high and communion low, validating the EEE account. (149 words)

Keywords: *intellectual arrogance, intellectual humility, communion, agency, circumplex, embodied cognition, evolutionary cognition*

As Oscar Wilde (1895) once observed, “truth is rarely pure and never simple (p. 10)”. One reason is that the world is hard to understand in itself (Blackburn, 2005). But there is another reason: human minds can operate in a way that obscures apprehension of reality (McGinn, 1993; Wolpert, 2013). Indeed, decades of research document abundantly the myriad ways in which human cognition falls short of optimal rationality (Ariely, 2009; Gilovich, Griffin, Kahneman, 2002; Nickerson, 1998), even if mental shortcuts may operate tolerably well in practice (Gigerenzer & Goldstein, 1996). Moreover, much evidence points to human irrationality being at least partly the product of motivational biases (Gregg, Sedikides, & Gebauer, 2011; Kunda, 1990; Molden, & Higgins, 2012). People are prone to promote and protect their own preferred opinions (Ditto & Lopez, 1992; Edwards & Smith, 1996; Sedikides & Strube, 1997; Stanovich & West, 2008; Taber, Damon & Simona, 2009).

Specifically, in evaluating the quality of arguments bearing on some issue, people’s prior opinions on that issue sway their evaluations of those arguments, independently of the objective quality of those arguments (Sá, West, & Stanovich, 1999; Stanovich & West, 1997). Such compromised evaluations may be characterized in terms of their psychological (as opposed to philosophical) *direction of fit* (Gregg & Sedikides, in press; Tenenbaum, 2006). Not only is this fit *mind-to-world*—disinterestedly reflecting how things actually are—but also *world-to-mind*—prejudicially reflecting how one sees things. Belief is corrupted, amongst other things, by the operation of the *self-enhancement motive* (Alicke & Sedikides, 2011; Sedikides & Gregg, 2008), resulting in a surfeit of regard for one’s own perspective—an *egotistical bias*—combined with a deficiency of regard for reality—a *lack of objectivity*. Such epistemic transgressions can be seen as hallmarks of *intellectual arrogance* (IA), or as counter-indications of *intellectual humility* (IH). (See Gregg & Mahadevan, 2014, and the other contributors to this Special Issue, for additional discussion of these constructs.) To the extent that intellectual arrogance prevails over intellectual humility among a community of discussants, genuine understanding may be compromised, and practical catastrophes may result (Johnson, 2013; Shermer, 2015). Hence, it is important to develop a deeper understanding of the nature of intellectual arrogance and humility, including as means of predicting their occurrence.

Evolutionary Accounts

One approach to these issues is *evolutionary* (Coyne, 2010; Darwin, 1859). Our human nature came to be what it is, at least in part, because it was conducive to the survival and reproduction of our ancestors. Accordingly, we can helpfully construe current aspects of our mind and behavior in terms of their ultimate *function*—as adaptations that were systematically selected for (Cosmides & Tooby, 2013)—or in terms of their historical *precursors*—as sophisticated elaborations of more primitive substrates (Tallis, 2003). To take but one example, self-esteem may have evolved partly to help optimize social competition (Mahadevan, Gregg, Sedikides, & De Waal-Andrews, 2015; Petersen, Sznycer, Sell, Cosmides, & Tooby, 2013; Sedikides, Skowronski, & Dunbar, 2006) and be rooted in simpler judgments of the capacity to hold onto valued resources (Price, Sloman, Gilbert, Gardner, & Rohde, 1994; Sedikides & Skowronski, 1997).

Note that, despite the integrative power of the evolutionary framework (Neuberg, Kenrick, & Schaller, 2010), not everything about mind and behavior may be fully interpretable in terms of genetically-coded biological evolution. In particular, it is unclear how exactly the capacity to *explicitly recognize and seek truth*—which is arguably presumed by many definitions of intellectual arrogance and humility—arose (Nagel, 2012; Tallis, 2011). This unique capacity goes hand in hand with many others, such as expressing oneself linguistically (Pinker, 2008), apprehending oneself reflexively (Corballis, 2011), and engaging in reflective or propositional thought (Gawronski & Bodenhausen, 2011; Strack & Deutsch, 2004). To this extent, humans may exhibit a type of *emancipated cognition* (Gregg & Mahadevan, 2014) that defies complete naturalistic explanation.

Nonetheless, as Wittgenstein (1953) pithily put it, “[t]he human body is the best picture of the human soul (p. 178)”. This insight is the basis of the field of *embodied cognition* (Barsalou, 2008). The key proposal here is that abstract or symbolic concepts have perceptual or physical roots, often foreshadowed in metaphorical correspondences (Lakoff & Johnson, 1980). For example, the vertical dimension of physical space symbolically conveys differentials in *power*—a phenomenon detectable in paradigms where targets are judged more readily as powerful to the extent that they occupy visibly higher positions (Schubert, 2005).

Behaviorally, the bodily act of making a fist also makes men feel more powerful (Schubert & Koole, 2009). At the same time, the horizontal dimension of physical space conveys symbolically differentials in interpersonal *closeness*—a phenomenon capitalized on by measures that scale intimacy in terms of visual overlaps (Schubert & Otten, 2002).

Behaviorally, the bodily act of approaching outgroup members also decreases people's implicit dislike of them (Kawakami, Phillips, Steele, & Dovidio, 2007). In all these cases, a more primitive psychological phenomenon lies behind a more sophisticated one. Moreover, the evolutionary roots of the more primitive phenomenon may be easier to discern. Indeed, the basis of social cognition may be a set of embodied cognitive modules that specifically answer the adaptive problems set by evolution (Kaschak & Maner, 2009).

In a similar vein, theories have advanced more general accounts of cognition guided by evolutionary considerations. For example, human beings' reasoning capacities may have evolved, not to facilitate knowledge acquisition or good decision-making, but rather to facilitate *practical argumentation*—the purpose of which is to persuade peers to do one's bidding, or to screen their communications for trustworthiness (Mercier & Sperber, 2011). This theory accounts for, amongst other things, the existence of confirmation bias (which aids persuasion) and the superiority of reasoning in the context of dialectical discussion (i.e., its natural context). Equally, *self-deception* may have evolved as an anti-screening strategy: for no deception can be detected if one believes one's own lies (Von Hippel & Trivers, 2011), which may explain why the objectively overconfident do receive better peer evaluations (Lamba & Nityananda, 2014). Finally, *error management theory* (Haselton, Nettle, & Andrews, 2005) explains many cognitive biases in terms of a natural selection for errors of judgment least likely to imperil the organism—those that yield many harmless false alarms but few fatal misses. Thus, heterosexual men, but not women, overestimate the opposite sex's erotic interest in them (Hasleton, 2003).

The above research illustrates how construing human beings as biologically rooted creatures shaped by evolution has yielded some theoretically promising and empirically supported accounts of various psychological phenomena. Below, we attempt to do the same for intellectual arrogance and humility.

Mental Materialism and Ideological Territoriality

Much philosophical ink has been spilled in an attempt to resolve the classic *mind-body problem* (Descartes, 1637/1991; McGinn, 1993; Searle, 1992). In brief, it is not clear how something ethereal like the mind, with its abstract ideas, can be identical to something physical like the brain, with its concrete location. However, we propose here that people *intuitively* bridge the infamous mind-body dichotomy—at least for beliefs central to their identity (Gregg et al., 2011). In particular, at a psychological level, people *experience their important beliefs as valuable possessions that they must fight to keep* (Abelson, 1986). More formally, people exhibit both *mental materialism* and *ideological territoriality* (Gregg & Mahadevan, 2014). Mental materialism involves evaluating beliefs more positively because they are one's own, and consequently becoming more attached to those beliefs—much as people exhibit an *endowment effect*, valuing goods that are theirs more than others', and consequently asking for more money to relinquish the former than they offer to acquire the latter (Morewedge, Shu, Gilbert, & Wilson, 2009). Ideological territoriality, a natural outgrowth of mental materialism, involves a combative approach to argumentation: seeking to prevail rhetorically rather than to arrive at the truth, so as to protect or promote one's own existing beliefs—much as people seek to defeat enemies vying for scarce resources, so as to maintain or expand control over some geographical area (Edney, 1974). We propose that mental materialism and ideological territoriality reflect a default mode of embodied cognition, a hangover from our evolutionary heritage, and that they lie at the root of intellectual arrogance.

Mental materialism and ideological territoriality are not, however, inevitable; human beings are, in principle, still capable of emancipated cognition—that is, of weighing the merits of beliefs from a detached and impartial perspective (*mental detachment*) and of treating argumentation as a cooperative means of getting at the truth (*ideological neutrality*). These relatively cultivated activities—which require logical and methodological discipline (e.g., philosophy or science)—lie at the root of intellectual humility (Blackburn, 2005; Wolpert, 2013). The embodied-emancipated dichotomy might also be considered yet another addition to the pantheon of dual-factor models of cognition (Evans, 2012; Kahneman, 2011).

Let us call our general account of intellectual arrogance and intellectual humility the *evolutionary-embodied-epistemic* account, or *EEE* account for short.

Existing Evidence for the Evolutionary-Embodied-Epistemic Account

Three lines of evidence provide initial support for the EEE account. The first is circumstantial and involves language. Clusters of linguistic terms metaphorically refer to belief in terms of physical objects, and to argumentation in terms of physical conflicts.

Like physical objects, beliefs can be *held*. Equally, they can be *acquired* or *discarded*, *picked up*, or *set aside*. As bits of stuff, they may also be *shaped* or *molded* over time; for having been initially *flexible*, they can eventually become *fixed*. Moreover, their close cousins— ideas—can be *grasped*. Like valued possessions, moreover, ideas can be *shared* or *traded*. However, if someone tries to *sell* you an idea, you may not *buy* it; it may be a *load* of nonsense, of which you need to *take stock*. Moreover, although you may *have your* beliefs, and I may *have mine*, it is not clear whether either of us is *entitled* to them. Either way, people may become *attached* to their beliefs. If they find a belief *attractive*, they may *cherish* it *dearly*, *clinging* to it and being loath to *give it up*.

Like physical conflicts, moreover, arguments can be *won* or *lost*, by people on *different sides* of an issue, who describe themselves as being either *for* or *against* some *bone of contention*. In terms of territory, *opponents* try to *attack* or *defend* each other's *positions*, which are either *strong* or *weak*, and which they may be inclined to *advance* or *retreat from*, because the *grounds* for *maintaining* them can be relatively *solid* or *shaky*. Indeed, argumentation itself is weaponized, with each side striving to make *incisive points* that cannot be *parried*, not matter how much their opponents seek to *deflect* or *dodge* them. Ultimately, the *rival claims* that are *disputed* need to be *supported* or *shored up*, lest they be *undermined* or *demolished*.

A second line of evidence for the EEE account is that several studies have already demonstrated a causal connection between physical and psychological construals. For example, people who are made to hold heavier objects regard the issues under consideration as more important (i.e., “weightier”) and think more carefully about them (Jostmann, Lakens, & Schubert, 2009). In addition, when people commit their beliefs to paper, those beliefs

feature more strongly in their subsequent judgments when that paper is preserved (by being stored in their pockets) than when that paper is destroyed (by being torn up and discarded) (Brinol, Casdcol, Petty, & Horcajo, 2012). Finally, both affirming the self (by listing an important value), and threatening the self (by having participants summarize a very difficult passage), affect the prices that sellers and buyers initially announce they would prefer to trade a physical good at. The standard finding is that sellers, who own the product, announce a higher price than buyers, who intend to own it; yet affirming the self increases this price discrepancy whereas threatening the self reduces it, suggesting a communality between monetary and psychological currency (Chatterjee, Irmak, & Rose, 2013).

Gregg, Mahadevan, and Sedikides (in press) provided a third line of experimental evidence favouring the EEE account. Participants considered a hypothetical theory about two arbitrarily named alien species on a faraway planet. The theory stated that one species was the predator and the other its prey. Participants read, one by one, seven pieces of evidence bearing on this theory, each time estimating its likely truth or falsity on a sliding scale ranging from 100 (*certain to be true*) to 0 (*certain to be false*). The evidence initially supported the theory, but then cast doubt on it. Across different studies, the theory was subtly ascribed either to the participant themselves (“You have a theory”), to another person (“Alex has a theory”), or to no one at all (“There is a theory”). People estimated the theory to be more likely to be true when it was “theirs”. This effect is consistent both with people being disposed to regard their own theories as superior (i.e., as true) and with being reluctant to abandon them, that is, with mental materialism.

Expanding and Testing the Evolutionary-Embodied-Epistemic Account

The EEE account can be expanded to make further testable predictions. This can be done by invoking, on the one hand, additional considerations of embodiment, and, on the other hand, a key integrative model in psychology.

In principle, what traits would define someone high in intellectual humility—one striving for objectivity, whose epistemic orientation is mind-to-world? Arguably two: she should *welcome* and *embrace* reality, in a spirit of *openness*; and she should *follow* the arguments and *respect* the evidence, in a spirit of *deference*. Indeed, reflective rationality can

be defined as a self-imposed duty to constrain one's beliefs, and delusion as a failure to do so (Gregg, 2009). In embodied terms, someone high in intellectual humility would be *drawing closer* to some *higher* reality, and *obligingly* letting it impose its imprint *upon* her.

Conversely, what traits in principle would define someone high in IA, one succumbing to egotistical bias, whose epistemic orientation is world-to-mind? Arguably two: he should *ignore* and *reject* reality, in a spirit of *hostility*; and he should *resist* arguments and *refuse to bow* to evidence, in a spirit of *dominance*. In embodied terms, he would be *looking down* on some *uncongenial* reality, and seeking *stubbornly* to impose his preferences *on* it.

These contrasting epistemic stances (hostile + dominant vs. open + deferential) can also be efficiently characterized in embodied terms—as being either *against and above* the world or *towards and below* the world (Figure 1). Note too how the two dimensions described have echoes in the embodiment literature (e.g., openness-hostility = closeness: Schubert & Otten, 2002; dominance-deference = hierarchy: Schubert, 2005).

Now, someone high in intellectual arrogance is arguably liable to exhibit more mental materialism and ideological territoriality than someone high in intellectual humility. In particular, the more one values and is attached to one's own beliefs, the less open one is to abiding by the indications of some contrary reality; and adopting a combative approach to argumentation is one way to express a hostile and domineering attitude. In support of this view, other theorizing and research has characterized variations in intellectual humility and normative rationality in terms of each of the two dimensions above. The openness-hostility dimension arguably maps on to individual differences in *open-mindedness* versus *closed-mindedness* (Kruglanski, 2013)—which has been linked to intellectual humility both theoretically (Speigel, 2012) and empirically (Ottati, Wilson, & Price, 2015). The deference-dominance dimension—which is theoretically linked to intellectual humility when characterized as a conspicuous lack of concern with status (Roberts & Wood, 2003) and low self-exaltation (Cleveland, 2015)—maps on to individual differences in *social dominance orientation* as a source of prejudice (Sidanius & Pratto, 1999) and *social vigilantism* (i.e., the “tendency of individuals to impress and propagate their superior beliefs”) as a source of resistance to persuasion (Saucier & Webster, 2010, p. 19).

Thus, although mental materialism and ideological territoriality may be built-in psychological proclivities, they also admit of variation that can be characterized along both an openness-hostility dimension and a dominance-deference dimension. How might such variation be predicted?

Both dimensions can be arranged in terms of the *circumplex*—a general model that features a pair of orthogonal super-dimensions characterizing a diversity of psychological phenomena (Abele & Wojciszke, 2014; Bakan, 1966; Cuddy, Fiske, & Glick, 2008; Foa, 1961; Huo, Binning, & Molina, 2010; McCrae & Costa, 1989; Moskowitz, 1994; Paulhus & John, 1998; Wiggins, 1979). These are *communion* and *agency*. Broadly speaking, they have to do, respectively, with relating to others and acting in the world. At different levels of analysis, moreover, they take different forms. At a *social* level, they manifest as *inclusion* and *status*; at a *dispositional* level, as *warmth* and *competence*; and at a *behavioral* level, as *amiability* and *assertiveness* (Mahadevan, Gregg, Sedikides, & DeWaal-Andrews, 2015). At each of these levels, a pattern of lower communion and higher agency should predict an epistemic stance that is against and above the world (i.e., high in intellectual arrogance), whereas a pattern of higher communion and lower agency should predict an epistemic stance that is towards and below the world (i.e., low in intellectual arrogance). In particular, people who are (a) low in inclusion but high in status, (b) low in warmth but high in competence, and (c) low in amiability but high in assertiveness, should exhibit greater intellectual arrogance, whereas people with a diametrically opposed standing should exhibit less intellectual arrogance (Figure 2). That is, people's social position, their personality disposition, and their behavioral inclination should facilitate the adoption of a hostile (as opposed to open) and domineering (as opposed to obliging) orientation that gets carried over into their epistemic stance towards the world.

To summarize: Human cognition is partly embodied. People have a default inclination to manifest mental materialism and ideological territoriality—that is, to treat their important beliefs as valuable possessions that they must fight to keep. This default inclination is a form of intellectual arrogance (as opposed to intellectual humility) and commonly manifests itself as an egotistical bias or a lack of objectivity. However, intellectual arrogance, so

characterized, can also vary. Specifically, to the extent that people adopt an epistemic stance that is, in embodied terms, against and above world (i.e., more hostile than open, and more domineering than deferential), their intellectual arrogance will be higher. This epistemic stance can predicted, moreover, from high levels of agency and lower levels of communion, at multiple levels of analysis.

Quantifying Variations in Intellectual Arrogance and Humility

To test our predictions empirically, we employed a complementary pair of indices of intellectual arrogance/humility. The first index was a bespoke self-report inventory designed to assess individual differences in both mental materialism and ideological territoriality. Entitled the *Brief Intellectual Arrogance Scale (BIAS)*, its purpose was to operationalize the constructs directly referenced in EEE theory themselves. The second index was a new version of a prior instrument (Stanovich & West, 1997), and was here used to operationalize a principal cognitive manifestation of intellectual arrogance/humility. Entitled *Gregg's Revised Evaluation of Arguments Task (GREAT)*, its purpose was to quantify the extent to which people's evaluations, of the quality of arguments bearing on various issues, reflected either (a) the independently determined quality of those arguments (indicating rational objectivity), or (b) their own prior opinions on those issues (indicating egotistical bias). Importantly, both our indices of intellectual arrogance/humility had undergone prior validation (further details below).

Quantifying Variations in Agency and Communion

As in Mahadevan et al. (2015), we operationalized communion and agency at three levels: socially, as inclusion and status; dispositionally, as warmth and competence; and behaviorally, as amiability and assertiveness. In all cases, we relied on respondents' self-reports, using scales and items derived from previous research (further details below).

Design, Analysis, and Predictions

In a cross-sectional design, we sought to determine whether the pattern of relations that emerged between operationalizations of agency and communion, on the one hand, and BIAS and GREAT indices, on the one other, would be consistent with our expanded EEE account.

Our statistical strategy to uncover such relations was as follows. Each time, we regressed relevant scores reflecting intellectual arrogance/humility—from the BIAS and the GREAT—on a pair of predictors, with each pair corresponding to agency and communion at one of the three levels of analysis (i.e., social, dispositional, behavioral). We did this because, although the respective dimensions of the circumplex at each level are conceptually distinct, they can sometimes be empirically correlated, creating the need for mutual statistical control.¹ In line with our extended EEE account, we predicted the emergence, in each of these multiple regressions, of (a) a negative beta weight for the communal variable (i.e., lower IA), and (b) a positive beta weight for the agentic variable (i.e., higher IA). The combination of these two beta weights would figuratively place higher intellectual arrogance in the upper left quadrant of the circumplex, and lower intellectual arrogance in the bottom right quadrant.

For completeness, we also included, in each of these regressions, an additional predictor representing a multiplicative combination of both predictors. This permitted us to test for the possibility of a synergic interaction emerging that would also be consistent with our extended EEE account, such that lower agency and higher communion scores together predicted higher intellectual arrogance (or lower intellectual humility), above and beyond their individual additive contributions.

Method

Platform and Procedure

We ran the study online, as part of a larger survey lasting about an hour. We created its content using the internet survey software *iSurvey* (University of Southampton, 2015). We crowdsourced participants via the leading platform *CrowdFlower*. They signed up voluntarily in exchange for payment of \$3.00. We targeted Western and English-speaking participants using interface options. Before beginning, all participants viewed an information sheet. Thereafter, they indicated their consent by clicking a box. Finally, after completing the survey—mostly by clicking radio buttons on assorted questionnaires—they viewed a debriefing statement.

Crowdsourcing provides reliably an abundance of valid data, both rapidly and cheaply, from diverse participants (Buhrmeister, Kwang, & Gosling, 2011; Paolacci &

Chandler, 2014). Nonetheless, out of prudence, we still excluded cases that featured (a) skipping of survey content (i.e., fewer than 95% of items completed); (b) identical responses to any questionnaire with reversed-score items (suggesting mindless button-clicking); (c) duplicate IP addresses (suggesting multiple completions); (d) suspiciously short durations (i.e., in less than half the median survey time); (e) poor self-reported English proficiency; and (f) a self-reported age below 18 years. Our final sample contained 722 participants.² These were mostly female (61.1%), mostly young ($M_{AGE} = 36.0$; $SD_{AGE} = 11.7$), mostly North American or British (USA: 47.5%; UK: 26.6%; Canada: 18.4%; Others: 7.5%), and generally well educated (53.8% with a college degree, 99.7% with a high school or equivalent diploma).

Indices of Communion and Agency

Inclusion and Status. We assessed communion and agency at a social level—one's inclusion and status as accorded by peers—using 9-item ($\alpha = .93$) and 8-item ($\alpha = .91$) self-report scales, respectively. Both scales were based on those devised by Huo et al. (2010), but included new items and excluded existing items so as to streamline conceptual coverage, and to optimize a two-factor solution (Mahadevan, Gregg, & Sedikides, in press). Both scales featured a 5-point response format (1 = *strongly disagree*, 5 = *strongly agree*). All items began with the same sentence stem ("Most of the time, I feel that people...") and ended with a different sentence completion. Sample items: "*see me as fitting in*" (inclusion); "*see me as an important person*" (status).

Warmth and Competence. We assessed communion and agency at a dispositional level—one's warmth and competence as self-ascribed—using two 7-items self-report scales (with $\alpha = .89$, and $\alpha = .84$, respectively). We selected adjectives a priori from stimuli used in previous research on communal and agentic personality traits (Campbell, Rudich, & Sedikides, 2002). Both scales featured a 7-point response format (1 = *strongly disagree*, 7 = *strongly agree*). All items began with the same sentence stem ("On the whole, I see myself as...") and ended with a different trait adjective. Items list: *caring, helpful, supportive, friendly, kind, gentle, nice* (warmth); *competent, effective, strong, powerful, capable, intelligent, talented* (competence).

These scales being newly formulated, we also conducted an exploratory factor analysis of all items together, using Principal Axis Factoring with a Direct Oblimin rotation. This revealed two factors, correlated at $r = .43$, with eigenvalues above 1, together accounting for 56% of the variance. Validating the intended structure, the pattern matrix items loaded on matching factors with a minimum value of .50, and on mismatching factors with a maximum value of .15.

Amiability and Assertiveness. We assessed communion and agency at a behavioral level—one's amiability and assertiveness as displayed in an interpersonal context—level using a 32-item self-report inventory, the *International Personality Item Pool–Interpersonal Circumplex (IPIP-IPC; Markey & Markey, 2009)*, which has undergone prior validation (Markey, Anderson, & Markey, 2013). Its items were devised, not merely to divide the circumplex for interpersonal behavior into quadrants—via the double-bisection of the two main orthogonal dimensions—but additionally to divide it into octants, such that half its items assess blends of the two main dimensions, figuratively lying at 45 degree angles from each vertex (Wiggins, 1979). Nonetheless, by appropriate multiplicative weighting (i.e., main dimensions by ± 1 ; blended dimensions by $\pm \sin 45^\circ$), we computed total scores corresponding to overall amiability and assertiveness.³ Moreover, to compute internal consistency, we divided the 32 items into parallel halves of 16, and computed parallel amiability and assertiveness totals, whose intercorrelations we then adjusted upwards in line with the Spearman-Brown prophecy formula (Eisinga, Te Grotenhuis, & Pelzer, 2013), yielding values of $r_{ADJ} = .86$ and $r_{ADJ} = .89$.

Indices of Intellectual Arrogance and Humility

BIAS. We assessed our two proposed elementary constituents of IA—namely, mental materialism and ideological territoriality—at a dispositional level, using two corresponding 6-item self-report scales (with $\alpha = .70$, and $\alpha = .80$, respectively). Items from both scales—all of which took 7-point bipolar form, and featured contrasting terminal statements—were devised a priori to map on to their respective constructs. In particular, items on the mental materialism scale were designed to capture egotistically inflated evaluations of one's own beliefs (e.g., *my personal ideas are very valuable as they are* versus *my personal ideas still*

have room for improvement) and undue attachment to one's own beliefs (e.g., *right or wrong, I am entitled to hold my beliefs* versus *I should probably abandon many of the beliefs I hold*). Items on the ideological territoriality scale were designed to capture a combative approach to argumentation (e.g., *the only point of a debate is to arrive at the truth* versus *I enjoy defeating weaker opponents in debates*) and a tendency to want one's beliefs to prevail (e.g., *I would like to see my own opinions becoming widely shared* versus *I doesn't bother me that many people see things differently to me*).

A series of studies (Gregg, Mahadevan, & Pegler, 2015a) has yielded support for the construct validity of the BIAS. Crucially, both the mental materialism and ideological territoriality subscales correlated positively with a standard measure of materialistic desire for physical goods (Richins & Dawson, 1992), as well as a standard measure of physical aggression (Buss & Perry, 1992). In addition, both correlated positively with social vigilantism (Saucier & Webster, 2010), with reactance proneness (Shen & Dillard, 2005), as well as with psychological variables that promote cognitive bias, such as dogmatic and categorical thinking (Stanovich & West, 1997). Thus, both the BIAS subscales fit neatly into the nearby nomological web.

GREAT. We assessed a principal cognitive manifestation of intellectual arrogance using GREAT, a completely updated version of the *Argument Evaluation Test* (AET; Sá, West, & Stanovich, 1999; Stanovich & West, 1997). The purpose was the same: to estimate the extent to which participants' evaluations of a set of arguments is objectively rational, reflected in the degree of correspondence with normative evaluations of those arguments, or egotistically biased, reflected in the degree of correspondence with personal opinions related to those arguments. This task ran as follows. Participants began by indicating, on 7-point scales, their level of agreement or disagreement (1 = *strongly disagree*, 7 = *strongly agree*) with a set of statements expressing a variety of controversial political opinions (e.g., *Every worker should be legally guaranteed a minimum wage whatever job they do; Ordinary civilians should be legally permitted to own a standard firearm for personal use*). Next, they re-read every statement, now supplemented by series of three additional statements: an *argument* for it; a *counterargument* against that argument; and a *rebuttal* to that

counterargument. In each case, participants then judged “how weak or strong [...] the rebuttal [...] is, while ignoring [their] own opinion” (1 = *extremely weak*, 7 = *extremely strong*). Subsequently, the mean ratings of the quality of the rebuttals were computed to estimate the normative quality of those arguments (Surowiecki, 2004).

On the basis of these three sets of ratings— individual prior opinions, individual argument evaluations, and normative argument evaluations—we computed a multiple regression for each participant (Figure 3). We used the beta weight corresponding to the prediction of individual argument evaluations from individual prior opinions in order to operationalize each participant’s level of egocentric bias; and we used the beta weight corresponding to the prediction of individual argument evaluations from normative argument evaluations (constant across participants) in order to operationalize each participant’s level of rational objectivity (Stanovich & West, 1997). Thus, we derived separate estimates for egocentric bias and rationality objectivity. The statistical control afforded by such beta weights makes them more specific indices than raw correlational coefficients would be.⁴ We also took care to exclude any anomalous beta weights in excess of .99, which multicollinearity occasionally produced.

The content of GREAT, whose content was entirely novel, had been designed to be briefer, more standardized, more ideologically balanced, and more internationally accessible than the original AET. First, unlike the original AET, whose statements and arguments contained up to 49 words, and varied greatly in length, no statement or argument in the GREAT contained more than 16 words, and most were nearly that long. In addition, whereas the AET repeated instructions with every item, the GREAT supplied them up front. Second, the GREAT, unlike the AET, did not require the participants to assume that any supplemental facts were true, or that any people were uttering them: arguments alone were presented. Third, in the GREAT, we designed half the statements to express left-wing points of view, and half right-wing ones; in contrast, political content in the AET was not balanced. Finally, whereas several items in the AET related specifically to US issues (e.g., *Interviews should be given a higher weighting in graduate school admissions than GREs or undergraduate GPAs*), items in the GREAT were relevant to developed nations generally (e.g., *When the economy is*

in a slump, the government should spend money to get it going). In addition, the GREAT featured 24 items and 7-point scale, as opposed to the AET's 23 items and 4-point scale.

Several studies (Gregg, Mahadevan, & Pegler, 2015b) found support for the construct validity of the GREAT. First, in two samples, we asked participants to indicate additionally the extent to which they identified with each underlying issue on the GREAT, expressed as a label (e.g., *Minimum Wage*, *Gun Control*) on a three-point scale (1 = *I don't identify with this issue at all: it hardly matters to me*, 2 = *I somewhat identify with this issue: it somewhat matters to me*, 3 = *I strongly identify with this issue: it really matters to me*). We then computed separate aggregate indices of egotistical bias and rational objectivity based on issues idiosyncratically selected to be at each level of identification. In both samples, we obtained a predicted interaction: whereas aggregate levels of egotistical bias rose when computed on the basis of topics that mattered more rather than less to participants, aggregate levels of objectivity fell. Thus, identification promoted bias, where indifference promoted objectivity. These findings—which constitute a type of internal validation of the GREAT—replicate many others showing that self-enhancement biases are greater when the topic at hand is more central rather than more peripheral to people's identity (Gebauer, Wagner, Sedikides, & Neberich, 2013; Gregg et al., 2011; Sedikides & Green, 2009).

We also obtained some additional evidence of the GREAT's construct validity from external correlations. In particular, the rational objectivity coefficient—incidentally, the only one reported by Stanovich and West (1997)—correlated positively with openness to experience (Benet-Martinez, & John, 1998) and with flexible thinking (Stanovich & West, 1997), but correlated negatively with the overclaiming bias (i.e., claimed recognition of fictitious relative to real words; cf. Paulhus, Harms, Bruce, & Lysy, 2003) and with questionnaire items assessing the self-deceptive enhancement of one's intellectual abilities (Paulhus, 1998). However, no such pattern of confirmatory correlations emerged for the egotistical bias coefficient.

Results and Discussion

Preliminary Analyses

Table 1 displays intercorrelations between the dependent variables, designed to capture intellectual arrogance/humility, namely, the mental materialism and ideological territoriality indices of the BIAS, and egotistical bias and rational objectivity indices of the GREAT. Table 2 displays intercorrelations between the independent variables designed to capture communion and agency at different levels: inclusion and status (social); warmth and competence (dispositional); and amiability and assertiveness (behavioral).

As would be expected, the mental materialism and ideological territoriality indices intercorrelated positively, consistent with the former being the hypothesized source of the latter. Also as expected, the egotistical bias and rational objectivity indices correlated negatively, consistent with both tending to exclude one another. Furthermore, as would be expected if both the BIAS and GREAT converged in assessing intellectual arrogance/humility (and despite the pronounced methodological dissimilarity of the instruments), their indices intercorrelated. Specifically, greater mental materialism and ideological territoriality both correlated negatively with rational objectivity. In other words, the more participants professed to valuing and being attached to their beliefs, or to taking a combative approach to arguments and wanting their beliefs to prevail, the less their individual evaluations of arguments were predicted by “correct” normative evaluations of those arguments, independently of their own opinions on argument-related topics. All else equal, then, this empirical convergence adds to the construct validity of both instruments. However, contrary to expectation, neither mental materialism nor ideological territoriality correlated significantly with egotistical bias. These null results, however, were in keeping with the absence of correlations between egotistical bias and other constructs during earlier validation (Gregg et al., 2015b), as well as the absence of any reports of such correlations by Stanovich and West (1997).

The various indices of agency and communion also exhibited a mostly positive manifold, with one or two minor exceptions. Moreover, though the coefficients were large enough to suggest affinities, they did not indicate redundancies. Correlations at different levels between matched variables (i.e., both communion or both agency: regular font in Table 2) generally exceeded those between mismatched variables (i.e., one communion and the

other agency: italic font in Table 2). In addition, correlations between the agentic and communal variables at the same level of analysis (e.g., status and inclusion: bold font in Table 2; also see Footnote) were almost identical to those observed by Mahadevan et al. (2015). Thus, at least at social and dispositional levels of analysis, some mutual control between was warranted between the overlapping communal and agentic variables used to predict levels of intellectual arrogance/humility.

Main Analyses

We used the communal and agentic variables at each level of analysis, plus their derived interaction term, to separately predict each of our four indices of intellectual arrogance/humility, following the hierarchical multiple regression procedures recommended by Aiken and West (1991)—in particular, centering all the predictors, and entering the interaction terms last. Table 3 displays the corresponding beta weights and their significance. For three of our indices of intellectual arrogance/humility, findings were entirely in accord with our hypotheses: significant betas for the agentic variable and the communal variable emerged in the right direction. As regards the GREAT, the higher people's inclusion, warmth, and amiability, the more their individual evaluations of arguments were predicted by "correct" normative evaluations of those arguments (i.e., they more they exhibited rational objectivity); furthermore, the higher their status, competence, and assertiveness, the less this was the case. As regard the BIAS, the higher people's status, competence, and assertiveness, the higher their mental materialism and ideological territoriality scores were; furthermore, the higher the inclusion, warmth, and amiability, the lower those scores were. In other words, two main effects emerged across also levels of analysis, such that higher agency and lower communion independently predicted higher levels of intellectual arrogance. Accordingly, our data suggest that intellectual arrogance "belongs" in the top left corner of the circumplex, and intellectual humility in the bottom right (Figure 2). In addition, inspection reveals a further pattern in our data. For rational objectivity, links to agency and communion variables were comparable; for mental materialism, links to agency were relatively larger; and, for ideological territoriality, links to communion were relatively larger. Thus, agency may

characterize better the more intrapsychic nature of mental materialism, whereas communion may characterize better the more interpersonal nature of ideological territoriality.

Only one statistical interaction emerged (for assertiveness x amiability predicting ideological territoriality), but this just reached significance and so may be artifactual. However, we found no link between egotistical bias on the GREAT and any of the predictor variables. This flush of null effects again echoes previous findings.

General Discussion

The philosopher Bertrand Russell (1950) once ruefully remarked that “[m]an is a rational animal—so at least I have been told [...] I have looked diligently for evidence in favour of this statement, but so far I have not had the good fortune to come across it [...] (p. 82)”. He went on to catalogue an array of “intellectual rubbish” that often translated into evil and tragedy. One primary source of man not being a rational animal, in this consequential way, is *intellectual arrogance*: people prefer, under the influence of the self-enhancement motive, to cleave to opinions at variance with argument and evidence (Alicke & Sedikides, 2009; Kunda, 1990; Sedikides & Gregg, 2008). Accordingly, it is important to understand the nature and precursors of intellectual arrogance to help cultivate the countervailing virtue of intellectual humility.

Here, we took an approach that considers people’s epistemic biases to be partly the result of human beings being embodied creatures whose ancestors were subject to evolutionary selection (Haselton, Nettle, & Andrews, 2005; Lakoff & Johnson, 1980; Mercier & Sperber, 2011). Our evolutionary-embodied-epistemic (EEE) account (see also Gregg and Mahadevan, 2014) proposes that people psychologically experience their beliefs as valuable possessions that they must fight to keep. In particular, people exhibit both mental materialism—overvaluing their beliefs and becoming attached to them—and ideological territoriality—taking a combative approach to argumentation and wanting their beliefs to prevail generally. As fundamental features of embodied cognition (Barsalou, 2008), both mental materialism and ideological territoriality naturally tend to promote intellectual arrogance. In contrast, the emancipated cognition of which human beings also capable, involving mental detachment and ideological neutrality, needs to be carefully cultivated.

Circumstantial evidence from linguistic metaphors (Abelson, 1986), and experimental research (Chatterjee et al., 2013; Gregg, Mahadevan, & Sedikides, in press), supports the EEE account. Here, expanding that account, we postulated that individual differences in people's tendencies to adopt different epistemic stances towards the world would vary the degree to which they exhibited intellectual arrogance versus humility. In particular, we postulated that people could adopt an embodied stance that was *against and above the world*, characterized by the hostile rejection of reality and attempts to dominate recalcitrant data, or *towards and below the world*, characterized by the open embracing of reality and due respect for reason and evidence (Figure 1). Moreover, we postulated that these contrasting stances could be characterized in terms of the *communion-agency* circumplex (Figure 2), extensively used to organize many psychology phenomena at different levels of analysis (Abele & Wojciszke, 2014; Bakan, 1966; Mahadevan, Gregg, Sedikides, & De Waal-Andrews, 2015). In particular, we hypothesized that intellectual arrogance would be higher to the extent that levels of agency were higher and levels of communion lower.

To test these hypotheses, we used two indices of intellectual arrogance/humility. The first was the Brief Intellectual Arrogance Scale (BIAS), comprising twin self-report measures of mental materialism and ideological territoriality. The second was Gregg's Revised Evaluation of Arguments Task (GREAT), yielding separate indices of egotistical bias and rational objectivity, in the evaluation of arguments bearing on controversial issues. Both indices had undergone prior validation (Gregg, Mahadevan, & Pegler, 2015a,b). In addition, we used a set of prior measures of agency and communion at three different levels of analysis: social, dispositional, and behavioral (Mahadevan et al., 2015).

In general—but excepting our index of egotistical bias—we observed patterns of correlation precisely in accord with the expended EEE account. First, the measures of mental materialism and ideological territoriality both correlated with the rational objectivity index, in keeping with the contention that both reflect levels of intellectual arrogance/humility. Second, the measures of both mental materialism and ideological territoriality, as well as the rational objectivity index, related positively to communion but negatively to agency, at all levels of analysis. That is, the highest levels of intellectual arrogance were apparent among

those participants who (a) believed they enjoyed high status among their peers, saw themselves as generally competent, and reported behaving in an assertive manner, but who simultaneously (b) believed that they did not fit in with their peers, did not see themselves as generally warm, and reported not behaving in an amiable manner. These participants reported (a) overvaluing their beliefs and becoming attached to them, (b) taking a combative approach to argumentation and wanting their beliefs to prevail generally, and (c) evaluating arguments differently from the “correct” normative evaluations of those arguments, independently of their own opinions on argument-related topics. Thus, people’s capacity or proclivity to adopt a stance of being “against and above” others—in terms of their social position, dispositional self-view, or behavioral orientation—also seem to adopt a matching epistemic stance—characterized by more mental materialism, greater ideological territoriality, and non-objective argument evaluation.

Limitations and Qualifications

One limitation of the present research was its cross-sectional character. We did not establish that variations in agency and communion at various levels of analyses were causally responsible for variations in mental materialism, ideological territoriality, and rational objectivity. Demonstrating this would require an experimental design—manipulating the former dimensions, as independent variables, and observing the result on the latter indices, as dependent variables. Nonetheless, the correlational patterns we obtained for these variables were precisely consistent with our theoretical hypotheses, which implied a specific joint prediction in involving directional effects for a pair of variables.

Moreover, one of the GREAT’s indices—egotistical bias—yielded null effects, having earlier failed (unlike rational objectivity) to correlate with the measures of mental materialism and ideological territoriality. This is surprising, given that a bias towards evaluating arguments as being of higher quality to the extent that they match one’s prior beliefs (independently of the normative quality of those arguments) would a priori seem to operationalize intellectual arrogance rather well. The interpretation of this anomalous null effect is complicated by the fact that other research has furnished contradictory signs as to the validity of the index. On the one hand, it routinely fails to correlate with a range of relevant

variables (Gregg, Mahadevan, & Pegler, 2015b); or else researchers only discuss correlates of the rational objectivity index (Sá et al., 1999; Stanovich & West, 1997). On the other hand, the egotistical bias index in this research does correlate inversely with the rational objectivity index, as would be expected; and in two samples, levels of egotistical bias duly increased as the rated importance of the topic increased instead—a clear sign of self-enhancement (Gregg, Mahadevan, & Pegler, 2015b). Accordingly, it is difficult to put down these null effects simply to improper measurement, especially given that the rational objectivity index, which was based on identical regression data, yielded such consistent correlations. Yet it is also difficult to explain why the egotistical bias would show signs of validity internally but none externally.

Finally, our circumplex-based predictions were exceedingly broad. They concerned the adoption of agency-based and communion-based stances on the whole, and how that would influence one's epistemic approach to reality as a whole. As such, the predictions did not differentiate between specific situations or contexts, or between specific topics or targets. Yet, it is difficult to argue that the adoption of an open and deferential stance when engaged in inquiry is *always* appropriate—that it is the invariant hallmark of epistemic virtue. In particular, if a discussant argues for position that all reason and logic indicates is farfetched, or that violates bedrock moral scruples (e.g., chemotherapy causes cancer; children may be murdered), then responding in an “intellectually arrogant” way seems appropriate. That is, the adoption of a hostile and domineering stance—representing a disdainful and steadfast rejection of offensive nonsense—can be virtuous (Fumerton, 2010), and indicate a fidelity to the truth, rather than an aversion to it. It may be precisely those who are situationally, dispositionally, or behaviorally higher in agency and lower in communion who help to keep a community of inquirers safe from lapsing into absurdity or falling victim to humbug.

Coda

The philosopher Blaise Pascal (1658/1670) opined that “man is a reed [...] but he is a thinking reed (p. 97)”. This phrase neatly captures the paradoxical nature of being human—somehow a part of nature, yet somehow apart from it. But even thinking *itself* may betray the “indelible stamp of [its] lowly origins (p. 597)” (Darwin, 1871). Specifically, people may

experience their important beliefs in partly physical terms—as valued possessions that they must fight to keep. Moreover, people who are generally inclined to adopt domineering and inhospitable stance towards the world may be particularly inclined to experience their beliefs in this way. Such embodied tendencies, we have shown here, go together with signs of intellectual arrogance. The belligerent beast, jealously guarding his sustenance or territory, may not be so different from the hubristic human, eagerly defending his beliefs or ideology.

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References

- Abele, A., & Wojciszke, B. (2014). Communal and agentic content in social cognition: A dual perspective model. *Advances in Experimental Social Psychology*, *50*, 195–255. doi: 10.1002/ejsp.791
- Abelson, R. P. (1986). Beliefs are like possessions. *Journal for the Theory of Social Behavior*, *16*, 223-250.
- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Alicke, M. D., & Sedikides, C. (2009). Self-enhancement and self-protection: What they are and what they do. *European Review of Social Psychology*, *20*, 1-48. doi: 10.1080/10463280802613866
- Alicke, M. D., & Sedikides, C. (2011). *Handbook of self-enhancement and self-protection*. New York, NY: Guilford Press.
- Ariely, D. (2009). *Predictably irrational. The hidden forces that shape our decisions*. New York, NY: Harper.
- Bakan, D. (1966). *The duality of human existence: Isolation and communion in Western man*. Boston, MA: Beacon Press.
- Barkow, J. H. (1980). Prestige and self-esteem: A biosocial interpretation. In D. R. Omark, F. F. Strayer, & D. G. Freedman (Eds.), *Dominance relations: An ethological view of human conflict and social interaction* (pp. 319-332). New York, NY: Garland SMTP Press.
- Barsalou, L.W. (2008). Grounded cognition. *Annual Review of Psychology*, *59*, 617-645. doi: 10.1146/annurev.psych.59.103006.093639
- Benet-Martinez, V., & John, O. P. (1998). Los Cinco Grandes across cultures and ethnic groups: Multitrait-multimethod analyses of the Big Five in Spanish and English. *Journal of Personality and Social Psychology*, *75*, 729-750.
- Blackburn, S. (2005). *Truth: A guide for the perplexed*. London, UK: Penguin books.
- Brinol, P., Cascol, M., Petty, R. E., & Horcajo, J. (2012). Treating thoughts as material objects can increase or decrease their impact on evaluation. *Psychological Science*, *24*, 41-47. doi: 10.1177/0956797612449176

- Buhrmester, M. D., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science*, 6, 3-5. doi: 10.1177/1745691610393980
- Buss, A. H., & Perry, M. (1992). The Aggression Questionnaire. *Journal of Personality and Social Psychology*, 63, 452-459.
- Campbell, W. K., Rudich, E., & Sedikides, C. (2002). Narcissism, self-esteem, and the positivity of self-views: Two portraits of self-love. *Personality and Social Psychology Bulletin*, 28, 358-368. doi: 10.1177/0146167202286007
- Chatterjee, P., Irmak, C., & Rose, R. L. (2013). The endowment effect as self-enhancement in response to threat. *Journal of Consumer Research*, 40, 460-476. doi: 10.1086/671344
- Cleveland, S. (2015). *Humility as intelligent, low-sensitivity to self-exaltation*. Paper presented at the Intellectual Humility Capstone Conference, Catalina Island, CA, USA.
- Corballis, M. C. (2011). *The recursive mind: The origins of human language, thought, and civilization*. Princeton, NJ: Princeton University Press.
- Cosmides, L., & Tooby, J. (2013). Evolutionary psychology: New perspectives on cognition and motivation. *Annual Review of Psychology*, 64, 201-229. doi: 10.1146/annurev.psych.121208.131628
- Coyne, J. (2010). *Why evolution is true*. Oxford, UK: Oxford University Press.
- Cuddy, A. J., Fiske, S. T., & Glick, P. (2008). Warmth and competence as universal dimensions of social perception: The stereotype content model and the BIAS map. *Advances in Experimental Social Psychology*, 40, 61-149. doi: 10.1016/S0065-2601(07)00002-0
- Darwin, C. (1859). *On the origin of the species by means of natural selection, or, the preservation of favored races in the struggle of life*. London, UK: John Murray.
- Darwin, C. (1871). *The descent of man*. London: John Murray.
- Descartes, R. (1637/1991). Discours de la method [...]. In J. Cottingham, R. Stoothoff, D. Murdoch, & A. Kenny (Eds. & Trans.), *The philosophical writings of Descartes*. Cambridge, UK: Cambridge University Press.

- Ditto, P. H., & Lopez, D. F. (1992). Motivated skepticism: Use of differential decision criteria for preferred and nonpreferred conclusions. *Journal of Personality and Social Psychology*, *63*, 568-584.
- Edney, J. (1974). Human territoriality. *Psychological Bulletin*, *81*, 959-975. doi: 10.1037/h0037444
- Edwards, K., & Smith, E. E. (1996). A disconfirmation bias in the evaluation of arguments. *Journal of Personality and Social Psychology*, *71*, 5-24.
- Eisinga, R., Te Grotenhuis, M., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach or Spearman-Brown? *International Journal of Public Health*, *58*, 637-642. doi: 10.1007/s00038-012-0416-3
- Evans, J. (2012). Questions and challenges for the new psychology of reasoning. *Thinking & Reasoning*, *18*, 5-31. doi: 10.1080/13546783.2011.637674
- Foa, U. G. (1961). Convergences in the analysis of the structure of interpersonal behavior. *Psychological Review*, *68*, 341-353. doi: 10.1037/h0039638
- Fumerton, R. (2010). You can't trust a philosopher. In R. Feldman, & T. A. Warfield (Eds.), *Disagreement* (pp. 91-110). Oxford, UK: Oxford University Press.
- Gawronski, B., & Bodenhausen, G. V. (2011). The associative-propositional evaluation model: Theory, evidence, and open questions. *Advances in Experimental Social Psychology*, *44*, 59-127. doi: 10.1016/B978-0-12-385522-0.00002-0
- Gebauer, J. E., Wagner, J., Sedikides, C., & Neberich, W. (2013). The relation between agency-communion and self-esteem is moderated by culture, religiosity, age, and sex: Evidence for the self-centrality breeds self-enhancement principle. *Journal of Personality*, *81*, 261-275. doi:10.1111/j.1467-6494.2012.00807.x
- Gigerenzer, G. & Goldstein, D. G. (1996). Reasoning the fast and frugal way: Models of bounded rationality. *Psychological Review*, *103*, 650-669. doi: 10.1037/0033-295X.103.4.650.
- Gilovich, T., Griffin, D., Kahneman, D. (2002). *Heuristics and biases: The psychology of intuitive judgment*. Cambridge, UK: Cambridge University Press.
- Gregg, A. P. (2009). Is identity per se irrelevant? A contrarian view of self-verification effects. *Depression and Anxiety*, *26*, E9-E59.

- Gregg, A. P., & Mahadevan, N. (2014). Intellectual arrogance and intellectual humility: An evolutionary-epistemological account. *Journal of Psychology and Theology*, *42*, 7-18.
- Gregg, A. P., Mahadevan, N., & Pegler, A. (2015a). *Validation of the Brief Intellectual Arrogance Scales*. Unpublished manuscript, University of Southampton.
- Gregg, A. P., Mahadevan, N., & Pegler, A. (2015b). *Validation of Gregg's Revised Evaluation of Arguments Scale*. Unpublished manuscript, University of Southampton.
- Gregg, A. P., Mahadevan, N., & Sedikides, C. (in press). The SPOT effect: People spontaneously prefer their own theories. *Quarterly Journal of Experimental Psychology*.
- Gregg, A. P., & Sedikides, C. (in press). Essential self-evaluation motives: Caring about who we are. In M. van Zomeren & J. Dovidio (Eds.), *The handbook of the human essence*. Oxford, UK: Oxford University Press.
- Gregg, A. P., Sedikides, C., Gebauer, J. E. (2011). Dynamics of identity: Between self-enhancement and self-assessment. In S. J. Schwartz, K. Luyckx, & V. L. Vignoles (Eds.), *Handbook of identity: Theory and research* (Vol. 1, pp. 305-327). New York, NY: Springer.
- Hasleton, M. G. (2003). The sexual overperception bias: Evidence of a systematic bias in men from a survey of naturally occurring events. *Journal of Research in Personality*, *37*, 34-47.
- Haselton, M. G., Nettle, D. & Andrews, P. W. (2005). The evolution of cognitive bias. In D. M. Buss (Ed.), *Handbook of evolutionary psychology* (pp. 724-746). Hoboken, NJ: Wiley.
- Johnson, P. (2013). *Intellectuals*. London, UK: Weidenfeld & Nicolson.
- Jostmann, N. B., Lakens, D., & Schubert, T. W. (2009). Weight as an embodiment of importance. *Psychological Science*, *20*, 1169-1174. doi: 10.1111/j.1467-9280.2009.02426.x
- Kahneman, D. (2011). *Thinking, fast and slow*. New York, NY: Farrar, Straus and Giroux.
- Kaschak, M. P., & Maner, J. K. (2009). Embodiment, evolution, and social cognition: An integrative framework. *European Journal of Social Psychology*, *39*, 1236-1244. doi: 10.1002/ejsp.664
- Kawakami, K., Phillips, C. E., Steele, J. R., & Dovidio, J. F. (2007). (Close) distance makes the heart grow fonder: The impact of approach orientations on attitudes toward Blacks. *Journal of Personality and Social Psychology*, *92*, 957-971. doi: 10.1037/0022-3514.92.6.957
- Kruglanski, A. (2013). *The psychology of closed-mindedness*. New York, NY: Psychology Press.

- Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin*, *108*, 480–498. doi: 10.1037/0033-2909.108.3.480.
- Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago, IL: University of Chicago Press.
- Lamba S., & Nityananda V. (2014). Self-deceived individuals are better at deceiving others. *PLoS One*, *9*. e104562. doi: 10.1371/journal.pone.0104562
- Mahadevan, N., Gregg, A. P., Sedikides, C., & DeWaal-Andrews (2015). *Winners, losers, insiders, and outsiders: Comparing hierometer and sociometer theories of self-regard..* Unpublished manuscript under review, University of Southampton.
- Mahadevan, N., Gregg, A. P., & Sedikides, C. (2015). *Untangling the impact of social Integration on self-regard: How status and inclusion shape self-esteem and narcissism.* Unpublished manuscript, University of Southampton.
- Markey, P. M., & Markey, C. N. (2009). A brief assessment of the interpersonal circumplex: The IPIP-IPC. *Assessment*, *16*, 352–361. doi: 10.1177/1073191109340382
- Markey, P., Anderson, J. M., & Markey, C. (2013). Using behavioral mapping to examine the validity of the IPIP-IPC. *Assessment*, *20*, 165-174. doi: 10.1177/1073191112436669
- McGinn, C. (1993). *Problems in philosophy: The limits of enquiry*. Oxford, UK: Blackwell.
- McCrae, R. R., & Costa, P. T., Jr. (1989). The structure of interpersonal traits: Wiggins's circumplex and the five-factor model. *Journal of Personality and Social Psychology*, *56*, 586-595. doi: 10.1037/0022-3514.56.4.586
- Mercier, H., & Sperber, D. (2011). Why do humans reason? Arguments for an argumentative theory. *Behavioral and Brain Sciences*, *34*, 57–111. doi: 10.1017/S0140525X10000968
- Molden, D. C., & Higgins, E. T. (2012). Motivated thinking. In K. Holyoak & B. Morrison (Eds.), *The Oxford handbook of thinking and reasoning* (pp. 390-409). New York, NY Oxford University Press.
- Huo, Y. J., Binning, K. R., & Molina, L. E. (2010). Testing an integrative model of respect: Implications for social engagement and well-being. *Personality and Social Psychology Bulletin*, *36*, 200-212. doi: 10.1177/0146167209356787

- Morewedge, C. K., Shu, L. L., Gilbert, D. T., & Wilson, T. D. (2009). Bad riddance or good rubbish? Ownership and not loss aversion causes the endowment effect. *Journal of Experimental Social Psychology*, *45*, 947-951. doi: 10.1016/j.jesp.2009.05.014
- Moskowitz, D. S. (1994). Cross-situational generality and the interpersonal circumplex. *Journal of Personality and Social Psychology*, *66*, 921-933. doi: 10.1037/0022-3514.66.5.921
- Nagel, T. (2012). *Mind and cosmos: Why the materialist neo-Darwinian conception of nature is almost certainly wrong*. Oxford, UK: Oxford University Press.
- Neuberg, S. L., Kenrick, D. T., & Schaller, M. (2010). Evolutionary social psychology. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (5th ed, Vol. 2, pp. 761-796). New York, NY: John Wiley & Sons.
- Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, *2*, 175–220. doi: 10.1037/1089-2680.2.2.175
- Ottati, V., Wilson, C., Price, E. (2015). *Open-minded cognition: The flexible merit standard model*. Unpublished manuscript, Loyola University Chicago, Chicago, IL, USA.
- Paolacci, G., & Chandler, J. (2014). Inside the Turk: Understanding Mechanical Turk as a participant pool. *Current Directions in Psychological Science*, *23*, 184-188. doi: 10.1177/0963721414531598
- Pascal, B. (1958). *Pascal's pensées* (trans. W. F. Trotter). New York: E. P. Dutton & Co. (Original work published 1670.).
- Paulhus, D. L. (1998). *Manual for Balanced Inventory of Desirable Responding (BIDR-7)*. Toronto, Canada: Multi-Health Systems.
- Paulhus, D. L., Harms, P. D., Bruce, M. N., & Lysy, D. C. (2003). The over-claiming technique: Measuring self-enhancement independent of ability. *Journal of Personality and Social Psychology*, *84*, 890–904. doi: 10.1037/0022-3514.84.4.890
- Paulhus, D. L., & John, O. P. (1998). Egoistic and moralistic bias in self-perceptions: the interplay of self-deceptive styles with basic traits and motives. *Journal of Personality*, *66*, 1024-1060.
- Petersen, M. B., Sznycer, D., Sell, A., Cosmides, L., & Tooby, J. (2013). The ancestral logic of politics: Upper-body strength regulates men's assertion of self-interest over economic redistribution. *Psychological Science*, *24*, 1098-1103. doi: 10.1177/0956797612466415

- Pinker, S. (2008). *The stuff of thought: Language as a window into human nature*. Harvard, MA: Harvard University Press.
- Price, J. S., Sloman, L., Gilbert, P., Gardner, R., & Rohde, P. (1994). The social competition hypothesis of depression. *British Journal of Psychiatry*, *164*, 309–315. doi: 10.1192/bjp.164.3.309
- Richins, M. L., & Dawson, S. (1992). A consumer values orientation for materialism and its measurement: Scale development and validation. *Journal of Consumer Research*, *19*, 303-316.
- Roberts, R. C., & Wood, W. J. (2003). Humility and epistemic goods. In M. DePaul & L. Zagzebski (Eds.) *Intellectual virtue: Perspectives from ethics and epistemology* (pp. 257-279). Oxford, UK: Oxford University Press.
- Russell, B. (1950). *Unpopular essays*. London, UK: George Allen and Unwin.
- Sá, W. C., West, R. F., & Stanovich, K. E. (1999). The domain specificity and generality of belief bias: Searching for a generalizable critical thinking skill. *Journal of Educational Psychology*, *91*, 497-510.
- Saucier, D. A., & Webster, R. J. (2010). Social vigilantism: Measuring individual differences in belief superiority and resistance to persuasion. *Personality and Social Psychology Bulletin*, *36*, 19-32. doi: 10.1177/0146167209346170
- Schubert, T. W. (2005). Your highness: Vertical positions as perceptual symbols of power. *Journal of Personality and Social Psychology*, *89*, 1-21. doi: 10.1037/0022-3514.89.1.1
- Schubert, T., & Otten, S. (2002). Overlap of self, ingroup, and outgroup: Pictorial measures of self-categorization. *Self & Identity*, *1*, 535-576. doi: 1529-8868/2002
- Schubert, T. W., & Koole, S. L. (2009). The embodied self: Making a fist enhances men's power-related self-conceptions. *Journal of Experimental Social Psychology*, *45*, 828-834. doi: 10.1016/j.jesp.2009.02.003
- Searle, R. (1992). *The rediscovery of the mind*. Cambridge, MA: Mideological territoriality Press.
- Sedikides, C., & Green, J. D. (2009). Memory as a self-protective mechanism. *Social and Personality Psychology Compass*, *3*, 1055-1068. doi: 10.1111/j.1751-9004.2009.00220.x

- Sedikides, C., & Gregg, A. P. (2008). Self-enhancement: Food for thought. *Perspectives on Psychological Science*, 3, 102-116. doi: 10.1111/j.1745-6916.2008.00068.x
- Sedikides, C., & Skowronski, J. A. (1997). The symbolic self in evolutionary context. *Personality and Social Psychology Review*, 1, 80-102.
- Sedikides, C., Skowronski, J. J., & Dunbar, R. I. M. (2006). When and why did the human self evolve? In M. Schaller, J. A. Simpson, & D. T. Kenrick (Eds.), *Evolution and social psychology: Frontiers in social psychology* (pp. 55-80). New York, NY: Psychology Press.
- Sedikides, C., & Strube, M. J. (1997). Self-evaluation: To thine own self be good, to thine own self be sure, to thine own self be true, and to thine own self be better. *Advances in Experimental Social Psychology*, 29, 209-269. doi: 10.1016/S0065-2601(08)60018-0
- Shen, L., & Dillard, J. (2005). Psychometric properties of the Hong Psychological Reactance Scale. *Journal of Personality Assessment*, 85, 74-81. doi: 10.1207/s15327752jpa8501
- Shermer, M. (2015). *The moral arc: How science and reason lead humanity toward truth, justice, and freedom*. New York, NY: Henry Holt and Company.
- Sidanius, J., & Pratto, F. (1999). *Social dominance: An intergroup theory of social hierarchy and oppression*. New York, NY: Cambridge University Press.
- Spiegel, J. S. (2012). Open-mindedness and intellectual humility. *Theory and Research in Education*, 10, 27-38. doi: 10.1177/1477878512437472
- Stanovich, K. E., & West, R. F. (1997). Reasoning independently of prior belief and individual differences in actively open-minded thinking. *Journal of Educational Psychology*, 89, 342-357.
- Stanovich, K. E., & West, R. F. (2008). On the failure of intelligence to predict myside bias and one-sided bias. *Thinking & Reasoning*, 14, 129-167. doi: 10.1080/13546780701679764
- Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review*, 8, 220-247.
- Surowiecki, J. (2004). *The wisdom of crowds*. New York, NY: Random House.
- Taber, C. S., Damon C., & Simona, K. (2009). The motivated processing of political arguments. *Political Behavior*, 31, 137-155.

- Tallis, R. (2003). *The hand: A philosophical inquiry into human being*. Edinburgh, UK: Edinburgh University Press.
- Tallis, R. (2011). *Aping mankind: Neuromania, darwinitis, and the misrepresentation of humanity*. Durham, UK: Acumen.
- Tenenbaum, S. (2006). Direction of fit and motivational cognitivism. In R. Shafer-Landau (Ed.), *Oxford studies in metaethics* (pp. 235-264). Oxford, UK: Oxford University Press.
- University of Southampton (2015). iSurvey. [Computer Software]
- Von Hippel, W., & Trivers, R. (2011). The evolution and psychology of self-deception. *Behavioral and Brain Sciences*, 34, 1–16. doi: 10.1017/s0140525x10001354
- Wiggins, J. S. (1979). A psychological taxonomy of trait-descriptive terms: The interpersonal domain. *Journal of Personality and Social Psychology*, 37, 395-412.
- Wilde, O. (1895). *The importance of being earnest* [Kindle edition]. England: Create Space Independent Publishing Platform.
- Wittgenstein, L. (1953). *Philosophical investigations* (Anscombe, G.E.M., trans.). Oxford, UK: Basil Blackwell.
- Wolpert, L. (2013). The unnatural nature of science. *European Review*, 21, pp S9-S13. doi:10.1017/S1062798713000239

Footnotes

¹For example, Mahadevan et al. (2015) found correlations between inclusion and status of $r \approx .65$, between warmth and competence of $r \approx .37$, and between amiability and assertiveness of $r \approx -.05$.

²Due to logistical constraints in payment disbursement, we were obliged to run the same study multiple times in sequence. Due to the unexpected smallness of the online sampling pool, many more participants took part on more than one occasion than we anticipated. Among the participants making serious attempts at the survey (> 95% of the items), the rate of IP duplication was high (35%). In addition, quite a few participants (26%) answered identically all items on at least one questionnaire that contained both forward-scored and reversed-scored item. The remaining screening criteria removed comparatively fewer participants (< 5%). Overall, we retained 47% of the original 1540 participants.

³Note that our labelling of the dimensions for interpersonal behavior differs from prior authors. We chose our labels to avoid potential confusion about levels of analysis. For example, the term *dominance*, although used to describe interpersonal behaviors (Markey & Markey, 2009; Wiggins, 1979), has also been used loosely to signify status or rank (Barkow, 1980; Sidanius & Pratto, 1999).

⁴Almost identical results were obtained when alternative coefficients (e.g., semi-partial correlations) were used. We thus follow Stanovich and West (1997)'s approach for the sake of consistency.

Table 1

Correlations Between Indices of Intellectual Arrogance /Intellectual Humility

	Mental Materialism (BIAS)	Ideological Territoriality (BIAS)	Egotistical Bias (GREAT)
Mental Materialism (BIAS)	-		
Ideological Territoriality (BIAS)	.56***	-	
Egotistical Bias (GREAT)	-.01	-.01	-
Rational Objectivity (GREAT)	-.13*	-.14**	-.26***

Note. $N = 708-716$. Mental Materialism and Ideological Territoriality are subscales of the Brief Intellectual Arrogance Scales (BIAS). The Egotistical Bias and Rational Objectivity are indices are yielded by Gregg's Revised Evaluation of Arguments Task (GREAT). Both indices are derived from simultaneous linear regressions computed individually for each participant, in which individual argument evaluations were regressed on individual prior opinions (yielding a β for Egotistical Bias) and normative argument evaluations (yielding a β for Rational Objectivity). The normative argument evaluations were averages of individual argument evaluations across the entire sample, and were constant for each individual.

* $p < .001$. ** $p < .0005$. *** $p < .0001$.

Table 2

Correlations Between Indices of Communion and Agency at Different Levels of Analysis

	Inclusion	Status	Warmth	Competence	Assertiveness
Inclusion	-				
Status	.68***	-			
Warmth	.54***	.37***	-		
Competence	.49***	.68***	.40***	-	
Amiability	.55***	.34***	.61***	.24***	-
Assertiveness	.09*	.23***	-.14**	.21***	.03

Note. $N = 717-719$. Inclusion and status reflected communion and agency at a social level (ratings of self in the eyes of others). Warmth and competence reflected communion and agency at a social level (ratings of self on personality traits). Amiability and assertiveness reflected communion and agency at a behavioral level (ratings of typical behaviors for the self). Coefficients in bold represent intercorrelations between communion and agency variables at the same level of analysis. Coefficients in regular font represent intercorrelations between matched variables (i.e., both status, both communion) at different levels of analysis. Coefficients in italic font represent intercorrelations between mismatched variables (i.e., one status, the other communion) at different levels of analysis.

* $p < .05$. ** $p < .001$. *** $p < .0001$.

Table 3

Standardized Weights (Betas) from the Regression of Indices of Intellectual Arrogance / Intellectual Humility on Two Indices of Communion and Agency, and their Interaction, at Different Levels of Analysis

	mental materialism β	ideological territoriality β	Egotistical Bias β	Rational Objectivity β
Inclusion	-.18***	-.32***	.05	.12**
Status	.34***	.24***	-.07	-.18***
Inclusion x Status	.05	.06	.04	.02
Warmth	-.09*	-.17***	.01	.08*
Competence	.37***	.11**	-.05	-.10*
Warmth x Competence	-.03	-.01	.01	.01
Amiability	-.10*	-.28***	-.04	.11**
Assertiveness	.16***	.21***	.04	-.12**
Amiability x Assertiveness	-.03	-.08*	-.05	.05

Note. $N = 711-716$. Variables are the same as those labeled in Tables 1 and 2. The values shown represent beta weights results from the simultaneous regression of each index of Intellectual Arrogance / Intellectual Humility

* $p < .05$. ** $p < .01$. *** $p < .0001$.

Figure Captions

Figure 1: Contrasting epistemic stances vis-à-vis the world, and their theorized relation with intellectual arrogance and intellectual humility

Figure 2: The circumplex, its orthogonal dimensions, and their predicted empirical relation with intellectual arrogance and intellectual humility

Figure 3: Schematic diagram representing the variables featuring in the within-participants regression for Gregg Revised Evaluation of Arguments Task (GREAT), yielding separate coefficients designed to capture egotistical bias and rational objectivity respectively.