

## A Naturalistic View of Human Dignity

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References to human dignity abound in contemporary political, legal, and ethical documents and practices, including a widening representation in bioethical contexts. Appeals to dignity characteristically involve some notion of equality (that all humans or persons have a special kind of worth captured by that term) and the idea that there is some range of actions which ought never to be directed at persons (e.g., torture). However, much of this contemporary use of dignity leaves the concept itself under-developed or poorly grounded. This sometimes conduces to a broadly skeptical view that dignity has any determinate content, or that it can be grounded independently of either religion or rationalism. I argue that dignity has substantial connections to modern biological views of human beings, and that the biological matrix for dignity should be explored to help remedy these shortcomings. I propose three major biological contexts for understanding dignity in a naturalistic fashion: reciprocity and punishment, in so far as both are implicated in the promotion of pro-social cooperative behavior among humans, and dignity as a communicative signal that also has power to promote cooperation. Each of these three components is explored in some detail by reference to a wide range of contemporary scientific literature. Finally, I make suggestions for how it might be possible to study dignity in a fully scientific way, by adapting methods and techniques already well-established in biological, physiological, and neuroscientific study of human cooperation.

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Elsewhere I have written about a regulatory system that includes the regulation of self-esteem (McClelland, 2010a, 2010b). The concept of human dignity has commonly been linked to self-esteem, either as a surrogate for it or as a possible ground for self-esteem. It may thus be argued that what I have called “normal narcissism” also has implications for our understanding of dignity. There has been a great flurry of activity in a variety of humanistic and scientific disciplines about human dignity, notably in the last decade or so. Despite this, one recent writer claims that “Across all disciplines, human dignity is an underexplored

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topic" (Castiglione, 2008, p. 655). Much of the recent activity concerns the history of the concept (or concepts) of human dignity, many of the most useful ones coming from legal scholars (e.g., McCrudden, 2008, pp. 656–663; Wright, 2006, pp. 537–548). These histories rightly reach back to the ancient world, notably to the treatment of *dignitas* in Cicero's *De Officiis* (on which see especially Cancik, 2002), exploring the Christian tradition and the treatment of dignity by Kant (see especially Iglesias, 2000; Wright, 2006). As these surveys show, "dignity" has had more than one meaning, has enjoyed a wide range of uses, and has been supplied with multiple rationales, both religious and secular. In the Christian tradition it is especially common to ground the value of human beings in the doctrine of creation (the notion of the *imago Dei*). For Kant, and his contemporary epigone (e.g., Lee and George, 2008; Zagzebski, 2001), the ground is the rational autonomy of human beings, an account not incompatible with religious versions. We have also had some very perspicuous studies of the role of dignity in political documents, notably constitutions of modern states (here Iglesias, 2001 and McCrudden, 2008 are particularly valuable). It is notable that dignity has come to play a key role in these state constitutions in the twentieth century and perhaps most of all in new constitutions in the period immediately following World War II, especially in the light of the barbaric depredations of the Nazi regime. Virtually none of these documents, however, makes any attempt to give a definition of the concept of human dignity, and not many of them posit a ground for that special value of human persons (though the Irish constitution of 1937 is a notable exception). Thus, in some respects the appearance of "human dignity" in contemporary political documents treats dignity as something of a "placeholder" for an unstated and under-developed concept, but one that is brought into the closest intimacy with conceptions of human rights.

Something similar has to be said about the appearance of "dignity" in many modern documents specifically pertaining to human rights, another venue where the idea is commonly found, paradigmatically in the 1948 United Nations' *Declaration of Human Rights*. Many other similar documents could be cited (see summaries in Iglesias, 2001, pp. 127–128; McCrudden, 2008, pp. 665–667; cf. Chaskalson, 2002 and Dicke, 2002). The pattern of these documents, however, is very similar to the state constitutions mentioned earlier: the concept of "dignity" is not provided with any substantive definition, and very often is provided with no clear or explicit rationale. It is not surprising, then, that some commentators on this situation hold that "dignity" is an ambiguous concept that functions as a mere place holder for other notions such as respect for persons or respect for individual autonomy, and that the concept could thus be dispensed with.

Some notion of human dignity also appears in many legal documents (to the extent that constitutions and human rights' documents are distinct from these: see Frowein, 2002). One of the most significant explicit uses of "dignity" in a legal setting occurs in the Common Article Three of the *Geneva Conventions* of 1949,

which forbids states involved in armed conflict from perpetrating “outrages upon personal dignity, in particular humiliating and degrading treatment.” Parallel usages appear in documents forbidding torture, e.g., the United Nations’ *Convention Against Torture* (see discussion of this document and others like it in Nagan and Atkins, 2001, especially pp. 95–102). Duff (2005) argues that torture is wrong mainly not because of the physical suffering that it entails but because of the “degradation” that it imposes upon its victims. Degradation, in this context, has to do with the morally impermissible denial of the moral standing of the tortured person. Such denials are a violation of the reciprocity which many find in the notion of human dignity and which is correctly understood (in my view) as foundational for any just political organization. Such notions of reciprocity or equality of treatment are foundational for most expositions of human rights and associated thinking about dignity. Two other ideas often found in these contexts are: (a) that there are some things which ought never to be done to persons because of their dignity, a level of treatment below which we cannot go and still preserve a sense of moral community (the logic of this idea is brilliantly expounded by Gewirth, 1996, pp. 6–20); and (b) that violations of dignity constitute a basis for punishment.

All of this work has been extremely valuable and continues, rightly, to inform serious discussion today of the notion of human dignity, including its appearance in contemporary bioethical debates (for a good short review of which see Caulfield and Brownsword, 2006). It is similarly foundational for any attempt to unify the various strands of meaning underlying historical usage of the term (e.g., Killmister, 2010; Nordenfelt, 2004; Shultziner, 2003). However, two features of most of this work deserve emphasis. The first, as already noted, is that “dignity” most often remains undefined and without a specific ground. And where definitions or grounds are specified, there appears to be no consensus about the contents of those definitions or grounds. It is thus not surprising that some bioethicists have complained that dignity is “a useless concept” and should be replaced with more substantive notions such as respect for personal autonomy or a catalog of specific human rights. Ruth Macklin’s (2003) brief essay on this theme is a case in point. Replies to Macklin’s pot-boiler have been astonishingly thin. Killmister, for example, insists that dignity is not a useless “place holder” for other ideas, but the best she can do is to describe dignity as “the capacity to live by one’s standards and principles” (2010, p. 160), which seems hopelessly broad. Doris Schroeder (2008, 2010) has also vigorously disputed Macklin’s thesis and seeks both to unify various uses of “dignity” and to provide it with a rational ground. However, her most recent offering concludes thus: “The fact that human beings are understood to have dignity must then be a contractual agreement between legitimate representatives and their peoples, transformed into written law” (2010, p. 124). But this seems to me to be tantamount to Macklin’s deflationary view of the notion of dignity.

Conspicuous by its absence from all of these discussions is any reference to human biology. And yet here, in my view, is fertile ground for addressing Macklin's issues. It is in its biological matrix that "dignity" also gains credibility and substance for those of us who do not embrace religious or Kantian rationales for notions of the special worth of human persons. Metaphysical naturalists tend to understand our species in a continuum with other mammalian species and indeed with the wider universe of animals, with many of which species we share our most fundamental cognitive capacities (Baier, 1991; MacIntyre, 1999). It follows from this view that understanding human persons in their most basic nature depends upon understanding their biology, including their likely evolutionary history. Attempts to ground dignity in the Kantian rationalist tradition encounter two major objections: (a) that most human moral judgments are not made on the basis of conscious, step-wise and linguistically mediated reasoning (Haidt, 2001); and (b) that evidence from psychopathology shows that humans can have intact reasoning abilities and their moral decisions not be motivated by such reasoning (see Nichols, 2002 on psychopathy; Roskies, 2003, 2006 on cases of acquired sociopathy; and the general discussion in Doris and Stich, 2007, pp. 123–128). Concepts such as that of human dignity, if they are to acquire a rich content, if they are to command our assent, and if they are to appear in their most coherent form, must be connected to the natural history of our species. However, so far as I can determine, no one has yet inquired about a possible biological matrix for the notion of "human dignity." My thesis is that there are three fundamental dimensions to such a matrix, two of them having to do with cooperative behavior among humans and the other having to do with dignity as a communicative signal. To the details of this proposal I now turn.

### The Biology of Human Reciprocity

The human species is the most aggressive species on the planet; but we are also the most cooperative species on the planet. Indeed, no large-scale or long-term human project succeeds without a quite staggering variety and array of cooperative behaviors on the part of large numbers of biologically non-related persons. No other animal species known to us cooperates on the scale that humans do. Moreover, it is clear that our capacity for cooperation is essential to the long-term health and survival of our species:

... evolution is constructive because of cooperation. New levels of organization evolve when the competing units on the lower level begin to cooperate. Cooperation allows specialization and thereby promotes biological diversity. Cooperation is the secret behind the open-endedness of the evolutionary process . . . . Thus, we might add "natural cooperation" as a third fundamental principle of evolution beside mutation and natural selection. (Nowak, 2006, p. 1563)

On this view, then, cooperation is a fundamental biological feature of the long-term history of our species. We could, perhaps, have gone on surviving as a species organized in very small groups of cooperating kin, but cooperation comes into its own especially once populations reach larger sizes (Dubreuil, 2008; Marlowe et al., 2008; cf. Skyrms, 2004, p. 29). As we have gradually become a fully global species, this has become more and more evident to us: our flourishing depends upon our capacities for cooperative behavior. We also know that cooperation depends upon reciprocity. It is plausible to hold that reciprocity is also fundamental to at least a wide range of the social or inter-personal uses of the notion of human dignity. This would account for the regularity of appeals to equality in juridical and political contexts engaged with human dignity. For, while reciprocity may not entail dignity, dignity entails reciprocity. And reciprocity is a fundamental feature of human biology. It seems in order, then, to inquire about the biological status of human reciprocity to further illuminate its nature.

At least three different forms of reciprocity are widely recognized in the biological and anthropological literature today. The simplest form seems to be “mutualism,” which has to do with the way two organisms may interact such that each and both of them derive some relatively immediate fitness benefit from that interaction. The bacteria in the guts of ungulates (cows, for example) derive such a benefit as do their hosts, who could not digest vegetable foods without those bacteria. Mutualism is known between humans, of course, but is the least interesting form of reciprocity. Robert Trivers, in a ground-breaking paper in 1971 identified “reciprocal altruism” as more characteristic of humans and also as problematic in modern evolutionary biology. Reciprocal altruism extends to mutually beneficial actions taken between non-kin, and also allows for considerable delays. That is, Trivers was concerned to provide an evolutionary account for all those transactions between biologically distant human persons which may benefit one party currently but may postpone any return benefit for long periods of time. Such actions have an unequal cost/benefit ratio at any given time, and it is this which seems paradoxical in classic Darwinian terms. More recently, discussion about “strong reciprocity” has taken center-stage. This notion presumes both mutuality and reciprocal altruism, but points to human practices in which individuals who defect from social norms for reciprocity will be punished by third parties, most of whom are not biologically related to the individuals being punished (Dubreuil, 2008; Fehr and Fischbacher, 2004; Gintis, 2000). The debate over what forms of reciprocity must be accounted for in human behavior, and how they are related to one another, continues. Similarly, arguments about how best to account for the latter two forms of reciprocity in evolutionary terms also continue. It is not my purpose to settle these matters here (I will also leave moot whether Clutton-Brock, 2009 and Tomasello, 2009 are right to argue that mutualism is the best explanation for social cooperation among humans, a view not borne out by the rest of the literature on this subject; and, besides, everyone agrees that mutualism

is a form of reciprocity). Moreover, I will return to the issue of punishment below. It suffices here to point out that the appearance of wide-spread cooperative behavior in our species is what might be expected if such behavior is the product of our evolution.

The first indication that this may be so is that reciprocal behavior appears very early in human ontogeny. This is notably so in the case of the affective development of normal human infants. That development springs from the appearance of innate basic emotions in neonates and the manner in which they go on to develop a capacity to regulate those emotions themselves. What we know about this process is that it depends vitally on affective exchanges between infants and their primary caretakers (most often, the biological mother). Synchrony in these exchanges can be tracked by observing very closely the manner in which mother and child look intently at one another or look away from one another. They take turns, one following the other or one leading the other, but in synch with one another throughout (Brazelton, Koslowski, and Main, 1974; Cappella, 1991; cf. also Feldman, 2007a, 2007b; Preston and de Waal, 2002; Schore, 1994; Weil, 1992). While every normal human neonate comes into the world with a suite of basic emotions available to it, everyone has to acquire the capacity to regulate those emotions, and these kinds of intimate reciprocal exchanges between infants and their caretakers are the matrix of that regulatory development. Children normally acquire the capacity to regulate their own emotions, on the basis of internalized working models acquired from these early interactions, by around two years of age (Carpendale and Lewis, 2006; Fonagy, Gergely, Jurist, and Target, 2002; Schore, 1994; Sroufe, 1995; Tronick, 2007). Moreover, both later moral development and capacity for thinking almost certainly depends upon these early affective, and non-linguistically mediated, regulatory capacities (Gopnik, Meltzoff, and Kuhl, 1999; Hobson, 2004).

Such development depends on a variety of other cognitive abilities that emerge automatically in human neonates (barring, of course, accident, disease or genetic defect), such as joint attention (the ability to attend to the same object as another does), discrimination of affective (emotional) qualities of the both the face and prosody of the voice, sensitivity to turn-taking cues, and cross-modal perception. The latter is the ability found in neonates to represent information from the environment in more than one sensory modality and to compare them for various purposes (see McClelland, 1993 for a discussion). It is important to note that all this takes place in large part before infants begin to develop linguistic capacities, and that such development of early reciprocity does not depend on conscious, step-wise reasoning. It is nonetheless cognitive, but non-rational (where "rational" is understood in the classic sense of deliberate, conscious, linguistically mediated and step-wise reasoning). Decoding the emotional content of faces is a crucial element in these developments. This depends upon a sub-cortical system that operates very fast (under 200 milliseconds, with peak

activities at 100 milliseconds and 170 milliseconds post stimulus), a system in which the amygdala plays a prominent role (Vlamings, Jonkman, and Kemner, 2010). Reading the emotional content of the faces of caretakers, infants are dependent on the coarse features of the face and especially those that contribute to an over-all holistic rendering of the configuration of those features (fine-grained processing of faces is not possible for the average human infant visual system much before the end of the first year of life: Vlamings, Goffaux, and Kemner, 2009; and cf. Pourtois, De Gelder, Bol, and Crommelinck, 2005; Yue, Cassidy, Devaney, Holt, and Tootell, 2011). The basic point is that these developments depend entirely on thoroughly reciprocal exchanges between infants and their caretakers of affectively laden information. Since these exchanges are also the very matrix from which human personality arises, we may say that reciprocity is built in to human personality (in the normal case).

Early emotional development reaches a climax in the second half of the first year of life to the second half of the second year, with the appearance at around ten months of age of reflexive distress (the capacity to become distressed in response to another's distress) and eventually the capacity for full empathy during the period of eighteen to twenty-four months of age. As Schore and others have shown, empathy is the key to all later moral development, and depends upon the early maturing right cerebral hemisphere. Reciprocity, then, is ontogenetically early in its appearance, non-rationally cognitive, and affectively laden. Moreover, it appears to have a distinctive neurobiological basis — some of which will concern us further below. Failure of reciprocity of this kind to appear in the normal way is almost always indicative of severe forms of psychopathology, whether those are based in organic brain damage (lesions), genetic deficits, or environmental toxicity (both social and physical). Pathologies of reciprocity will also concern us further below.

Reciprocity is a human universal, appearing in similar forms in all stable human cultures known to us (see especially the study by Henrich et al., 2005). Especially important is the evidence that it is widespread among human hunter-gatherer and hunter-agriculturalist societies (Boehm, 1999, pp. 212–217; Gray, 2009; Hill, 2002; Tomasello, 2009). For it is commonly supposed that such cultures are important guides to how things worked for groups of our species much earlier in its evolutionary history. Cooperative behavior grounded in reciprocity is also found in some other animal species besides our own, notably other primates (Boehm, 1999; de Waal, 1996, 2008, 2009; Hill, 2002). Whether such reciprocity rises to the level of full-blown empathy, in our close primate relatives and in other animals, is much debated, but this is not a debate that can be settled here. (Frans de Waal is perhaps the most vigorous champion of this view; and see also Bates et al., 2008; Johnson and Pierce, 2008; Langford et al., 2006; Pierce, 2008. A more skeptical position is in Cheney and Seyfarth, 2007. Tomasello, 2009 gives a balanced discussion of this issue.) But

evidence of reciprocity appearing early and automatically in human ontogeny, evidence for it across human cultures, including hunter–gatherer cultures, and evidence for it among non-human animals, especially our close primate relatives — all this is what we would expect to find if reciprocity is indeed the product of human evolution. That being so, we may also expect to find evidence for the following: (a) neural networks dedicated to social cognition generally (roughly, cognition about social relationships, networks and processes), and especially to socially affiliative and aversive phenomena; (b) a basic mechanism for promoting pro-sociality and affiliative behavior, especially on an affective, non-rational level; (c) evidence of sensitivity, in humans at least, to considerations of fairness and unfairness in social exchanges, such sensitivity itself to be dependent upon and realized in distinctive neurobiological networks and to function in a non-rational, but cognitive, fashion; (d) a capacity automatically and reliably to detect “cheaters,” those who either actually do or potentially may defect from reciprocal social arrangements and the norms that govern them; and (e) that deficits in reciprocity, social exchange, and these same neurobiological networks would go hand in hand and would signify severe forms of human psychopathology. All five of these phenomena are supported in recent biological investigations. I will take them in the order given above.

With the advent of multiple, and increasingly accurate methods for electronically scanning living brains in real time, we have unprecedented capacity to observe neural networks in operation. It is now evident that social cognition generally takes place in a distributed network engaging elements of the limbic system and elements of the lateral and prefrontal cortices (Moll and Schulkin, 2009; Rilling et al., 2008; Tomlin et al., 2006; Wilson, 2006). Interactive tasks in social settings involve three closely related sub-tasks: detection of the salience of events (via activity in the anterior part of the insula), representing the mental states of social partners (via activity in the dorsal medial area of the prefrontal cortex), and executive control functions (subsuming motor behavior and directed by activity in the dorsal lateral area of the prefrontal cortex). Sub-cortical regions of interest include the amygdala, the hippocampus, and the striatum, all of which are also implicated in empathy (see further below). It further appears that interactions among in-group members are processed in distinct sub-regions of the cortical networks, as compared with interactions among out-group members (Dubreuil, 2010a; Wilson, 2006). Social cognition, then, appears to be correlated to distinctive functions of the human brain, as would be expected for cognitive functions that are the product of our evolutionary history.

The most basic affective capacity of human animals to promote pro-social behavior, and especially cooperation by means of various kinds of reciprocity, is empathy (for what follows see especially the reviews in Decety and Jackson, 2004, 2006; Decety and Moriguchi, 2007; Jackson, Meltzoff, and Decety, 2005; Lamm, Nusbaum, Meltzoff, and Decety, 2007; Preston and de Waal, 2002; Singer



and Lamm, 2009). Human empathy appears to involve at least three basic components: an affective response to another person, often one that shares or mimics the emotional state; a capacity to take the perspective of the other person; and some regulatory mechanism that prevents loss of self-identity and preserves our capacity to distinguish between our own feelings and those of the other person. Neural networks engaged in empathic experience include regions of the limbic system, notably the amygdala, the anterior cingulate cortex, the hippocampus (which is heavily involved in emotional memory), the anterior insular cortex, together with neural projections of these regions into the frontal lobes, especially the prefrontal cortex.<sup>1</sup> We know that humans can feel empathy for a wide range of targets, including animals of other species. We also know that empathy is costly, demanding scarce cognitive resources and sometimes places considerable emotional burdens on the empathic person (Hodges and Klein, 2001). I add that it can also be costly in social terms, both cognitive and emotional costs making some patterns of sociability more difficult than they would be in the absence of highly empathic responses to others. Empathy tends very strongly to promote pro-social behavior, notably reciprocal cooperation (Page and Nowak, 2002) and inhibits aggression (Schore, 1994, chapter 27). However, empathy is not always pro-social, and harmful behaviors can also spring from empathic connection to another person (Batson, Klein, Highberger, and Shaw, 1995; Van Lange, 2008). Nevertheless, since empathy gives one person a stake in the emotional condition and welfare of another person, it is not surprising that it generally supports pro-social and cooperative behavior, especially the giving and receiving of support, notably where the relationship between the two persons is otherwise emotionally close and positive (de Waal, 2008). Moreover, from an evolutionary perspective it makes little sense to suppose that empathy would be selected for and thus preserved, in the long run, if it did not tend strongly towards pro-social behavior. A recent study shows that we tend to empathize more strongly with offers made in social exchanges that are perceived to be fair, than we do to those that are perceived to be unfair (Singer et al., 2006). Cortical activity also appears to be further specialized in so far as different cortical regions are active during cooperative exchanges than during competitive exchanges (Decety, Jackson, Sommerville, Chaminade, and Meltzoff, 2004). Both results suggest that the role of empathy in social cognition is closely bound up with perceptions of fairness vs. unfairness, sensitivity to which I consider next.

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<sup>1</sup>Some scientists have argued that a system of "mirror neurons" is involved in empathy: Decety and Jackson (2004); Frith and Singer (2008); Gallese (2001); Gazzola, Aziz-Zadeh, and Keysers (2006); Keysers and Gazzola (2007); Preston and de Waal (2002); Singer, Seymour, O'Doherty, Stephan, Dolan, and Frith (2006); Zaki, Weber, Bolger, and Ochsner (2009). However, Lingnau, Geserich, and Caramazza (2009) failed to find evidence for mirror neurons in humans and their results have not yet been decisively answered (Kilner, Neal, Weiskopf, Friston, and Frith [2009] notwithstanding). For a general survey of mirror neurons see Pineda (2008).

Human beings respond differentially to perceived unfair offers in an economic game, as compared to our neural responses to offers perceived to be unfair (Tabibnia and Lieberman, 2007; Tabibnia, Satpute, and Lieberman, 2008; van't Wout, Kahn, Sanfey, and Aleman, 2006; and for a general review of the use of games to study cooperative behavior, see Colman, 2003). It is clear from these findings that we find fair offers in social exchanges more rewarding than we do unfair offers, and that this sense of greater reward is realized in the brain's reward system, especially the striatum, a very active region of the limbic system heavily involved in computation of the expected reward value of actions (Delgado, Frank, and Phelps, 2005; King-Casas, Tomlin, Anen, Camerer, Quartz, and Montague, 2005; Rilling, Gutman, Zeh, Pagnoni, Berns, and Kilts, 2002). Moreover, there is some reason to believe that we prefer equity in social exchanges to efficiency, when it comes to trade-offs between these two values (Hsu, Anen, and Quartz, 2008). Van't Wout also found evidence that our sensitivity to fairness and unfairness is preferentially activated for exchanges with conspecifics as opposed to offers made in economic games by computers. Evidently it matters very much to us that we are engaged with an intentional agent. The insular cortex, especially its larger anterior portion, is also heavily implicated in such behaviors (Güroğlu, van den Bos, Rombouts, and Crone, 2010; Hsu et al., 2008; Rilling et al., 2008; Sanfey, Rilling, Aronson, Nystrom, and Cohen, 2003; Takagishi, Takahashi, Toyomura, Takashino, Koizumi, and Yamagishi, 2009). The anterior insula plays a large role in the regulation of emotions, interoceptive experience (our awareness of our own bodily conditions and states), and homeostasis of several subsystems vital to human life (e.g., maintenance of blood pressure within tolerable limits). The insula has significant neural connections to other parts of the limbic system, including the thalamus, hippocampus and the amygdala, all of which also engage with our emotions. It is thus not surprising that considerations of fairness/unfairness or equity primarily arise from our emotions, and not from cold reasoning about utility (Hsu et al., 2008). We will see similar connections in regards to punishment dynamics. The anterior cingulate cortex also plays an important role in this neural network governing our assessments of fairness in social exchanges (Güroğlu et al., 2010; Rilling et al., 2002). These brain regions also project to the frontal lobes, notably areas of the orbitofrontal cortex and areas of the prefrontal cortex. Reward assessments implicate various neuropeptides and thus significant elements of brain biochemistry as well, notably dopamine, serotonin, oxytocin and vasopressin, the latter two promoting affiliative behavior (Crockett, 2009; Crockett, Clark, and Robbins, 2009; Crockett, Clark, Tabibnia, Lieberman, and Robbins, 2008; and for discussion of oxytocin and vasopressin see De Dreu et al., 2010; McClelland, 2009; Porges, 1998). Judgments of fairness/unfairness thus engage three of the major systems of the human brain: brain stem (reward system), limbic system, and frontal and lateral cortices. The entire system bears a marked bias in favor of fairness, for

which reciprocity is a necessary (but not sufficient) condition. Furthermore, our closest primate relatives, chimpanzees, seem not to be sensitive to issues of fairness (Jensen, Call, and Tomasello, 2007; Tomasello, 2009). That animals of our particular type should show such distinctive functionality associated with neurobiological structures and processes is not at all surprising if reciprocity is a product of an evolutionary process that split us off from the great apes six or seven million years ago.

The other side of our sensitivity to fairness and equity in social exchange is our capacity to detect and respond differentially to “cheaters,” those persons we perceive to be likely to defect from fair reciprocity. Cosmides, Tooby, Fiddick, and Bryant (2005) posited “an evolved neurocognitive system that is functionally specialized for reasoning about social exchange, with a subroutine for detecting cheaters” (p. 505; cf. Cosmides, Barrett, and Tooby, 2010). Given what we know about human sensitivity to fairness considerations in social exchanges, it seems a reasonable posit. And it has gained increasingly wide support recently (Moll and Schulkin, 2009; Rilling et al., 2008; cf. Farrelly and Turnbull, 2008; Wischniewski, Windmann, Juckel, and Brüne, 2009; Yamagishi, Tanida, Mashima, Shimoma, and Kanazawa, 2003). What is particularly remarkable is the evidence presented by these investigators that automatic detection of cheaters is found in every human culture so far investigated, ranging from hunter–horticulturalists to urbanized market economies (Sugiyama, Tooby, and Cosmides, 2002). It is similarly remarkable that some empirical tests show that such judgments, though made unconsciously, very quickly and without evident step-wise reasoning, are 65–80 percent accurate in distinguishing defectors from cooperators in situations of social exchange. Humans are, apparently, canny judges of the likelihood of reciprocity (and associated fairness or unfairness in exchange) among their social interlocutors. Perhaps for this reason it is not surprising that failures in such matters are widely held to be signs of psychopathology.

This is not the place for a full review of the evidence of failures of reciprocity, empathy, and associated dysfunction of specialized neural networks in major forms of human psychopathology. However, these “natural experiments” add a substantial element to the argument that reciprocity is part of our evolutionary heritage, and thus something should be said (for discussion see Baron–Cohen, 1997 and Fábrega, 2002; however, wide-ranging synthesis in this area is probably premature). Given our hypothesis, and the evidence surveyed above, what we might expect is that failures of reciprocity, of cooperative behavior, and of empathy would reflect neural dysfunctions and that such failures would be regarded as maladaptive formations of the personality, and hence severe forms of psychopathology. And this is, indeed, just what we find in anti-social personality disorders (including psychopathy), borderline personality disorder, narcissistic personality disorder, autistic spectrum disorders, schizophrenia, and alexithymia (Decety and Moriguchi, 2007). Anti-social personalities, for example, regularly show dysfunc-

tionality in their orbito-frontal cortex, dorso-lateral prefrontal cortex, and reduced volume in both the hippocampus and amygdala (primary limbic structures governing emotional regulation and empathy). Deficits of empathic functioning are especially characteristic of psychopaths and cases of acquired sociopathy (Blair, Mitchell, and Blair, 2005; Colman and Wilson, 1997; Patrick, 2006). Psychopaths generally show severely reduced compliance with social norms, and associated deficits in anterior insular functioning (Spitzer, Fischbacher, Hernberger, Grön, and Fehr, 2007). Borderline personalities regularly show “a profound incapacity to maintain cooperation” in an iterated trust game, and generally lack a well-functioning capacity to repair ruptures of cooperation (Austin, Riniolo, and Porges, 2007; Harari, Shamay-Tsoory, Ravid, and Levkovitz, 2010; King-Casas, Sharp, Lomax-Bream, Lohrenz, Fonagy, and Montague, 2008; Silbersweig et al., 2007). Neurotransmitters like serotonin and dopamine also show abnormalities in borderline patients and belong especially to the impulsive aggression which is characteristic of this disorder (for a review of this evidence see McClelland, 2010a). We find similar profiles in autistic persons (Baron-Cohen, 2009; Bird, Silani, Brindley, White, Frith, and Singer, 2010; Hobson, 1993; Hobson, Harris, Garcia-Perez, and Hobson, 2009; Lombardo, Barnes, Wheelwright, and Baron-Cohen, 2007) and schizophrenics (Bora, Gökçen, and Veznedaroglu, 2008; Montag, Heinz, Kunz, and Gallinat, 2007): disruptions of empathic functioning and its associated neural network, together with broad failures of reciprocity and cooperation in social encounters. Many of the most tragic behavioral deficits entailed by these severe forms of psychopathology represent profound failures of reciprocity. Alexithymia is not itself regarded as a pathological disorder, but is rather a personality trait found widely in the general population (as well as among several severe forms of psychopathology). It has to do with relative inability to represent emotions verbally, imaginatively and in dreams (for the construct see Chen, Xu, Jing, and Chan, 2011; Guttman and Laporte, 2002; Taylor, Bagby, and Parker, 1999). Moderately or severely alexithymic patients tend strongly towards psychosomatic disorders and regularly show weak abilities for empathic connection with others, especially that element of empathy that involves taking the perspective of the other person. What the study of these pathological conditions tends to show, then, is the breakdown of the matrix of empathic and cooperative behaviors, along with deficits in the functioning of the associated neurobiological systems (including associated neurochemistry). Such failures are what one would expect if that biological matrix for reciprocity is indeed a function of our long evolutionary history. For where functionality is hard-wired to the human animal by virtue of its evolution, so dysfunctionality may be expected to show itself in both behavioral and neurobiological terms. It should also be noted here that temporary disruption of the right frontal cortex (by imposing a magnetic field upon it) tends to disrupt reciprocal fairness, efforts to build reputations for same, and to increase the chance

that agents will indulge in risky behavior (Knoch, Gainotti et al., 2006; Knoch, Pascual-Leone, Meyer, Treyer, and Fehr, 2006; Knoch, Schneider, Schunk, Hohmann, and Fehr, 2009).

For all these reasons, then, I think that reciprocity (promoting fairness and equity) in social exchanges is a fundamental human expectation, one that is integral to our biological development as a species. It is not surprising, on this account, that reciprocity and equity should appear, then, as fundamental features of notions of human dignity and the worth that attaches to it. This is especially so wherever the notion of dignity is used as a portmanteau term for defining characteristics of humanity. Something similar, I will argue next, applies to the association of dignity with punishment. For punishment, as we will see, plays a large role in cooperation among humans.

### Punishment and Cooperation

We have seen that notions of human dignity can be a basis for punishment, in so far as actions that violate dignity may be subject to social and legal sanctions themselves specified in legal documents or practices. Dignity violations are commonly held to be “degrading,” and thus to deny the moral standing of the victim(s) in the human community. There is, then, a deep connection to be drawn between equality or equity and punishment. And, as I hope to show here, there is also a deep connection between punishment and cooperation among humans and other animals. Understanding this may help to explain the connections contemporary human cultures draw between rights claims and punishment, both founded on some conception of human dignity.

The role of punishment in promoting cooperative behavior has to do with social norms and our characteristic responses to violations of those norms. Gintis has offered a succinct statement of the kind of norms I have in mind:

*An internal norm is a pattern of behavior enforced in part by internal sanctions, including shame, guilt and loss of self-esteem, as opposed to purely external sanctions, such as material rewards and punishments. Humans internalize norms through socialization by parents (vertical transmission) and extraparental conspecifics (oblique or horizontal transmission). (2003, p. 407)*

It is not uncommon to further distinguish norms of cooperation (including moral norms) and norms of conformity (Tomasello, 2009, p. 34; cf. Fiddick, 2008; Sripada and Stich, 2006 for further consideration of the structure of norms). Enforcement of norms often takes the form of conditional prescriptive rules: if you do X, then you must also do Y. Developmental studies show that human children (in a variety of cultural frames) acquire the ability to understand and appropriately apply such rules as early as age three years (Harris, Nuñez, and Brett, 2001; Rakoczy, Brosche, Warneken, and Tomasello, 2009; Rakoczy, Warneken,

and Tomasello, 2009). Moreover, children spontaneously learn to understand and apply such rules specifically in contexts involving social exchange and social agreements (Wyman, Rakoczy, and Tomasello, 2009).

Punishment as norm enforcement is not unknown in the non-human animal world (Clutton-Brock, 2009; Clutton-Brock and Parker, 1995). However, humans practice both second-party enforcement (punishment of you by me for what you did to me) and third-party enforcement (punishment of you by me for what you did to that other person) more widely and more vigorously than any other animal known to us. Indeed, widespread sanctioning for third-party violations of social norms is a hallmark of our species (Haidt, 2001). Moreover, as we have already seen, sustained difficulty internalizing norms or following norms is often a mark of severe psychopathology (e.g., anti-personality disorder, borderline personality disorder, and schizophrenia). In his study of hunter-gatherer cultures and nomadic foragers, Boehm (1999, pp. 64–89) discovered a wide range of types of such punishments. These range from moderate punishments such as criticism, ridicule or disobedience, to stronger ones such as ostracism, desertion or expulsion from the social group (for exclusion, or shunning, see also Fehr, 2004; Panchanathan and Boyd, 2004). Even more notable are “extreme” sanctions such as physical assault or execution. Boehm argues that such punishments among foragers are mainly motivated by egalitarian concerns and that the most severe of these punishments are almost always aimed at despotic usurpers of power within the social group. To some extent, punishments among primate groups parallel practices of human foragers. But there is a further biological function of punishment, and it arises especially in connection with so-called altruistic punishment.

Altruistic punishments are those that are costly to administrate (costly, that is, to the punisher) and which may not reap any positive return to the punisher, whether in the short term or the long. It is now widely believed by evolutionary biologists that the ultimate purpose of such punishment is to promote cooperative behavior, especially over large populations of non-kin (e.g., Boyd, Gintis, and Bowles, 2010; Dawes, Fowler, Johnson, McElreath, and Smirnov, 2007; Egas and Riedl, 2008; Gächter and Hermann, 2009; Marlowe et al., 2008; Rockenbach and Milinski, 2006). There has been a vigorous debate over more proximate causes or motivations for altruistic punishment. The leading candidates are either egalitarian motives (compare Boehm’s analysis of punishment among human nomadic foragers) or retributive motivations. The best solution is to accept that both these motives play important parts in our punishing activities, but that retribution is the dominant and more primary of these two motives. Empirical tests suggest very strongly that retribution is more likely to motivate punishment even where people may *say* that they punish in order to deter future offenses (Carlsmith, 2006; Carlsmith and Darley, 2008; Carlsmith, Darley, and Robinson, 2002). Moreover, violations of fairness or equity tend to

mobilize the retributive emotions of righteous anger and indignation, as well as associated (but non-punitive) emotions such as disgust or contempt (Brebels, De Cremer, and Sedikides, 2008; Dawes et al., 2007; the distinction of punitive emotions from non-punitive is drawn by Dubreuil, 2010b). The game-theoretic and other empirical investigations of Fehr and his colleagues seem to me to decisively support the same order of priority: retributive motives are more fundamental than equity or egalitarian motives (Falk, Fehr, and Fischbacher, 2005; Fehr and Gächter, 2002, 2005; the contrary position is argued by Fowler, 2005 and Fowler, Johnson, and Smirnov, 2005). Moreover, retribution as an action is driven by retributive emotions, which tend to evaluate their targets much faster and more automatically than conscious reasoning processes can (though still reliably).

There is some evidence that punishment, when it is aimed at cooperators, *decreases* levels of cooperation (Dreber, Rand, Fudenberg, and Nowak, 2008; Hermann, Thöni, and Gächter, 2008; Rand, Ohtsuki, and Nowak, 2009; Wu et al., 2009). However, this does little to discredit the role of punishing defectors in promoting cooperation, and much of the evidence is based on faulty assumptions, losing its significance in the presence of better models (Boyd et al., 2010). Hermann et al. (2008) also show that such “antisocial punishment” tends to be widespread in societies with weak norms of civic cooperation or weak rule of law, both of which conditions may be uncontrolled and confounding variables in other studies. There is thus not yet good reason to reject the view that punishment tends to promote cooperation in human social groups.

An element of punishment that may have special connections with dignity is the matter of reputation among our fellow conspecifics. Reputations are of very great value, generally, to humans (Semmann, Krambeck, and Milinski, 2005). We protect our reputations, often at great expense, and we are quick to attack or undermine the reputations of others if we think they deserve it or it will otherwise suit our purposes (Sigmund, 2007). Indeed, that is one common function of informal sanctions like gossip, criticism, sarcasm, ridicule and the like (all of which in our case, of course, depend upon language, but in more attenuated forms can be found among our close non-linguistic primate relatives). A reputation for being helpful to those in need is especially valuable in the context of building social alliances and of expectations of future pay-offs. “Don’t lose your reputation!” may thus be an unconscious imperative guiding much of our social conduct (Rockenbach and Milinski, 2006, p. 722; cf. Fehr, 2004; Semmann, Krambeck, and Milinski, 2004). Reputation effects, which take account of past experience in order to guide future experience, especially in repeated exchanges, are most effective in promoting cooperation when combined with altruistic punishment (Rockenbach and Milinski, 2006). Both mechanisms clearly interact with one another, for gaining a reputation as a just punisher can be especially attractive to potential alliance partners in many human social settings. By contrast, having

a reputation for being an unjust punisher of others (especially cooperators) is deeply antithetical to prospective alliance partners, even defectors who may share some common values (whose alliances tend not to be stable: see Gächter and Thöni, 2005). There also appears to be a distinctive neural signature for judgments having to do with future dependence on a partner who has proved in the past to be a reciprocator (King-Casas et al., 2005; Milinski, Semmann, and Krambeck, 2002). Not surprisingly, that signature for such “trust-based” responses reflects activity in cortical and limbic networks familiar to us already, as well as elements of the reward system.

Of particular interest here is activity in the striatum, in various parts of the cingulate cortex, in the prefrontal cortex, and in the emotional-regulatory circuits of the amygdala, hippocampus, and thalamus. To this should also be added the work of Rebecca Saxe on the temporo-parietal junction and the precuneus (Saxe, 2009; Saxe and Kanwisher, 2003; Saxe and Wexler, 2005; Young, Camprodon, Hauser, Pascual-Leone, and Saxe, 2010; Young, Dodell-Feder, and Saxe, 2010; Young and Saxe, 2008). Crockett’s studies of the role of serotonin in fairness judgments are also relevant in this context (see Crockett, 2009; Crockett, Clark, Lieberman, Tabibnia, and Robbins, 2010). Boksem and De Cremer (2010), Fukui et al. (2006), and Walter, Adenzato, Ciaramidaro, Enrici, Pia, and Bara (2004) have independently confirmed functions of the cingulate cortex in trust-based reward system activity. Judgments (including forecasts) of trust-worthiness of social partners thus appears to have a firm footing in human neurobiology and neurochemistry, as might be expected for a function developed over the long period of evolutionary adaptation for so intensely social a species as our own.

Before leaving the issue of punishment per se, various complications should be introduced to help give a more complete view of this aspect of the biological meaning of dignity. One is this: “Like-minded cooperators do not need punishment to uphold cooperation” (Gächter and Thöni, 2005, p. 313). This is especially pertinent to the issue of alliance-formation and building good reputations. One of the difficulties for defectors is finding others who are genuinely “like-minded” with them (that is, who share important core values), for defection as such does very little by itself to fix values, and this may be one reason why alliances of defectors tend to be unstable. A second complication is related: culture has a strong influence on reciprocity, both positive reciprocity and strongly negative reciprocity (Gächter and Herrmann, 2009). Durable and well-functioning alliances are regularly based on common values. Cultures that promote the equal dignity of their members generate such values. I expect, then, that durable and well-functioning alliances will be especially common in such cultures. This claim is one that could be investigated empirically in selected cultures. My prediction is that cultures that score high on measures of dignifying their members will also score high on such affiliative measures. It is also expectable that dignity-preservation and dignity-violations may take different forms in different cultures.



It seems also likely on these grounds that the precise behavioral profile of dignity might vary substantially across human cultures (while those various representations of dignity might retain a strong family resemblance to one another). That is, the pattern that is often found in human evolutionary development will be repeated on this level also: universal commonalities coupled with local variations.

Boyd, Gintis, and Bowles (2010) generate two further complications that are of interest in this context. One is that stable cooperation and a stable mix of punishers and non-punishers in a broadly cooperative society depends on the threshold at which punishment sets in. If the threshold for punishment of defectors is too low, then cooperation erodes. In such settings, dignity is unlikely to be preserved or enhanced. The other result of interest is that *coordination* of punishment across the actions of many punishers is needed to account for the stability of punishment as a cooperation-promoting strategy. Boyd and his colleagues show that some alternative analyses of cooperation are particularly remiss in failing to take coordination into account. And coordination of punishment is a further common feature of alliances: the enemy of my enemy is my friend, so to speak. Indeed, even small alliances which regularly coordinate punitive actions or gestures can sometimes exert influence (disproportionate to their numbers) over a larger group. Contrariwise, groups that confer dignity on all their members and are assiduous in protecting and honoring the dignity of their members are likely to have a strong internal egalitarian ethos, and to be particularly attractive to newcomers who are prepared to respond in kind. Genuine like-mindedness tends thereby to reduplicate itself. Such like-mindedness (together with its behavioral expressions) is a kind of ethical reciprocity. It is not surprising, then, that coordinated reciprocity based on common values should promote and secure cooperation. I further expect, then, that societies (on whatever scale) that promote dignity will also be more cooperative than those that do not (see Margalit, 1998; Wilkinson and Pickett, 2009 for similar arguments). This, too, could be tested by empirical means.

Two final complications merit attention. One is that when groups compete for resources some forms of cooperative behavior within those groups (though not between them) increase: "Variation in contribution among individuals, either with or without intergroup competition, was positively correlated with individuals' propensity to regard group mates as collaborators" (Burton-Chellew, Ross-Gillespie, and West, 2010, p. 104; see Puurtinen and Mappes, 2009 for similar results). This appears to be what some other investigators have called "parochial altruism," the tendency to give preference to the members of one's own ethnic, racial or language group, as compared with members of out-groups. The parochial effect extends to punishment: punishers protect members of their own group more than members of out-groups (Bernhard, Fischbacher, and Fehr, 2006). Such behavior clearly adds to the cohesion of in-groups, and suggests that humans are more likely to form alliances with the members of their

own groups than with strangers. But then, social exchange with strangers is bound to be fraught with all kinds of anxieties and aggressive possibilities that will not be as strong between members from within the group (though the strength of this bias may depend on how large the group is). Conferring equal dignity on in-group members, and acting so as to preserve or enhance the dignity of in-group members may both reflect the same dynamic.

De Dreu et al. (2010) have contributed significantly to discovering the role of the neuropeptide oxytocin in parochial altruism, and have supplied an experimental design for investigation of that phenomenon. They find that aggressive responses to threats perceived from out-groups tend to be defensive rather than offensive in character. It is a further matter whether parochial altruism is at all likely to be a successful strategy once populations reach much larger sizes than was typical in the early environment of adaptation for our species. The relative success of expanding circles of cooperation (and empathy) in assisting humans to spread across the globe and (so far) to dominate all other primates suggests that parochial altruism, in the strict sense, has little adaptive value for our species as a whole, especially since we have recently emerged as a genuinely global species.

The last complication is that when punishment is perceived to be administered inconsistently within a group (sometimes defectors are punished, sometimes they are not; sometimes cooperators are punished, sometimes they are not), the members of the group will cooperate less (Van Prooijen, Galluci, and Toeset, 2008). These effects are also mediated by how strongly people feel themselves to belong to the group. Both procedural fairness and fairness of treatment are important issues for most members of most intentional social groups, and their relative importance increases if members are uncertain about their status in the group (De Cremer, Brebels, and Sedikides, 2008; De Cremer, Brockner, Fishman, Van Dijke, Van Offen, and Mayer, 2010; De Cremer, Tyler, and Ouden, 2005). Not unexpectedly, when procedures are perceived to be unfair, the extent to which members will trust authorities over the group is also eroded (Van Dijke, De Cremer, and Mayer, 2010). Such findings are commonly reflected in our experiences in our work places, our institutions, and other intentional groups. One way to prevent such effects is to insure that members are treated with dignity and that there is reasonable certainty that not just anything can be done to any member of the group, whether by authorities or other ordinary members of the group. Such assurances, after all, also apply to defectors and set some minimal lower bound of punishment that the group can avail itself of against defectors from the cooperative norms of the group.

There are good reasons, then, to think that punishment, and especially altruistic punishment, is a natural concomitant of reciprocity and tends to promote cooperative behavior among groups of humans. Moreover, I hope to have shown that some concept of human dignity can fit into this part of the biological frame-

work very well. Indeed, one thing illuminates the other. Punishment practices and intentions to punish, of course, do not get off the ground, so to speak, in any intentional group without first some signaling of those intentions to the other members. Similarly, coordination of punishment across many members of such groups (which makes punishment promote cooperation more effectively than it would otherwise do) also requires signaling of intentions between group members (this point is emphasized by Boyd, Gintis, and Bowles, 2010). Moreover, such signals have to be honest ones if they are to be effective. This introduces the third dimension of my proposed biological matrix for dignity: dignity as a communicative signal.

### Dignity as a Communicative Signal

Dignity is commonly associated with a certain kind of bodily presentation of the self in social settings (this is Schroeder's "dignity of comportment"). Dignity of comportment is a combination of elements that include a certain kind of facial expression (one that is calm, confident, even determined or grave), a very erect posture, a slow and stately gait unaccompanied by large movements of the arms or hands, and certain range of prosody of the voice (including frequency, pitch, intonation, rhythm and tempo, the latter generally being slow). Aristotle thought to include some of these elements in his analysis of the proud man:

... a slow step is thought proper to the proud man, a deep voice, and a level utterance; for the man who takes few things seriously is not likely to be hurried, nor the man who thinks nothing great to be excited, while a shrill voice and a rapid gait are the results of hurry and excitement. (*Nicomachean Ethics* IV.3, 1125a 13–16; trans. Ross)

My thesis here is that the combination of facial expression, posture, gait, and prosody of the voice constitutes a multi-modal signal that has a particular communicative function that can be vital to success in social exchanges and that has been subject to selection pressures throughout our long evolutionary past. This function has mainly to do with disarming (or at least inhibiting) the operation of a very fast perceptual system in humans that automatically categorizes traits of persons on the basis of how they appear. That system is biased towards aggressive responses, and it is important in many social encounters that its operation be inhibited. (In this way, dignity-signals also promote cooperation.) Before visiting some of the details of this hypothesis and its scientific support, a somewhat wider context should be set, for detecting dignity-signals depends upon our ability to detect biological motion.

Humans are remarkably adept at detecting biological motion (as opposed to mechanical motion) in their near environment. Such detection depends on a distinctive neural substratum, both in humans and in monkeys. Portions of the

temporal lobe (especially the posterior area of the superior temporal sulcus), occipito-temporal region, the pre-motor cortex, and the inferior parietal cortex, all play prominent roles here (Blake and Shiffrar, 2007; Grèzes, Fonlupt, Bertenthal, Delon–Martin, Segebarth, and Decety, 2001; Peelen, Wiggett, and Downing, 2006). Under favorable circumstances, the system is about 90 percent accurate, and it is remarkably robust. That is, it performs well when the information available to it is severely distorted or degraded. If we outline the shape of the human body by attaching small LED lights to shoulders, hips, knees, and ankles (point-light displays) and view their motion in the dark, humans are adept at recognizing walking, running, and dancing. Humans reliably detect gender, direction of movement, emotional expressions communicated by movement, and intentions, from such point-light displays, and also under further conditions of informational degradation (Casile and Giese, 2005; Chang and Troje, 2008; Cutting, 1978; Thurman and Grossman, 2007). The system is also very fast, completing its discrimination efforts in around 200 milliseconds (Hunt and Halper, 2008; Reid, Hoehl, Landt, and Striano, 2008). The system appears very early in human ontogeny, functioning as early as three months of age (Booth, Pinto, and Bertenthal, 2002; Pinto, 2006). Finally, it appears that the single most important datum for detecting biological motion is the contra-lateral motion in the horizontal plane of the hands and feet, as they pass one another and the vertical midline of the body (Giese, Thornton, and Edelman, 2008; Troje and Westhoff, 2006). This may explain why gait is so important for reading the affective expressiveness of the body as a whole when it is in motion. (It may also help to explain why military “slow march,” which is approximately half the natural tempo of human locomotion, is reserved for especially grave occasions such as funerals. For the “natural tempo” of 60 beats per minute, see MacDougall and Moore, 2005.)

Scientists have long studied our ability to “read” the affective expressions of the human face (with special attention to the areas around the mouth and eyes). Only recently have they begun to look at the emotional expressiveness of the body as a whole and our complex ability to communicate intentions and emotional tone by means of whole-body movements. But, of course, whole-body motion is detectable at a much greater distance than is the face alone. (The voice is also detectable at much longer ranges, and I return to this issue below.) Indeed, many social encounters will begin well before the face can clearly be seen, and in some, of course, the face may be obscured. Beatrice de Gelder and her colleagues have launched an ambitious, innovative and rigorous program for investigating “emotional body language,” its neural underpinnings and its biological significance (De Gelder, 2009; De Gelder, Van den Stock, Meeren, Sinke, Kret, and Tamiotto, 2010; Sinke, Kret, and De Gelder, 2011; Van de Riet, Grèzes, and De Gelder, 2009). She notes that “Human and non-human primates are especially sensitive to the gestural signals made by other primates, and use these signals as guides for their own behavior” (De Gelder,

2006, p. 242). The neurobiological underpinnings of this system involve prominent roles for the amygdala, the insula, the cingulate cortex, the striatum, the superior temporal sulcus, and the prefrontal cortex (De Gelder, 2006; Grèzes, Pichon, and De Gelder, 2007; Hodzic, Kaas, Muckli, Stirn, and Singer, 2009; Minnebusch and Daum, 2009; Pichon, De Gelder, and Grèzes, 2008; Urgesi, Calvo-Merino, Haggard, and Aglioti, 2007), the same combination of cortical and sub-cortical regions mentioned before in connection with social cognition. Similar body-selective cortical areas are found in our fellow non-human primates (De Gelder and Partan, 2009; Kriegeskorte et al., 2008; Pinsk, DeSimone, Moore, Gross, and Kastner, 2005; Tsao, Freiwald, Knutsen, Mandeville, and Tootell, 2003). Moreover, sensitivity to the configuration of bodily parts in a perception of the body as a whole appears in human children as early as three months of age, along with the general capacity to detect biological motion, and reaches adult levels of categorization accuracy for some emotions by age five years (Gliga and Dehaene-Lambertz, 2005; Vieillard and Guidetti, 2009). Like other functionalities that depend on the same or closely related neural networks, this one is also very fast. Processing of the affective qualities of whole-body gestures or motion can begin in as little as 115 ms post stimulus, and may be completed within 260 ms post stimulus (Kret and De Gelder, 2010; Meeren, Van Heijnsbergen, and De Gelder, 2005; Pourtois, Peelen, Spinelli, Seeck, and Vuilleumier, 2007; Van de Riet et al., 2009). The results in Joubert, Rousselet, Fize, and Fabre-Thorpe (2007) are especially impressive: categorization of affective bodily expression can occur with exposure to a stimulus as brief as 26 ms, and is often completed by 400 ms, with up to 96 percent accuracy.

Joubert et al. (2007) were looking especially at human capacity to categorize whole scenes and objects. Such “visual categorization” starts between 50 and 100 ms post stimulus (Meeren et al., 2005) and appears to depend on two passes of the relevant information through cortical networks: the first to categorize an object or scene in its grossest aspects (is this a monkey face or a human face?), the second to record finer details (identity of the face or its emotional valence). Our attention is drawn especially quickly (for stimuli presented for as little as 20 ms) to scenes or objects that arouse fear or represent a threat (including whole-body postures: see Bannerman, Milders, De Gelder, and Sahraie, 2008; Bannerman, Milders, and Sahraie, 2010; cf. Grèzes et al., 2007; Pichon et al., 2008). The system is thus biased towards very fast perception of threats in the near environment. Perception of bodies in this system appears also to be further specialized in so far as one neural circuit (the extrastriate body area on the lateral surface of the temporal cortex) is specialized for body parts (Astasfiev, Stanley, Shulman, and Corbetta, 2004; Downing, Jiang, Shuman, and Kanwisher, 2001), while another circuit (the fusiform body area located in the ventral surface of the temporal cortex: see Schwarzlose, Baker, and Kanwisher, 2005) configures those parts into wholes (Pourtois et al., 2007; Taylor, Wiggert, and Downing, 2007; Yue et al.,

2011). As might be expected, there is good evidence for strongly analogous networks in our close, highly social primate relatives (Kriegeskorte et al., 2008).

The processing times found by Joubert et al. (2007) are short enough to indicate that processing of emotional body language is automatic, can take place without our conscious awareness of it, and does not require step-wise linguistically mediated reasoning (De Gelder, 2006). The system operates reliably even when information from the face is missing or degraded, and, when facial expressions are available, the system is biased towards detecting the emotional expression of the body. Thus, emotional body language trumps facial affective expressiveness (De Gelder, 2009; Meeren et al., 2005; Van den Stock, Righart, and De Gelder, 2007). It further appears that the emotional body language detection system is especially sensitive to large motions by the arms (including the hands) and legs, generally interpreting these movements as expressing aggressive intent (De Gelder, 2009). It seems likely, then, that gait could have an important role to play in inhibiting or enhancing aggressive responses in social encounters, especially between strangers. The emotional body language detection system thus appears to be hard-wired to the human neonate brain, to appear very early in normal psycho-social development, to be very fast and automatic in its operations, and to be entirely independent of our linguistic abilities. Given parallels in our close primate relatives, and appearance of similar functionality across all human cultures so far investigated, there are excellent reasons to think that the system is a product of human evolution.

The emotional expressiveness of the body is further enhanced when the prosody of the voice matches what the rest of the body is communicating. In general, multi-modal signals are more effective than mono-modal signals (Hebets and Papaj, 2005; Rowe, 1999, 2005; Van den Stock et al., 2008). Cross-modal effects of voice prosody (especially its emotional content) and facial expressions are well-known (Dolan, Morris, and De Gelder, 2001; Ethofer et al., 2006; Kreifelts, Ethofer, Grodd, Erb, and Wildgruber, 2007; Walker-Andrews, 1998). But it is also the case that body motion and voice prosody, taken together, trump information available from the face and voice together (De Gelder, 2009; Van den Stock, Grèzes, and De Gelder, 2008; Van den Stock, Righart, and De Gelder, 2007). Emotional prosody of the human voice involves a combination of cues, some universal to human cultures and others more specific to cultural location (Elfenbein and Ambady, 2002, 2003). Thus, while native English speakers show their highest recognition rates (90–100 percent) for emotions expressed through prosody when those are given in English, they are also surprisingly accurate (50–95 percent) at categorizing emotions expressed prosodically in Japanese, Chinese, and Tagalog (Thompson and Balkwill, 2006; cf. Juslin and Laukka, 2003). This was true for prosodic joy, anger, sadness and fear. Indeed, mean proportion of correct categorizations in all five languages involved in Thompson's study was 70 percent. What matters most in prosody

of the voice is frequency of utterance, intensity of emotional expression and the “density” of those events (number of frequency wave peaks per second). Perception of the pitch of the voice also plays a role here, and that is partly dependent upon temporal dynamics, especially use of prolongation (drawn out utterance: see Balaguer–Ballester, Clark, Coath, Krumbholz, and Denham, 2009). Here, as in so many cases of emotive expression and its detection, the neurobiological substratum is supplied especially by the amygdala, the insula, the striatum and the frontal cortices (Van Rijn, Aleman, Van Diessen, Berkmoes, and Vingerhoets, 2005; Wildgruber, Ackermann, Kreifelts, and Ethofer, 2006). Persons with autism commonly show difficulties in perceiving and categorizing prosodic emotional expressions and such deficits are associated with dysfunctions of just these circuits, especially in the right hemisphere (Järvinen–Pasley, Peppé, King–Smith, and Heaton, 2008; Kujala, Aho, Lepistö, Jansson–Verkasalo, Nieminen–von Wendt, von Wendt, and Näätänen, 2007; Kujala, Lepistö, Nieminen–von Wendt, Näätänen, and Näätänen, 2005). Hesling, Dilharreguy, Peppé, Amirault, Bouvard, and Allard (2010), however, also found evidence for abnormal activity in the left hemisphere. Adolphs, Damasio, and Tranel (2002) found similar deficits for persons suffering from lesions in their right parietal cortex, right temporal lobe, and left frontal cortex. These are very similar to what happens in autism, and both lesion cases and cases of autism provide natural experiments to confirm likely neurobiological underpinnings for affective prosody detection. The same set of neural networks appears to be especially sensitive to angry prosody (Grandjean et al., 2005; Quadflieg, Mentzel, Miltner, and Straube, 2008). Prosodic detection and categorization also gives evidence of being very fast (within 110 ms post stimulus), automatic in its operation, and ontogenetically early, starting around three months of age. Our capacity readily to detect and accurately to categorize the emotional aspects of the prosody of the human voice is expectable if it is the result of natural selection. It is plausible also that other mechanisms might exist in humans to exploit this system for the purpose of supporting cooperative behavior. My view is that dignity signals are just such mechanisms. They are especially important given the special role of the amygdala in forming “first impressions.”

First impressions are those very quick and intuitive judgments we tend to make about traits of persons on the basis of how they look to us. Such over-generalizations are especially well known with regard to the face (for a thorough review see Ambady and Skowronski, 2008; Zebrowitz and Montepare, 2008). We are especially prone to this in social situations that we perceive to be risky. We may draw conclusions about the trustworthiness (or untrustworthiness) of another person, their competence, dominance, or aggressiveness from what little we can see of their faces (Montepare and Dobish, 2003; Oosterhof and Todorov, 2008, 2009). Such quick trait inferences from appearances can, of course, go wildly astray. What is surprising is that they can also be quite valid and accurate, though we

tend to do markedly less well when confronted by a deceiver. In one study, inferences about competence from faces were used to predict the outcomes of Congressional elections in the United States in 2000, 2002, and 2004 (Todorov, Mandisodza, Goren, and Hall, 2005). The results were nearly 70 percent correct (similar results across cultures were found by Ozono, Nakashima, Yoshikawa, and Watabe, 2010). In these experiments faces of candidates were exposed to subjects for as little as one second. The speed of the system is, indeed, quite impressive: consistent first impressions can be formed based on whatever information is available in the first 39 ms post stimulus (Bar, Neta, and Linz, 2006). The amygdala plays a central role in these trait inferences (Engell, Haxby, and Todorov, 2007; Sinke, Sorger, Goebel, and De Gelder, 2010; Todorov, Baron, and Oosterhof, 2008; Todorov and Engell, 2008), and is probably responsible for the speed of the system (Willis and Todorov, 2006). Investigating the activity of the right amygdala during trustworthiness inferences, Said, Baron, and Todorov (2008), using higher resolution techniques than previously, found an interesting bipolar result: the activity peaked for faces perceived to be maximally untrustworthy (from among those shown) and again for those perceived to be maximally trustworthy. The lowest levels of amygdalar activity during first impression formation were for neutral faces. In my view, this is a singularly important finding. For it suggests that this very fast, automatic, and effortless process of forming first impressions is driven by minimal neural activity only when processing neutral faces. There is a role here for the calm, confident, and grave facial expressions that we commonly associate with dignity. They may have some power to inhibit first impression formation, thereby causing the system to function at minimal levels of amygdalar activity. (Trustworthy faces should not be confused with dignified faces. Judgments of trustworthiness and untrustworthiness seem to depend on forming a gestalt of several structural and configural features: faces with high inner eyebrows, pronounced cheekbones, wide chins, and shallow nose sellion are judged more trustworthy than those with opposing features [Todorov, Baron, and Oosterhof, 2008]. These features are distinct from those I am suggesting for dignified faces.)

Sinke et al. (2010) found a similar pattern of activity in the amygdala for whole bodies, and whole bodies (especially when the face is obscured) are also a common basis for first impression-formation. And, as we have already seen, humans are especially sensitive to perceived threats, whether conveyed facially or bodily. The first impression system operates automatically, though the precise manner in which it operates in a given individual is subject both to individual variations and can also be altered by sustained training regimens (Ambady and Skowronski, 2008, pp. 313–333). So, here is the situation when two human strangers first meet, especially when at such a distance from one another that facial details are not readily perceived, but bodily postures, gait, and prosody of the voice can be accurately perceived. Each individual is likely to form very



quickly a series of inferences about the intentions, emotional condition, and personality traits of the other. Each individual's first impression system is operating very fast, and is largely outside of her control. Moreover, the system is biased in the direction of perceiving threats. This makes sense from an adaptive point of view, because it would be in our interest (especially during the early period of our evolution as a species) to form too many false positives (taking situations to be threatening when they are not) than to form too few (which could very quickly be fatal). This is the context within which I propose to think about dignity as a signal. However, before considering the general meaning of such a signal, something more should be said about gait and posture.

Scientific investigation of gait is still in its infancy, not least with respect to identifying emotions or other mental states from gait information. However, it has been shown that people can identify others known to them from their gait alone, at levels of accuracy well above those expected by mere chance (Cutting, 1977). More careful developments along these lines have given rise to a variety of recognition algorithms which function in security systems to make possible recognition of individuals at a distance from their gait (Mu and Tao, 2010; Zhang, Vogler, and Metaxas, 2007). It has also been shown that it is possible to "read" emotions off of gait information, again, well above merely chance levels. Such reading appears to depend upon a variety of kinds of information, from configural (the arrangement of body parts in a whole), to kinematic (especially relative to motion and angles of knees, ankles, and hips), as well as temporal and spatial information (Atkinson, Tunstall, and Dittrich, 2007; Barclay, Cutting, and Koslowski, 1978; Bouchrika and Nixon, 2008; Garcia and Grossman, 2008). More important for my purposes, exaggeration of body movements improves recognition accuracy of emotions expressed thereby (Atkinson, Dittrich, Gemmell, and Young, 2004). When information from gait is combined with facial biometrics, identification gets much faster and more reliable (up to 73 percent from 40–42 percent according to Liu and Sarkar, 2007). Neural processing time for gait information is likely to be similar to that for other forms of biological motion, namely in the region of 100–180 ms post stimulus (Pavlova, Birbaumer, and Sokolov, 2006; Pavlova, Lutzenberger, Sokolov, and Birbaumer, 2004). So, what does all this mean for dignity signals? Common lore associates slow and stately gait with dignity or pride. Montepare, Goldstein, and Clausen (1987) attempted with some success to detect pride from gait, but found that such detection was substantially less accurate than for sadness or anger. They also found that length of stride and degree of arm swing played roles in such affective gait recognition. This suggests that gait information alone is a signal in need of amplification. Such amplification may well be the function of the other elements associated with dignity: voice prosody, erect posture, limited arm swing, open and relaxed hands, calm and confident facial expression (Atkinson et al., 2004 tends to confirm amplification effects). If so,

then dignity of comportment may prove to be a reliable and honest signal by design (Taylor, Hasson, and Clark, 2000).<sup>2</sup>

The matter of erect posture has been held to be a mark of dignity or justifiable pride since ancient times. Socrates (according to Xenophon, *Mem.* 1.4.11), Plato (*Timaeus* 90a 12–b 1), and Aristotle (*Part. Anim.* IV.10, 686a 27–31) all argued that erect posture was unique to humans among all animals and a mark of divine favor or worth. In his much later book on the expression of emotions in the faces of men, Charles Darwin observed:

A proud man exhibits his sense of superiority over others by holding his head and body erect. He is haughty (*haut*), or high, and makes himself appear as large as possible; so that metaphorically he is said to be swollen or puffed up with pride. (1890, p. 263f)

And of a certain facial expression, he adds: “the firm closure of the mouth tends to give an expression of determination or decision to the countenance.” (1890, p. 235f)

This suggests that erect posture and determined facial expression could well be bodily markers for something like dignity. Erect posture also means that the large muscles of the chest are not ready for a deep intake of air, preparatory to fight or flight, and the shoulders will be well back, also indicating absence of aggressive intent.

An adult human person who exhibits dignity as a combination of gait, posture, and affective voice prosody is sending a signal to potential social partners that may have some power to inhibit their fast, limbic system from forming first impressions. This would be especially valuable in encounters between strangers or in other circumstances of risk or stress. For, in those circumstances humans are most likely to adopt a hostile stance towards the other, unless such a signal is received. What, then, does the signal communicate? It seems to me that the bodily dignified individual is communicating two things: (a) that he is a cooperator (or are at least prepared to cooperate) and is not present with hostile or threatening intent; and (b) that he expects the other person to be the same, and is ready to receive cooperative overtures from the other. It may suffice to make encounters with strangers less dangerous for dignity signals merely to retard the action of the amygdalar system, slowing it down. Indeed, part of the stately gait, the sonorous and drawn out prosody of the voice, and the grave mien may be to entrain slower responses in this very system. Like other multi-component and multi-modal signals, it acts as a functional unit (Hebets and

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<sup>2</sup>A difficult issue in the study of communicative signals in animals is the question of reliability, the causes of that reliability, and what happens when deceptive signals are detected. All of this is highly relevant to the study of dignity as a communicative signal among humans, but cannot be further explored here (see Espmark, Amundsen, and Rosenqvist, 2000; see Searcy and Nowicki, 2005 for reviews).

Papaj, 2005) and is the product of the operation of selection forces. In the early environment of adaptation for our species, after all, encounters between strangers would have been unusual, since most humans lived in relatively small bands (fewer than 150 members) of direct biological kin. But encounters between strangers would have occurred, nonetheless, when groups or individuals met. For at least some of that period, also, it seems likely that more than one hominid species co-existed in close enough spatial proximity to make encounters between hominid species possible. (The best evidence for such “close encounters of the third kind” would be evidence of interbreeding, and a recent report suggests that humans interbred with at least two other hominid species, perhaps as recently as 30,000 years ago: see Reich et al., 2010.) Whether meeting strange conspecifics, or encountering members of other hominid species, humans could find dignity signals useful to prevent unnecessary hostilities that would otherwise have become highly likely. Dignity as a communicative signal, then, would have been adaptive. It remains for me to draw this study to a close by suggesting some directions for future work on the biological significance of human dignity.

### **Towards a Science of Human Dignity**

Suppose, then, that dignity has biological meaning and that this meaning is bound up with the evolution of cooperative behavior among humans (and to a lesser extent other primates). Suppose, further, that the importance of equity and/or equality that is closely and commonly associated with dignity (especially in documents dealing with human rights) reflects the role of various kinds of reciprocity in promoting such cooperative behavior. Suppose, also, that dignity can and properly does function as a basis for punishment (as it does, for example, in documents forbidding torture and enjoining penalties on torturers, as well as a universal duty to prosecute them), and that this also finds its deep meaning as a further element promoting cooperation among our conspecifics. Suppose, finally, that dignity of comportment is a multi-component communicative signal designed by selection pressures operating in the human early environment of adaptation to disarm or inhibit the operation of an automatic and fast, amygdala-based system for processing faces and whole-body affective meanings (including attitudes), a processing system that is strongly biased towards aggressive responses to strangers in social situations of perceived uncertainty (including perhaps encounters between humans and members of other hominid species). Suppose, that is, that the hypotheses developed above are at least approximately true. What follows? It seems to me that what follows is the gradual emergence of an experimental and empirical approach to the nature of dignity that might be very valuable. That is, it may be possible for us to develop a science of dignity. What would such a scientific approach involve and how might the research program proceed?

One major aspect of such a program will be behavioral in character. For example, there is a set of pictures that is widely used to study affective responses to standard and varied human facial expressions or whole scenes (the International Affective Picture System) which could be adapted to represent an array of whole-body affective expressions, and this could give a useful tool for identifying responses to such "emotional body language." So far, no attempt has been made to do so, but there does not seem to be any reason in principle why this could not be done (for the International Affective Picture System, see Mikels, Fredrickson, Larkin, Lindberg, Maglio, and Reuter-Lorenz, 2005; and for its auditory parallel, the International Affective Digitized System, see Stevenson and James, 2008). Should such an adaptation take place, it would seem to be possible, further, to develop a subset of the adapted IAPS to deal with conventional or common expressions of dignity in whole-body language.

That latter move would of course entail developing an appropriate profile of what constitutes dignified behavior. This would include a profile of a dignified gait. Here the algorithms being developed in the artificial recognition of individuals by their gaits might be the foundation for a further and more specific adaptation to produce empirically testable recognition criteria for a dignified walking style (including length of stride, speed of walking, associated arm-swing, and the characteristic "open but relaxed" hand configuration). Similarly, there seems to be nothing to prevent observing paradigmatically dignified erect posture, together with associated disposition of the head relative to both the trunk and the direction of movement, to discover commonalities (or more likely a range of commonalities) that might belong to such a profile. Much the same goes for what might reasonably be classified as a dignified facial expression, or range of such expressions. In a recent study of communication of emotion through qualities of the voice, Gobl and Chasaide (2003) picked out emotive qualities including "confident," "unafraid," "friendly," "interested," "neutral," all of which might have a bearing on analogous facial expressions relevant to dignity of comportment (see similar results in Banse and Scherer, 1996).

I have argued that prosody of the voice is plausibly taken to be an amplifier of larger whole-body emotive language, and we already know quite a lot about how voice prosody communicates affective states. Prosodic processing is dissociable from processing of the lexical qualities of the voice and exerts a stronger influence on listeners' judgments than does lexical content of speech (Dietrich, Ackermann, Szameitat, and Alter, 2006; cf. Bänziger and Scherer, 2005; Gobl and Chasaide, 2003). Scherer, Banse, and Wallbott (2001) showed that inferences of emotional state from vocal cues (here "sentences" made up out of randomly selected meaningless syllables), across nine culturally different countries, reached average accuracy rates of 66 percent. One affective quality that was particularly accurately perceived was the neutral condition expressed by German actors to German-speaking subjects (88 percent accurate). Scherer et al. (2001)

concluded that such results confirm phylogenetic continuity of emotional sounds. Scherer (2003) found that voices are less accurate representations of affective states than are faces, but that recognition of affective qualities conveyed by voices was 55 percent to 65 percent accurate (faces were up to 75 percent accurate), a rate five to six times greater than that predicted by mere chance. Recognition of affective condition from voice prosody is sensitive to the time course of utterance, and to any social interactions that may be part of the communicative scene, both of which are also relevant to the study of dignity (Cowie and Cornelius, 2003). Scherer's model took into account expression of emotion (encoding), transmission of emotion, and recognition of emotion (decoding). Such a model responds well to something that studies of animal signals generally have emphasized: the importance to the meaning of signals of the psychology of their receivers (see Grandjean, Bänziger, and Scherer, 2006; Russell, Bachorowski, and Fernandez-Dols, 2003). Discrimination of pitch variability is also known to be an important aspect of prosody decoding (Murray and Arnott, 1993; Pihan, 2006; Pihan, Tabert, Assuras, and Borod, 2008). Technical capacities for such work could be transferred to the study of dignity if it were possible to isolate the pitch and intonation contours of that sonorous tone of voice that is commonly taken to be an aspect of dignity of comportment. Such isolation of relevant elements of the human voice is certainly within current technical limits.

There thus seems to me little standing in the way of developing a measurable and empirically testable profile of dignity as a communicative signal, with regard to posture, gait, and prosody of the voice. Such a profile, in turn, could drive adaptation of economic games to test the role of dignity signals and dignity impressions in various forms of reciprocity, direct and indirect. That is, it might be possible no longer to need to rely on merely intuitive or contingent cultural associations of equality with dignity, but to find a way rigorously to demonstrate that connection and to determine its various parameters. Such game-theoretic investigations have already provided a rich fund of insight into possible evolutionary trajectories for our species arriving at sustained high levels of complex forms of cooperation. Dignity might come to find its empirical foundation in related studies. Field studies of dignity in anthropological investigations of diverse human cultures could also become much more specific and rigorous in their results should such a profile, and such game-theoretic investigations, prove fruitful.

Finally, there does not seem to be any reason why such investigations should not extend to study of relevant neurobiological and other physiological infrastructures. There is already evidence that affective prosody of the voice, for example, is lateralized to the right hemisphere, with some assistance from left hemispheric structures for such matters as the segmentation of sounds and the temporal course of utterances (Pihan, 2006; Pihan et al., 2008; Wildgruber et al., 2006). Electroencephalograph studies, coordinated use of various brain imaging technologies

(functional magnetic resonance imaging, including diffusion tensor imaging; positron emission tomography; magnetic encephalography), and studies of important affective neurotransmitters, could all combine to provide powerful information about regions of interest in the brain engaged in recognition of dignity signals. Indeed, it is not difficult to predict that cortico-limbic networks such as I have already discussed will figure prominently in that account. That, in turn, could illuminate problems recognizing dignity in various forms of psychopathology (especially autism, personality disorders, psychopathy), notably in those pathologies that show severe to moderate deficits in empathy. Lesions, especially to the right hemisphere, caused by strokes, accidents or disease, might also be drawn into this orbit and add confirmation to the results of brain imaging and neurochemical investigations.

Should a workable and empirical profile of dignity behavior become available, it should also be possible to investigate physiological correlatives of the detection of dignity signals, as hypothesized in this paper. Here the work of Stephen Porges and his colleagues is of particular importance. They have shown a deep connection between physiological states and qualities of human social behavior, especially with regard to communicative pro-social behaviors. The myelinated vagus nerve functions as a tightly regulated “vagal brake” on the heart (systematically altering the rate of change of heart rates) in social contexts that are perceived to be safe (Movius and Allen, 2005; Porges, Doussard–Roosevelt, Portales, and Greenspan, 1996). When applied, the vagal brake slows heart rate to promote a calm behavioral state which in turn fosters social interaction. Vagal activity can be monitored closely (via ambulatory electro-cardiograph) by measuring the amplitude of the naturally occurring spontaneous fluctuation of heart rate occurring at respiratory frequencies (respiratory sinus arrhythmia). This has to do with the relative lengthening or shortening of the interval between heart beats. Large decreases in respiratory sinus arrhythmia are associated with greater sociability, while increasing arrhythmia promotes alternative patterns of behavior, either sympathetic nervous system mediated fight–flight behaviors or parasympathetic nervous system mediated immobilization behaviors (“freezing” or feigning death; see Porges, 2001, 2004, 2007, 2009; cf. Field and Diego, 2008). Both practical and statistical methods for measuring respiratory sinus arrhythmia with great accuracy already exist (Denver, Reed, and Porges, 2007; Heilman, Bal, Bazhenova, and Porges, 2007; Porges, 2007). Changes in respiratory sinus arrhythmia activity are also correlated with production of cortisol, a stress hormone (Doussard–Roosevelt, Montgomery, and Porges, 2003), and measurement of cortisol is a well-established technique in the study of human stress responses.

The same cranial nerve complex that regulates heart rates also regulates various other head muscles, including those of the middle ear, mouth, larynx, and pharynx.

These muscles control looking, listening, vocalizing, and facial gesturing. Of particular interest here is the middle ear. The stapedius muscle acts to stiffen the chain of small bones in the middle ear, when excited. Such activity is essential for dampening out the low frequency sounds that flood the human environment and make it harder for us to distinguish human voices (and their associated prosody) from surrounding noise (Porges, 2006). It is possible to monitor this activity by measuring the degree of responsiveness of the tympanic membrane. The combination of respiratory sinus arrhythmia, cortisol production and tympanic membrane compliance could provide a powerful tool for investigating how agents respond to dignity signals, as those have been here conceived. If my view is correct, then receipt of dignity signals should result in decreased respiratory sinus arrhythmia, decreased cortisol levels, and greater tympanic membrane compliance. Experimental determinations of these measures could, in turn, suggest modifications of our behavioral profile for dignity. Some forms of psychopathology have already been investigated for deficits of autonomic functioning, including respiratory sinus arrhythmia profiles and associated defects of social engagement. Autistic persons, for example, show distinctive differences from normal controls in sinus arrhythmia (Bal, Harden, Lamb, Van Hecke, Denver, and Porges, 2010; Van Hecke et al., 2009). Austin et al. (2007) demonstrated that a group of borderline patients tended to produce physiological states supporting fight-flight behavior (in keeping with the impulsive aggression characteristic of borderline disorders), while a control group tended to produce a physiological state supporting social engagement. Such natural experiments tend not only to support Porges' "polyvagal theory" of autonomic functioning, but also suggest further ways in which hypotheses about dignity as a communicative signal could be tested empirically.

In sum, it seems to me that scientific study of human dignity, both as something that is conferred on individual humans and as something that humans commonly communicate to one another, is now both possible and desirable. By pursuing it, it may be possible to winnow through the many cultural and common sense traditions attaching to dignity, with a view to confirming some and disconfirming other elements of those traditions. It might also be possible to find a more rigorously contested ground for a unified account of the nature of human dignity, and no longer be dependent on the vagaries of historical and culturally specific practices or beliefs. Such scientific investigation could help to specify a range of social conditions under which human dignity might flourish, and another range of social conditions under which it does not, thereby helping to build a more decent human culture. Naturalists, especially those who find the traditional grounding of dignity in classical theism or in Kantian rationalism dubious, should have particular interest in seeing such a science of human dignity brought to fruition. For, many of us find notions of dignity both irreplaceable, especially in the context of human rights, even though at present intolerably

vague and inadequately grounded. However, neither further fine-grained conceptual analysis nor more extensive and critical historical analysis is likely to relieve such concerns nearly as well as rigorous empirical investigations.

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