Articles

Culture, the Crack'd Mirror, and the Neuroethics of Disease

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Abstract: Human beings are sensorimotor coupled to the actual world and also attuned to the symbolic world of culture and the techniques of adaptation that culture provides. The self-image and self-shaping mediated by that mirror directly affects the neurocognitive structures that integrate human neural activity and reshape its processing capacities through top-down or autopoietic effects. Thus a crack'd mirror, which disrupts the processes of enactive self-configuration, can be disabling for an individual. That is exactly what happens in postcolonial or immigration contexts in which individuals' cultural adaptations are marginalized and disconnected in diverse and often painful and disorienting ways. The crack'd mirror is therefore a powerful trope for neuroethics and helps us understand the social and moral pathologies of many indigenous and immigrant communities.

Keywords: neurocognitive structures; neural activity; neuroethics; autopoiesis

> As he walked on to the Marae, the call was drawing him, penetrating to his bones like a two edged sword. It summoned him and it set in train the events that would enfold him. What happened next would move like a stately dance until it reached the time for him to speak, to declare himself before his family and community. What he had done needed dealing with and the way he would deal with it was even now being prepared within him in this ordered sequence of act and response, response and act. We would all stand in the same place and view the thing together, we would all be linked in coming to try and understand how it had happened and whether what he had done and who he had become had a place in the order of things. He had such a place but his actions, now unable to be taken back, may be more problematic. There would be a remedy, perhaps unsatisfactory but the best that could be done in the sight of Gods and men (whoever they were). As the talk proceeded and things were told, questions asked and answers given, he said what needed to be said and felt better for saying it. Now there could be a way forward, with life and spirit in it.
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> He walked into the courtroom. How should he wear his face? How should he walk? What were the faces now fixing him in time and place looking at him. What he would say was prescribed but how should he say those things? An alien, he groped for points of connection that would show who he was and enable some understanding of what he had done and why. This was awkward, where should he cast his eyes? If he cast them down he was expressing a defect, a fault, that did not honour him but if he threw them up into the faces of those judging him he might seem to be expressing pride, a pride that he could not whole-heartedly feel in this place, with this strange sequence of alienating rituals and words that did not catch the heart of the thing. Here he could find no grip on himself or what was going on.

Two accounts, both aspects of a single lived sensorimotor reality, theorize two modes of attunement shaping one complex of uneasily articulated neural circuits

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mutually adjusting themselves to diverse situations that variously demand different ways of conducting and forming oneself as an integrated human being. These ways of being human become disordered, sometimes through obvious physical insult (investigated and treated by clinical neurology) and sometimes in a more complex and holistic way that touches and distorts what has become second nature to a person. In the latter sphere we find mental disorders, "dissolutions of higher order integration and coordination of sensori-motor processes" as served by the embodied site of ongoing evolution[1]—the human neural system and its neuronal groups.[2] To examine this contested site, at which our adaptation to the sociopolitical world is integrated with biological adaptation, we must conceptually dissect the entities we call diseases.

The Metaphysics of Disease

The conceptual dissection of an entity is the work of metaphysics. Locke, the physician-philosopher, distinguishes the real essence of anything (the basis in nature for the constant connection between the ideas we use to distinguish that thing and the real, if unknown, inner constitution on which the sensible qualities depend) and nominal essence—the ideas we form of that thing.[3] It is easy to think that the real essence is the thing itself, but both the real and the nominal essence are conceptions—creations of the understanding that ground further inquiry—one according to what science reveals and one according to our experiential impressions.[4]

An example of Locke's idea in the area of disease occurs when we think of a tumor and ask, "What type of tumor is it?" That opens up for us a diagnostic grid—a cognitive structure that, for a neuroscientists, is realized in a set of connection strengths in the human neural network. That grid is distilled from the actual experience of patients showing this or that disease, representations of the disease both scientific (e.g., neoplastic growth) and popular: "If it's cancer it's a death sentence." A nominal essence—one of the clusters of ideas apprehended by the mind on variously informed or even uninformed acquaintance—is not sufficient, and scientific distinctions among, for instance, inflammatory reactions, contusions, abscesses, or neoplastic growths, bring out genuinely significant regularities in natural history and the microbiology of the cells and tissues concerned.

The real essence, once identified with the aid of science, reveals the true inner constitution of the lump and steers us toward a scientific and projectable idea of what we are dealing with as the person in question shows us the lump troubling him or her. This idea of the real essence of the phenomenon then undergoes certain evolutions as it is theorized and retheorized, particularly in the area of mental disorder.

If the real essence of a thing reveals its true inner constitution, that explains why it is as it is and how it is likely to behave according to laws of nature and the causes of common events and processes. Evolutionary or natural design is the master theory for contemporary understandings of health and disease. In a paper entitled "The Liberty Bell and the Kiwi's Egg," Stephen Jay Gould argues that not all natural features of a creature are a product of design, that some are historical vestiges.[5] He also alerts us to the fact that an historical or evolutionary hangover may be coapted for another purpose, as in theories about the appendix and the tonsils and adenoids sampling matter in our digestive system and the mounting of an effective

immune response to dangerous substances. In accounting for mental disorder, a combination of personal history, historical situation, and sociocultural reality, in effect, constitutes the relevant context of adaptation. Those framing thoughts then inform a neuroethical evaluation of the research domains criteria initiative (RDoC) for understanding mental disorder.[6]

RDoC classification rests on three assumptions: first, mental illnesses are brain disorders or disorders of brain circuits; second, dysfunctions in neural circuits can be identified with the tools of clinical neuroscience, including electrophysiology, functional neuroimaging, and new methods for investigating connections in vivo; third, data from genetics and clinical neuroscience will yield biosignatures that will augment clinical symptoms and signs for clinical management.[7]

The RDoC proposal does not suppose that neural dysfunction is the only cause of mental disorders and recognizes developments in mental health science showing that causes or risks of mental disorders may operate at many levels, including genetic and neural, psychological, and (micro- and macro)social. Such a multifactorial or multilevel view of causation (or risk) acknowledges that explanations and interventions at any of these levels may affect the onset and course of mental illness, playing important roles in primary prevention and in management and treatment.[8]

There are, however tensions here with contemporary cognitive neuroscience, which emphasizes embodied cognition and autopoiesis. "The primary focus for RDoC is on neural circuitry, with levels of analysis progressing in one of two directions: upwards from measures of circuitry function to clinically relevant variation, or downwards to the genetic and molecular/cellular factors that ultimately influence such function."[9] Autopoiesis or self-ordering, as a pervasive feature of function in the human neural network, implies that causal pathways run up and down, connecting both with physiological contingencies and with the sociocultural and political structures to which human beings adapt themselves. That view has been expressed in recent discussions of disorders in the Anti-Social Personality Disorder (ASPD)/psychopathy spectrum[10] and of the fact that psychopathy, criminality, and ASPD are massively overrepresented in colonized indigenous populations and politically disaffected immigrant or traditionally oppressed communities. Similar considerations apply to other mental disorders such as depression, domestic violence, and substance abuse.[11]

The RDoC focuses mental health research on cognitive/affective systems for which there is reasonable evidence of identifiable brain circuitry, assuming that causation only proceeds from the bottom up, in accordance with the mechanistic view of science. But John Hughlings-Jackson and the embodied cognition model[12] situate the discursively engaged individual within structures and institutions that have inscribed his or her body and its neural network, as adapted through a balance of inhibition and excitation responsive to external situations full of affordances at a discursive level (at which we speak to each other, create opportunities, warn of threats and dangers, and put incentives in place.)

This schematization captures Aristotelian "second nature"—rather than something more biological or neurological—as the basis of mental disorder. This takes us into human ethology, philosophical anthropology, and cultural criticism to identify the key regularities influencing the developmental shape of the human neurocognitive system.

Crucially, the RDoC studies these systems to display the adaptation (both micro- and macrosociological) of a developing human being so as to identify, for instance, (1) resilience and alterations therein as the effect of something like the monoamine oxidase (MAO) genetic variations associated with violence and poor affective responses to human distress that we see in psychopathy; (2) the genetic variations in autism and the failure of primary intersubjectivity that distort the structures of social and affective cognition; and (3) anorexia and obesity, which have both moral and cultural factors deeply entwined in them but also specific variations in hypothalamic food intake regulation we find in young people prone to eating disorders.[13] Such examples demonstrate the ongoing usefulness of researching basic physiological mechanisms so as to understand the genesis and persistence of illnesses in certain conditions.

We should also remember that adaptation and maladaptation may well have left us with a fairly stable nature since the Paleolithic age, whereas cultural adaptation has required many changes in human beings since that time. Things that worked well for us in early hominid times—like sensitive fight-and-flight reactions or a metabolism good at conserving energy—may now be maladaptive. As noted, a biological model of disease is implicit in the discussion of neural circuits and mental disorder as a breakdown between human beings and their lived worlds.

Three Models of Mental Disease

Neuroscientists and medical researchers bring at least three models of disease to our analyses of clinical care and to neuroethical debates: (1) disease as an internal, organismic defect or anomaly, such as appendicitis, delirium, or Jacob-Creuzfeld disease; (2) disease as a social construct applied to outliers, such as "sluggish schizophrenia" (of the Soviet era) or, arguably, ASPD; and (3) disease as a failure of adaptation, as in post-traumatic stress disorder.

The view that disease is a failure of adaptation between an organism and a context recognizes that certain environments (such as war zones) can engender diagnosable mental disorders, as in the "crack'd mirror" analysis of culture and mental disorder in indigenous groups.

The image of the crack'd mirror comes from the story of the Lady of Shalott, who could only look at the world reflected in her mirror and who wove a tapestry depicting the world as she saw it. She lived under a curse—that if she confronted the real world directly, she would die and her life's work fall apart. As a creature of myth, she lives in a mirror world in which her life is so bound up that it will unravel if she moves beyond it. The fable is an apt metaphor for the mirror of the world constituted by the meanings that a people use to make sense of their being-in-the-world and to organize their lives.

A critical examination of our nature as beings-in-the-world brings into focus the knowledge underpinning practical systems that "stem from three broad areas: relations of control over things, relations of action upon others, relations with oneself."[14] These praxes generate a "technology of the self"—a science and art of self-formation and care of the self—whereby each of us is produced in an image, or *imago* (Lacan), of the fundamental structure of human existence and identity. Hacking notes "the looping effect of human kinds," whereby how we conceive of ourselves conditions our modes of being-in-the-world significantly shaped by our mirror world.

Neurocognitive schemata are structured and interrelated in relation to a reflected or meaningful world so as to allow anticipation and prediction of the crises we will face and the development of techniques to cope skillfully with those challenges (Dreyfus). Neurocognitive structure links the meaning of any term or expression to the fragment of language in which it is located and through which our techniques of perception and intervention are articulated. Embodied cognition theory couples human agents to the contexts of use or discourse in which we operate and in which we do things with the aid of words (e.g. in physics: trajectory, force vectors, centers of gravity, frequency, amplitude, and so on come to mind). This brings us close to Wittgenstein's claim that meaning is use, with all the nuances arising from the power relations that locate and fit human beings for participation in a set of meaningful exchanges that constitute culture as a repository of shared techniques.

It is that reading that is articulated in postcolonial discussions of identity and the dislocation of the ways in which peoples make sense of their lives in postcolonial settings. The mirror world of the colonizer imposes a framework of meaning on the land and people that have been colonized, whose identity is created and sustained in relation to that land and to their attunement to it within their own mirror, or web of meanings. The disruption of encounters between cultures presents, however, both threats and opportunities, given the possibility of venturing on a new path encompassing harms and opportunities in the face of an altered engagement with actuality, contingency, and mortality.

Wittgenstein's claim that logic is "a mirror image of the world"[15] resonates with the metaphor in which literature and culture are both mirror worlds, constituted by layers of connection and engendering of things so that human beings inhabit a world of meaning that structures all the actualities of life. The structuralist metaphor connects with Lacan's analysis of human identity and self-formation as "the mirror phase" in which the mirror is complex:[16] neither purely a structure of meaning nor unaffected by meaning but infused by meaning, relationality, encounter, and value, all admixed to allow the predictive brain to potentiate actions and responses in a given environment.[17]

The crack in the mirror disrupts a neurocognitive image of oneself as a human-in-the-world such that the members of a colonized culture experience and have to make sense of the causal touch of a new reality, but their predictive structures of response-reward-punishment (laid down by long-term potentiation and the processes of learning and memory) are thrown out of their practiced flow. Colonization is therefore potentially destructive to identity, self-worth, and the nourishment of the soul of the colonized because the connections among oneself, stories of worth and value, and the roots of being reflected in the mirror as our human being-in-the-world (a relation not expressible in language) have been disrupted.[18] Whereas an integrated mirror of meaning smoothly adapts a predictive brain to its context of action and offers a web of meaning and belief sedimented from discourse and supporting one's mode of being—a neurocognitive map, a disruptive reflection generating a cross-grained neurocognitive map fractures the image and disrupts the otherwise well-worked circuits linking our coupled sensorimotor activity to our off-line predictive structures[19] But just as a crack'd world can disrupt an individual's structures of self-organization, so it might be needed to release life from a place of fossilized confinement (as in many mythologies); the cut or fissure is not only a wound but a source of light and expanded possibilities.[20] The Lady of Shalott portrays a romantic and tragic lost world, but life in the postcolonial world

is real and problematic, and human subjects caught in it may kick against the goads of tradition and yet want to avoid losing the order that keeps life directed (a sense of ordered being). An ancient Maori saying is: "In the midst of death there is life"; a culture may be struck a mortal blow, but a crack in the mirror world of its inhabitants can generate a new way of being that produces innovation reflecting two mirrors—that of the colonizer and that of the colonized—to create a new web of emergent meaning otherwise inaccessible. Thus the crack'd mirror does not just signify a tragic idyll of a lost world.

The structural interconnections in the mirror world create neurocognitive maps and select neural groups serving actual, embodied, subjective dealings with the world. The mirror is built by detecting and using contingencies whereby there can be "a loosening of the sclerotic tradition and a dissolving of the concealments produced by it."[21] Given the context that creates those contingencies—legal boundaries, practices of discipline and confinement, and habitual ways of doing things specific to times and places—the crack'd mirror is clearly made for the biopsychosocial model of medicine and mental disorder and a scientific concept of autopoiesis.[22]

The Biopsychosocial Model of Medicine

The biopsychosocial model of medicine (BPSM) has been adopted as a holistic approach enabling dynamic systems theory to encompass diverse modes of explanation in clinical understanding of health and disease. Thus, hypertension is contributed to by stressors in a person's life such as financial insecurity; threats to relationships; an uncertain vocational future; shifting life to a new neighborhood, city, or country; and so on, all of which engage the internal homeostatic systems of the organism and its pathophysiology with external and sometimes nonphysical realities (e.g., restructuring in an industry) that causally affect the whole.

The relevant dysfunctions of the human organism are aggravated by certain contexts and outstrip the mechanisms understood by biomedicine and exploited by the very same medical technologies and interventions that have created massive gains in terms of human suffering. Some interventions have been achieved by the most simple measures—clean water, tolerably healthy living conditions, education, and so on—but these interventions fit the traditional model of human pathophysiology. Others are more difficult: young women, for instance, have a tendency to take upon themselves the demands of the world and the conflicting role possibilities that face them with severe dilemmas in adolescence, but only in some contexts does this tendency result in anorexia (dieting cultures are dangerous, and the statistical incidence is in part attributable to the prevalence of television sets in the society).[23] Thus, even if anorexia can be linked to certain abnormalities of function in hypothalamic and limbic circuits, one needs to relate activity in those circuits to the challenges facing a young woman in our cultural context, just as biology in general must be related to the context of phenotypic expression. Certain genes allow human beings to thrive in relatively nutrient-poor, exercise-rich environments where most of their fat and glucose comes from fruit, vegetable, and seafood sources, but the same genes may lead to obesity and type 2 diabetes when salt, fat, and glucose are readily available and when minimal exercise will obtain maximal nutrition. Thus culture as well as nature helps generate eating disorders (obesity and anorexia/bulimia) through its actions on the human predictive brain.

Not only eating disorders but other illnesses may well reflect psychosocial as well as biological factors; pain, for instance, can become uncontrollable by biomedical means in an unfulfilled or oppressed person, in part because the neural pathways for pain are not like those of other senses like vision or audition. Pain is a motivational state that grabs attention in response to a predicted or potential threat so that a person who is anxious, insecure, or unsettled may develop a pain syndrome that is very difficult to control in conditions in which others cope well and do not have that problem. Contexts of development contribute to such explanations by drawing on dynamic systems theory and an understanding of the human world in which we internalize (write into our neurocognitive maps and neuronal assemblies) structures of meaning and value. These ontogenetic neural changes involve the external context of neuro-humoro-immunological development.

Biopsychosocial Adaptation and the Human Nervous System

The human nervous system is best regarded as a multilayered network forming an integrated or holistic coordinator of the function of the whole organism: "The highest divisions of this sensori-motor mechanism, 'organ of mind' (1) represent impressions and movements of all parts of the body; (2) in most complex &c., combinations; and (3) triply indirectly."[24] Hughlings-Jackson, like others of his time, was an associationist using what became known as Hebb's law—"Neurones that fire together wire together"[25]—and here he observes that higher-order integration and coordination of sensorimotor patterns imposes the order we call mind on our behavior.

This process results in quasi-stable adaptive configurations of connectivity such that each event in the life trajectory of a human being changes his or her neural network (a little). Given that our top level of adaptation is cultural, producing a second nature by which we adapt to the mirror world and its discursive context, our nervous system becomes socio-psycho-neuro-humoro-immunally organized to produce a flowing, psychosomatic life, "a *natural self*, a current of given existence"[26] such that "le moi est une coordination."[27]

Once this model is in place for neural evolution and integration, we can begin seeing human stories and their traces through the mirror of culture, the basis for top-down configuration of adaptive routines in the human neural system and its neurocognitive microstructure of neural assemblies. This theoretical stance invokes new forms of description and explanation based on the connections of engenderment among events[28]—a kind of empiricist structuralism or poststructuralism, as in the principle of enaction, or self-reconfiguration as an internal neurocognitive act that is a fundamental tenet of embodied cognition.[29]

We could even say, to reconnect with the Lady of Shalott, that enacting dynamic discourses of the type that structure human consciousness[30] is a bit like weaving a tapestry according to which we indwell the days of our lives and into which we integrate ourselves.

Integration and the Self

Human stories and the cultures giving rise to them not only frame subjects and their lives but also allow subjects to reflect on that framing—to question it.

This second nature potentiates a narrative metaphysics of human identity and an ethics of self-evaluation according to worth as it is argued about "around here" or in some local socio-cultural context.[31]

The neural account of first and second nature, against which well-being, health, and disease can be understood, therefore confronts us with a lived and storied body that is holistically integrated on the basis of the biological potential that a human being is born with (his or her first nature). Ontogeny then forms us such that psychology is, in a sense, the developmental history of the will to power, as we are trained and shaped by discourse so that we develop a second nature.[32]

The cultural, ontogenetic story and its importance are now starting to resonate with recent findings in the neurobiology of long-term potentiation (LTP), genes, and environment. The idea that qualities acquired from experience can be transmitted to future offspring has long been considered incompatible with the current understanding of genetics, but recent documentation of non-Mendelian transgenerational inheritance makes such a Lamarckian phenomenon more plausible.

> Strikingly, defective LTP and contextual fear conditioning memory normally associated with *ras-grf* knock-out mice are both masked in the offspring of enriched mutant parents. . . . The transgenerational transmission of this effect occurs from the enriched mother to her offspring. . . . If a similar phenomenon occurs in humans, the effectiveness of one's memory during adolescence, particularly in those with defective cell signaling mechanisms that control memory, can be influenced by environmental stimulation experienced by one's mother during her youth.[33]

The expression of a large number of genes changes in response to enrichment training; many of these changes can be linked to neuronal structure, synaptic plasticity, and patterns of information transmission.[34] Therefore our environment is formative in our psychological and—therefore, in the human case—ethical formation. One mechanism by which this quite evidently occurs is seen in the neural pruning that is a prominent part of language acquisition: "At birth, infants already have a remarkable facility for discriminating and categorizing many aspects of human language."[35] Presumably this occurs during the selective strengthening of neuronal connections, as the developing prebirth infant is exposed to auditory signals from the mother, but the process then carries on through "dendritic pruning" and other mechanisms to realize a phonemic and dialect-related structure due to the plasticity of the human nervous system such that ongoing maturation (e.g., dendritic pruning) in higher-order cognitive areas (e.g., the angular gyrus) continues into adolescence.[36]

A Way of Being in the World: Adaptation, Culture, and the Brain

A neo-Aristotelian neurophilosopher does not separate features of cognitive development (or psychology) from features of neural evolution whereby the nervous system connects us with a culture—a shared way of being in the human lifeworld. We find ourselves psychosomatically constituted and reflected by the structures of that world and our holistic indwelling of them such that the human soul (psyche) is a complex set of inscriptions on the body. The body, in Foucault's words, is "the inscribed surface of events (traced by language and dissolved by ideas) . . . a volume in perpetual disintegration,"[37] and the soul is "the present

correlative of a certain technology of power over the body" born out of methods of punishment supervision and constraint,[38] This has profound implications for neuroethics: "If I am now interested in how the subject constitutes itself in an active fashion through practices of self, these practices are nevertheless not something invented by the individual himself. They are models that he finds in his culture and are proposed, suggested, imposed upon him by his culture, his society, and his social group."[39]

Nietzsche was quick to realize what a radical situated view of the human organism as a creature of evolution and the molding effect of human culture on psychology implied about the self and its pathologies:

> Even the determination of what is healthy for your body depends on your goal, your horizon, your energies, your impulses, your errors, and above all on the ideals and phantasms of your soul. Thus there are innumerable healths of the body; and the more we abjure the dogma of the "equality of men," the more must the concept of a normal health, along with a normal fate and the normal course of an illness, be abandoned by medical men.[40]

A more powerful statement of the basis of the crack'd mirror trope and its applicability to mental health in general and indigenous and migrant groups especially could not be found.

Mental Health and a Place in the Order of Things: An Indigenous Example

The following quotation arose in the course of a set of interviews about Maori attitudes to genetic research. The topic was "the warrior gene."[41]

> That came from the way they have been bought up and the standards of living and the whole change of living . . . because this is the pakeha western world now you live this way and no better. . . . I've gotta come to the city to get a job to get your money from the dole; you have to live within so many k's which means you can't go back to your *papakainga* [land occupied by *iwi* or *hapu*] and live with power, you have to come back to the western ways and processes.[42]

The warrior gene was originally conceived of as a neurobiological defect, a personality configuration, based on the discovery of a gene variant leading to higher levels of circulating hormones implicated in fight-and-flight behavior due to a deficiency of MAO activity in primates who were outliers in terms of overt aggression and violence toward conspecifics. "Warrior gene" was a term coined to justify genetic assessment in violent offenders who showed the gene variant more commonly than controls.[43] Variations in levels were also found in ethnic populations, including Chinese and Polynesians, and links were made to the overrepresentation of Polynesians in our prison population. Lo and behold, we had an explanation of violent aggression in terms of the genetic constitution of criminal types and racial tendencies. But it is not that simple.

Imagine, for instance, that I were an indigenous person with certain competencies derived from the skills and knowledge that, in my culture, form a person's birthright. Imagine that my domain of activity is changed by development such

that the traditional ecosystem to some extent vanishes and traditional crops and species proper to that place (as it used to be) no longer flourish. In such a case, I might deploy a traditional understanding of the interrelationships in the ecosystem to try and explore my current maladaptation to the lifeworld that I now inhabit. But my concepts are unlikely to be sufficient for the task I am asking of them, and the language of the colonizer's technology (deeds, titles, survey reports, institutional arrangements, legal requirements, etc.) that has now come along to manipulate that context is not a language with which I am familiar. I am therefore both disempowered ("organically insufficient") and rendered ignorant ("lacking verifications") at a stroke. So I have a choice: to abandon or radically modify the world that my mirror used to show me and the tapestry of neurocognitive structures that represented it or to atrophy as an effective agent and die undernourished by self-affirmation from what is left of the place to which I was attuned and from which I am now alienated as it appears in the new forms of life that the colonizer has brought.

The possibility of alienation means that the elaboration of an *imago*—a conception of oneself—can be an artefact of a tradition that embodies a crack'd mirror, so that it is, metaphorically speaking, "cursed" (by colonization) and now carries the seeds of death. The alienation produced is often fostered by untruths that the intruding world has brought, such as the illusion of individual personal autonomy or the idea that the world is an unlimited resource for us to exploit. Both create a meconnaissance[44] whereby one forgets that one's being is rooted in belonging and is inseparable from its ground of birth and development and that only in dynamic exchange with that context can it nourish and strengthen itself in anticipation of the challenges that it will have to face. My traditional ways of meaning may undermine the colonizer's illusions, but they have no worth in the new context—the new great mirror of the world that shows the world to itself and me within it. Thus the layers of meaning that integrate my being are frayed and unraveling, so my subjective embodiment is itself served by severely attenuated neurocognitive structures that cannot help me indwell with mana and life my indigeneity and identity. I am subject to *ennui* or *anomie*—loss of meaning—and am without purpose (lacking a vital entelechon), perhaps defensive, insecure, resentful, and hostile to the betrayal of my being through brutal and unsympathetic violations of my world. I am denied what is necessary for a good enough mode of being-in-the-world-with-others. The colonizer has engendered losses that touch me at many points of deep significance. Forgiveness, rearticulation of myself, and reevaluation of values does, however, carry with it a certain promise of new relational adaptation.

Trust and antitrust, care and neglect, exploitation and abuse, and self-protection and self-interest all are tainted by marginalization and resentment. Within this ontogeny, maintaining mana and self-respect is problematic, a potent reason why young indigenous males throughout the world demonstrate psychopathologies of all kinds. These problems inevitably reflect levels of integration and dissolution in neurocognitive structure. Health and identity are linked, situated in both a context and its dynamic relationship to a culture: according to the World Health Organization, health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.[45]

Neuroethics can therefore illuminate the elusive link between the destruction of culture and the destruction of the human spirit. Cultural dislocation displaces

traditional knowledges and their neurocognitive maps to impose its own framework, within which a human spirit must forge a sense of life in a historico-politico-geographic situation. The narrowing of the human spirit by widespread destruction of human languages and cultures curtails the modes of being that configure our evolved neuronal assemblies that underpin the flow of life. Developed industrialized societies, driven by economics and functional models of social organization create a hegemony, often supported by "rational" scientific-technological thinking, that can lose sight of the meaning of life and our connectedness to one another so as to lead to an increase in social pathologies such as suicide, crime, family breakdown, and child poverty.[46]

To offset this malignant neuroethical transformation, we could usefully invoke some indigenous concepts from the New Zealand context that have resonances in many indigenous cultures:

1) *Whakawhanaungatanga*: a principle of honest engagement and respectful inclusion whereby truth; open, inclusive discourse; and health are interwoven
2) *Rangitiratanga*: a concept and process whereby one achieves self-sovereignty in a context of meaning and belonging, a network of support and mutual valuation that affirms one as a being of worth

The Lady of Shalott dies because she is a creature of ancient ways of being and cannot live in the real world, but a colonized people, if not totally demoralized and crushed but treated with a modicum of dignity and respect, is not so bloodless and ephemeral a creature. The tragedy of the lost mirror and the tapestry that must inevitably decay is in fact all too evident in any of the social ills of postcolonial society, where anomie, disaffection of youth, a sense of ethnic worthlessness, the loss of structures of identity and self-enactment, and the destruction of traditional and central values that hold in being a culture and its ways of being are all too tragic realities. They are evident in the ethnic imbalance in prison populations, health statistics, mental disorders, and social ills such as alcoholism, gambling, and child abuse. But there is an alternative that is not attainable when we just throw over the old (with its ways of meaning) and embrace the new.

Within every tradition there is a mythical innovator, a trickster who breaks the mold of tradition and ushers in a transgression that brings life and renewal: Prometheus brings fire; Odin tricks the Norns, trades his eye, and gains wisdom; Hanuman is the monkey god, steeped in tradition but somehow able to finesse it in ways that require ingenuity and quickness of response; and Coyote is always disrupting the order of things to bring about an unexpected and traditionally impossible result. The Polynesian traditions are not without their trickster hero. This hero, Maui, is the son of humankind in the age when they still trace their ancestry to Tane, who prized apart the ancient earth mother and sky father to give human beings a place to stand. Maui is not loath to carry on a tradition of transgressing traditional limitations for the sake of people and their well-being. In one myth he and his brothers ambush the sun god, who leaps across the sky so fast that human beings have no light for their daily affairs. The brothers lie in wait, and when the god leaps above the horizon, they catch him in a net and beat him up with clubs and axes. He is so wounded by their attack that he can only limp across the sky, and humankind has the light it needs to live by. A study of Maori attitudes to biomedical technology rediscovered the Maui attitude: people aware of their

traditions and things *tapu*, including organ transplantation and manipulating *whakapapa*, or lineages. Maori understandings of human life value these things and the respect for tradition required, but they are prepared to find a way to deal with *tapu* and protocol when human life is at stake—particularly the life of a child. A different set of compulsions, commitments, and responsibilities come into the equation, and thus, even if ancient ways of meaning cannot be dismissed, a way forward may be found. The crack'd mirror and its neural correlates are no more deterministic than any other features of human biology, society or culture in the face of human worth and ingenuity, but they are also vital to understand if we want to understand what we are doing to each other when our health statistics show the evils of dehumanization,[47] marginalization of the human spirit, and some aspects of colonization. What we are doing is made vivid in the imagined scenarios with which I began this discussion.

Notes

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4. Gillett G. *Subjectivity and Being Somebody: Human Identity and Neuroethics*. St Andrews Series on Philosophy and Public Affairs. Exeter: Imprint Academic; 2008.
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9. See note 7, Insel et al. 2010, at 749.
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12. Thompson E, Varela F. Radical embodiment: Neural dynamics and consciousness. *Trends in Cognitive Science* 2001;5(10):416–25.
13. Gillett G. *The Mind and Its Discontents*, 2nd ed. Oxford: Oxford University Press; 2009.
14. Foucault M. *The Foucault Reader*. Rabinow P, ed. London: Penguin; 1984, at 48.
15. Wittgenstein L. *Tractatus Logico Philosophicus*. Pears D, McGuiness B, trans. London: Routledge & Kegan Paul; 1922, at 5511. (References to this work are usually cited with the paragraph number - #nnnn, as in the work itself.)
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18. Both Wittgenstein's (see note 15, Wittgenstein 1922) and Heidegger's use of *dasein* indicate the fact that human beings-in-the-world as subjects of logic and language present a problem that cannot be captured in language as would an objective state of affairs in which the articulation of experience involved somehow stands apart from our own immersion in and use of it.
19. See note 2, Edelman 1992. Chemero A. *Radical Embodied Cognitive Science*. Cambridge, MA: MIT Press; 2009.
20. Two myths—those involving Coyote from First Nations culture (see Levi-Strauss C. *The Story of Lynx*. Tihanyi C, trans. Chicago: University of Chicago Press; 1995) and those involving Maui and his brothers (from Maori mythology; see Māui [Māori mythology]. In: *Wikipedia*; available at

https://en.wikipedia.org/wiki/Maui_(Maori_mythology)) (last accessed 23 May 2016)—celebrate the tricksters who find unconventional solutions for problems and help their fellow human beings, thereby reiterating in their mythical deeds the story of enlightenment and the opening of opportunities for human development. See also the First Nations myths of Raven (Raven tales. In: *Wikipedia*; available at https://en.wikipedia.org/wiki/Raven_in_Creation [last accessed 22 Mar 1916]) and the Maori myth of Tane and Rangi and Papa.
21. Heidegger, M *Being and Time*. Stambaugh J, trans. New York: SUNY Press; 1953 [1996], at 20.
22. Autopoiesis, or self-configuration and organization, is a principle of natural systems that is poorly dealt with by mechanistic theory and is central to embodied cognition theory, as Kant notes: Kant I. *Critique of Judgment*. Bernard JH, trans. New York: Hafner; 1793 [1953]. For a more recent source, see note 12, Thompson, Varela 2001.
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27. See note 1, Hughlings Jackson 1887, at 35.
28. See note 14, Foucault 1984, at 56.
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31. See note 4, Gillett 2008, esp. chap. 5.
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37. See note 14, Foucault 1984, at 83.
38. See note 14, Foucault 1984, at 176.
39. Foucault M. *Ethics: Essential Works of Foucauklt 1954–1984*, London: Penguin; 1997, at 291.
40. Nietzsche, Nietzsche F. *The Gay Science*. Kaufmann W, trans. New York: Random House; 1887 [1974], at 177.
41. See note 10, Gillett, Tamatea 2012.
42. The quote is from the unpublished transcripts of the research interviews, which can only be used in approved publications such as the present (Bioethics Centre, University of Otago and Te Pumanawa Hauora, Massey University. "Clarification and evaluation of Maori beliefs about genetic biotechnologies." FoRST Project UOOX0227 2003–2009) authority held by the University of Otago).
43. See note 10, Gillett, Tamatea 2012.
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45. Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19–22 June 1946; signed on 22 July 1946 by the representatives of 61 states (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 Apr 1948.
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