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Addressing and Managing Systemic Benefit, Burden and Risk of Emerging Neurotechnology

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As MacDuffie, Ransom and Klein (2022) note, recent advances in neurotechnology have generated—and prompted industry and policy engagement with—concerns about individual (i.e., idiosyncratic) benefits, burdens and risks. However, discourse about the ethical values that undergird concerns about such issues may be of limited benefit and value when attempting to guide the development, use(s), and manifest effects of impactful inventions in a culturally diverse and hegemonically changing world. Idiosyncratic benefits and risks are reciprocally interactive with those on the systemic level.

We argue that broadening the use of neurotechnology could (and likely will) generate considerable reconfiguration and disruption of extant social and economic balances in and among developed, developing, and non-developed nations. These will inevitably include moral and justice inequalities and inequities unless market considerations and precautions are taken in advance. Evaluation of investments, benefits, and risks should be inherent to a balanced process of both commercial cooperation and competition (i.e., “coopetition”); and achieving this balance should be a regulatory priority.

Ethics must be a fundamental factor in realizing and sustaining cooperative competition, and competitive cooperation. This is particularly important where emerging markets and new stake/shareholders are involved. Just as economic issues (such as asymmetries of commutative and distributive justice) continue to foster ethical issues, ethical hazards pose economic risks, even within long-established economic sectors. New technologies and their markets display significant liability, lability, and fragility, so their consumers-qua-recipients are more vulnerable. Broken trust is the harbinger of systemic burden, if not risk, threat, and harm.

Building moral safeguards into the development and applications of neurotechnology is sound wisdom. Hence, establishing ethical standards for market networks and international trade systems is essential to smart policy. We urge the viewpoint that fiscal analysis should be ethically informed, and ethical analyses must address economics, especially given the widening niches of neuroscientific and technological research, and use(s) in a variety of practices – from the biomedical to the bellicose.

Here we invoke Owen Flanagan’s construct of ethics as “human ecology” (Flanagan et al. 2014) which reminds us of broader contexts, those ecological domains which are essential to any authentic approach to neuroethics. In this light, we have posited, and reiterate here, the fundamental and dynamic relationship between a biopsychosocial approach to both economics (Cañadas and Giordano 2010) and (neuro)ethics (Giordano et al. 2016; Giordano 2011). But given what we have termed the reality of neuroethics—that brains are embodied in individuals living in groups that are embedded in a temporospatial environment—then we are driven to ponder wider matters: what biopsychosocial dynamic; which ecology; whence “good”?

To be sure, defined “goods” differ, and increasingly may diverge, as the capabilities and use-propositions of neurotechnology expand in and across geographic, socio-economic, and political ecologies. To wit, we propose a form of Thagard equilibrium (Thagard 2010) that seeks to define discrete contexts of practices; clarify goals and intransigent norms for the practices; and analyze if and how differing precepts and practices achieve these goals – as pursuant toward their adoption in particular circumstances of collective engagement. This method obligates identification of the interactive nature and

effect(s) of both idiosyncratic and systemic benefits, burdens and risks, and grounds such assessment to elucidation of “*cui bono; cui malo?*”

Put simply, public policy should certainly hear from both innovators and their clienteles, but good policy should also be informed by, and responsive to, systemic effects of the uses of neurotechnology on both local and non-local scales. Legal analyses abound, yet a regulatory realm is a poor place for the first hearing of worries and grievances. Why would the economic sphere have to be deaf to articulable concerns while it listens so carefully to the markets themselves? Not all benefits and risks are purely financial.

Even if the economic sphere can only notice what gets represented as fiscal matters, we argue for a “minimax” calculation, akin to the difference principle of John Rawls (Parijs 2002) to translate ethical sense to market sense. Minimum international standards for ethical technology should not be dismissed as weak or ineffective. Rather, perceived impotence is due to the short-sighted way that ethics is often applied retroactively after new markets have widely impacted consumers across many cultures and jurisdictions.

Proactively, we believe that good ethics is a smart preventative measure against the heavy hand of “too tight” regulation after-the-fact, and we also point out how ethical practices are always more trustworthy from the consumer perspective. On an international scale, voluntary market standards play an investment function akin to that “minimax” estimation of maximum long-term benefits for a market from a minimum investment of principles. As Thagard – and we – have noted, this moves away from simplistic ethical relativism; relevant ethical standards lose none of their force at a global scale (Lanzilao et al. 2013).

For example, at both idiosyncratic and systemic levels, we can pose questions of (1) Beneficence: Has the neurotechnology provided measurable and reliable effectiveness and value, in and across contexts of use, when compared to alternatives? (2) Non-maleficence: Is the application of a neurotechnology shown to be sufficiently safe, both in terms of consequences upon the recipients/users, as well as the local and non-local systems of their ecologies? (3) Autonomy: Can the use of this neurotechnology gain users’ understanding, approval, and consent? And, (5) Citizenry: Do these principles maintain both community and cosmopolitan legitimacy and inherent value?

To this latter point, cross-cultural considerations merit both economic and ethical considerations. No impactful neurotechnology could be used in a “neutral manner” by generic consumers apart from their social surroundings and cultural traditions. As Latour has

stated, new scientific discoveries do not merely answer extant questions, but rather pose others that are emergent (Latour 1987). In our work, we pose key questions such as the following. How will people be directly experiencing the application of neurotechnology during the ongoing course of their lives, given their own values and goals, and living within their own social groups? How has the application of neurotechnology been evaluated within each society for responsible innovation, genuine social need, and justice for all members? How will a culture generally assess a neurotechnology’s relationship to customary values, cherished ideals, and established laws? And, how will such evaluations and practices comport with (i.e., both affect, and be affected by) systemic needs, values, economics, hegemonies, and ethics? Therefore, we have proposed a framework to engage (idiosyncratic and systemic) risk analyses and mitigations within more globally relevant contexts (Shook and Giordano 2020).

Moralistic words and good intentions are never enough. We expect innovators, manufacturers, and marketers to wisely invest in ethics as much as technology, as this is good business sense. There is no cause, other than short-sightedness, to treat technological progress at odds with ethical progress. Markets rise and fall on trust, like any other systemic social institution.

Let the public put some trust, for now, in producers and products that promise better lives and livelihoods. But the wisdom embodied in that “minimax principle” cannot be overridden by “iron laws” of economics. If the vulnerable are mistreated or left behind, everyone will eventually notice, and the novel technoscience and its inventors will be faulted. There is no amount of private profit compatible in the long run with public loss. Not all risks are purely financial risks, nor can they be equated with monetary deficits. Must ethics and economics work at cross purposes? They both inherently rely on trusting investments, seeking a more secure future. Keeping joint investments in a single ethical account makes good sense for the public welfare.

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Recognizing a Plurality of Industry Perspectives in the Responsible Innovation of Neurotechnologies

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MacDuffie et al. (2022) rightly argue that ethical principles to guide the development and dissemination of neurotechnologies should be informed by the perspectives of a multitude of stakeholders, including industry. To this end, MacDuffie et al. surveyed the attitudes of industry members toward seven key ethical topics: privacy, responsibility, access, stigma, control, family, and enhancement.

We agree with MacDuffie et al. that industry stakeholders have indispensable perspectives that have been largely overlooked in previous efforts to elucidate ethical principles guiding the development of neurotechnologies. However, we believe that by broadly classifying an “industry member” as anybody who “works with a device that either reads information from the nervous system

... or stimulates the nervous system in some way” (46), MacDuffie et al. have not accounted for the rich diversity within the neurotechnology industry.

In recent years, there has been an increase in direct-to-consumer (DTC) companies selling neural devices marketed for enhancement, such as wearable electroencephalogram (EEG) systems providing neurofeedback (e.g., Emotiv Systems), as well as transcranial direct current stimulation (tDCS) headsets (e.g., Focus) (Ienca et al. 2018). These products can be manufactured from cheap and widely available hardware components (e.g., 9 V batteries, transistors, surface electrodes) and sold to healthy consumers at an affordable price without the need for clinical oversight (Wexler 2016). The commercial imperatives, priorities, governance, and