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## Neuroethics in the Shadow of a Pandemic

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### ABSTRACT

Neuroethics under the BRAIN Initiative has been focused upon both the neuroethical implications of basic advances in neuroscience, as well as the ethics attending the development of ever more powerful tools to both understand the brain and treat dysfunction. It has focused on health and disease in the context of the pre-pandemic status quo, essentially divorced from issues like infectious disease and large-scale disruption of social and economic structures. The questions animating the neuroethics of the BRAIN Initiative, on first glance, seemingly fail to intersect with the primary concerns of a post-Covid world, but careful consideration shows that they of course do. After all, the brain's job is to model and respond to the pressures of our environment, and the environment of virtually all of humanity has changed in a dramatic way, unprecedented since the rise of modern neuroscience. Here we consider ways in which neuroethics work aligned with the BRAIN Initiative can inform our response to the Covid crisis, as well as ways in which the pandemic may shape future work in neuroethics. In particular we focus on neuroethics work on *agency*.

### KEYWORDS

Neuroethics; bioethics; cognition; deep brain stimulation; mental health; neuroscience

Many of our colleagues in the medical and scientific professions have found that their expertise is highly valuable in the Covid-19 pandemic. Virologists, pulmonologists, ER doctors, nurses, statisticians and epidemiologists are all doing essential work. While the virus is occasionally associated with neurological problems, especially from clotting, in general the brain seems largely spared the ravages of SARS-CoV-2. Consequently, many neuroscientists have no doubt felt that their particular expertise leaves them unable to contribute meaningfully to combatting the disease. From this, one might infer that neuroscience and also neuroethics have little to contribute to dealing with the pandemic and its aftermath. We will argue that in the longer term neuroscientific and neuroethical work are highly relevant.

The role of the brain, after all, is to model the world, predict relevant future trajectories, and to respond to the pressures of our environment. Moreover, brains have been shaped in the context of millennia of sociality. Consequently, severe disruptions to either our physical or social environments are bound to have resounding effects in our brains and on mental health. Covid-19 impacts both.

A prominent theme in the current neuroethical projects funded by the BRAIN initiative is the study

of human agency, its brain bases, and the effects on agency of neurological and psychiatric disease, and vice versa. The neuroethical work on agency supported by the BRAIN Initiative is often pursued in the context of neurointerventions, such as Deep Brain Stimulation (DBS) or Brain-Computer Interfaces (BCIs). Although the coronavirus does not directly intervene on our brains, it hugely impacts the world we inhabit and the ways in which we can inhabit it. It impacts our agency. The insights provided by current neuroethical work are relevant to understanding its effects.

There are three principal ways in which the coronavirus crisis has affected people, both those that have been infected and those that haven't. People are experiencing a significant loss of control over the ways in which their life unfolds. They are being kept isolated from family and friends, and from close encounters with other humans more generally, and what socializing there is has been largely transferred from the in-person to the digital. Finally, the usual social structures and routines around which people have organized their lives have been disrupted, disrupting crucial conditions and support for agency.

## LOSS OF CONTROL

Coronavirus itself is an invisible threat, hard to control because unseen and unknown. It is difficult for individuals to do anything about it, and impossible to foresee when the immediate crisis might end. In addition, many people, ill and well, have lost their livelihoods, and have found their days dramatically reshaped by demands of child care and physical confinement. All these changes drastically diminish the sense of control people have over their lives.

Although SARS-CoV-2 does not selectively target demographic groups, it has become clear that the death toll of coronavirus is disproportionately placed on people who are already marginalized in society: people of color, immigrants, and those with low socio-economic status. These populations are those that already have less control over the way in which their lives unfold, and not unrelatedly, worse health outcomes. Bioethicists have already highlighted the moral imperative we have to recognize and ameliorate these inequities.

There is significant work in social and developmental neuroscience regarding the effects of loss of control. The phenomenon of learned helplessness has been studied in rats and extended to people (Maier and Seligman 2016); it is more severe in cases of loss of control (Yao et al. 2019). Those who have gotten sick have often reported experiencing severe anxiety; many of those who are vulnerable or who have loved ones sick or at risk have as well. Loss of control, and the feelings of anxiety it provokes, lead to an upsurge in stress hormones (Maier and Seligman 2016). The extended nature of this crisis has led to protracted periods of stress for many, and chronic stress has been shown to have a constellation of negative effects, including neural changes, depression and suicidal ideation, obesity, and immune suppression (McEwen 2017).

BRAIN Initiative funded projects that focus on agency often ask questions about feelings of control, sense of agency, autonomy and self-determination (Bluhm et al. 2019; Gilbert et al. 2018, 2019; Kubu et al. 2019). In our own data, subjective assessments of control positively correlate with belief in free will, positive assessments of self-efficacy, and positive affect. In contrast, assessments that affirm lack of control correlate with feelings of alienation, passivity, and anxiety. Our interpretation is that feelings of loss of control negatively impact multiple aspects of agency (see also Goering and Klein, 2020).

## SOCIAL INTERACTION

A second major effect of the coronavirus is on socializing. We have evolved as a social species, and our brains are built to interact with other humans. During this pandemic, people who were routinely in contact with tens and maybe hundreds of others in their daily routines are now restricted to personal interactions with only a handful of others, or maybe none.

Studies on people in solitary confinement have underlined the importance of social interaction for mental health. Social distancing and even quarantine do not impose such draconian isolation on us because digital technologies provide some connection to others – but how well do these substitute? Recent work in social cognitive neuroscience suggests that interpersonal interaction and engagement leads to neural synchrony, and that degree of synchronization is correlated with a variety of beneficial cognitive and emotional consequences, including stress reduction, feelings of trust and empathy, affiliative behavior, and improved communication (Hoehl et al. 2020; Redcay and Schilbach 2019). Do the digital platforms that we now rely upon to interact with others preserve the subtle but essential information that our brains normally use in interpersonal relationships, and do they sustain the same benefits? Worries that digital platforms like Zoom and Skype, because of limited spatial and temporal resolution, camera placement, or the glitchiness of digital media, elide or distort many of the normal cues we subconsciously respond to, such as direct eye contact, and subtle movements of eyes and mouth, affecting emotional responses and the degree of neural synchronization (Murphy, 2020). More work needs to be done to probe the degree to which digital platforms offer a true substitute for the salutary effects of in-person interactions, and to understand the discrepancies between the real and virtual signals and whether and how they can be ameliorated. Knowledge of these factors is even more important given predictions that increased virtual interactions for school and work may persist long after the threat from the virus is gone. Understanding the differences between in-person and digital interaction is an area where social neuroscience and neuroethics can fruitfully interact.

Current efforts to combat Covid-19 also affect the quality of our in-person interactions. Wearing masks covers the face in a way that makes it difficult or impossible to transmit many of the social cues normally available, and our avoidance of bodily proximity with one another mimics reactions we normally have to those we dislike and shun. Our deliberate

avoidance of others in preserving social distance may lead to negative affect in both parties despite the neutral or even prosocial underlying motivations.

The effects of social distancing may resound even further than we anticipate. Although agency has traditionally been interpreted in individualistic ways, more recent conceptualizations have emphasized the relational aspects of agency. Theories of relational agency examine how agency itself is constituted through social practices, where an individual's ability to act autonomously is situated within, and often augmented by, their socio-relational contexts (Mackenzie 2014; Zuk and Lázaro-Muñoz 2019). Even determining what it means for an individual to act autonomously, or to be their authentic selves, may be context-dependent and structured by interactions with others and the environment (Baylis 2013; Goering et al. 2017; Mackenzie 2014). As these interactions have been crippled by the virus, so individuals' agency may be impacted as a result of the pandemic.

## ENVIRONMENTAL SCAFFOLDING

Finally, the environmental scaffolding we all use to support our life-ways has been altered, in some ways only temporarily, but in other ways perhaps permanently. Philosophers of cognitive science have been sensitive to the importance of our physical environment in scaffolding cognition and communication (Clark 2001). These physical scaffolds enable us to cope with the demands of daily life. People typically structure their days around institutions that provide needed services, community, and a sense of identity. All are important to defining who we are, what we think and believe, and what we do. The importance of embodied action in constituting our agency has also been an important theme in the last decades. More contentiously, theories of extended cognition hold that cognition itself extends into or is partly constituted by the physical environment, such that changing the physical environment entails a change of mind.

Philosophers have argued that as a matter of social justice, liberal societies should be especially concerned to address vulnerabilities of individuals regarding the development and maintenance of their autonomy (Anderson and Honneth 2005). Although autonomy is traditionally conceptualized in terms of an individual's independence from others, recent theorizing increasingly recognizes the existence and importance of relational aspects of autonomy. Neuroethicists have argued that for individuals with neurological or psychiatric dysfunction, relational and environmental scaffolding

is an essential component of their ability to pursue desired goals throughout their daily lives. In this context, constraints on an individual's actions, like stay-at-home orders or wearing a mask, may be seen as ensuring conditions for safety and health that promote the agency and autonomy of all members of the community, rather than as restricting individual agency.

At least in the short term, our societal scaffolding has been reshaped by the coronavirus: our effective territories have been curtailed; the communities with which we interact in person have been cut off; the institutions that we have relied upon to support us in achieving our goals, be they schools, gyms, medical staff, stores, etc., have been closed. Neuroethicists are accustomed to looking at the way in which social and environmental scaffolding impacts people with neurological and psychiatric dysfunction. But during the coronavirus the physical world in which we move and the interpersonal world in which we form our identities have been effectively altered for all of us. It may be that the neuroethical insights prompted by the study of patients with brain damage may be surprisingly relevant to all of us living through this crisis.

## SUMMARY

Neuroethicists have just begun to respond to the Covid-19 crisis. They have focused so far on important considerations such as how the pandemic impacts those with preexisting neurological dysfunction, and principles for fair distribution of scarce resources (Kim and Grady 2020). But the Covid pandemic has affected all of us, albeit in different ways and to differing extents. How long the overt disruptions to our lives last, and the ways in which their effects will resound in other aspects of our lives remains to be seen, as do the nature of the lasting changes to society. What the longer-lasting disruptions are to our sense of agency, and to our mental health more generally, are questions that are relevant to neuroscientists and neuroethicists alike (see, for example, Chiong, 2020).

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