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Dimensions of Agency: Conceptual and Data-Driven Approaches

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It has long been recognized that neurointerventions raise neuroethical questions regarding their effects on agency. Schönau et al. (2021) discuss four dimensions of agency that have been implicated in the neuroethics literature: responsibility, privacy, authenticity, and finally, trust, which until recently has been largely ignored. They note, importantly, that for each of these dimensions, a subject's perceptions can diverge from more objective metrics. They argue that each dimension is tied to an agential competency, and stress the relational aspects of each. They argue that discussing these dimensions individually fails to account for the role each plays in agency, and for the important influences among them. Their hypothetical case studies illustrate how for various patients, adopting neurotechnologies may improve some aspects of agency while challenging others. The authors provide a synoptic view of the literature, and do a laudable job of discussing conceptual interrelations between the different dimensions they identify.

It must be noted, however, that the resulting map of agency that they describe is less of a map than a bare-bones diagram. In addition, it is one that is primarily derived by conceptual analysis and *a priori* reasoning (although it is also informed by case studies). Here we describe a different approach to the same question, which is largely data-driven rather than *a priori*. Our approach is motivated by prior work which contemplated the wide range of reports about changes in agency due to neurointerventions (Roskies 2015). In this early work, I hypothesized that agency is likely to best be modeled as a multidimensional construct, but one in which we don't antecedently know the nature of the dimensions, or how they are interrelated. I proposed then a method for investigating the nature of this space, a method which we now are putting into practice.

In a project funded by the NIH BRAIN Initiative, we aim to develop a computerized diagnostic to characterize agency in its many facets, and to examine the effects on agency in patients undergoing Deep Brain Stimulation (DBS), by comparing the results of the test given before and after chronic stimulation. This diagnostic, the Agency Assessment Test, or AAT, is a mixture of survey questions and behavioral measures. Like Schönau, we recognize the necessity of capturing both the subjective perspective on dimensions of agency, and a more objective measure where possible. However, in contrast to Schönau et al., we do not posit four identifiable dimensions, but rather aim to cover the space of agency-related issues by asking a broad array of questions that can be answered on a Likert scale. The questions have been informed by a wide spectrum of literature, including clinical literature on psychiatric and neuropsychiatric conditions, the philosophical literature on agency, case

studies in clinical medicine, and papers in neuroethics. Many of our questions respond to the concerns identified in the discussion by Schönau et al. (and indeed, some have been directly inspired by their prior work, especially attention to self-trust and relational aspects of agency). In addition, we incorporate performance measures related to, for example, inhibitory control, temporal discounting, and perceptions of agency/ responsibility, which can provide a different kind of information than the more subjective self-report questions we ask.

Our approach differs importantly from Schönau et al.'s in that we do not begin with a preconceived notion of what the dimensions of agency are. Indeed, despite their commitment to four dimensions, their discussion makes clear that they view privacy and authenticity as categories that are themselves multi-componential (e.g., in *privacy* they identify informational privacy, bodily privacy, decisional privacy). In addition, although we agree with them that responsibility attribution is a function of intentional control, we recognize that there are different kinds and domains of control, and these may not all be equally impacted by a disease or neurointervention. Finally, there are different domains of self-trust, and self-trust is important in agency even in human beings who do not have to contend with neuropsychiatric diseases, BCIs, or other neurointerventional devices.

It is also worth noting that while the discussion of Schönau et al. is closely tied to issues that arise with BCIs, we think that characterizing agency broadly will be useful in understanding the effects of a wide range of both neuropsychiatric diseases and neurointerventions. We anticipate that with sufficient data from the AAT, along with demographic and self-report health measures, machine learning techniques will enable us to discern patterns in the data that correlate with a variety of agency-related mental health issues. The ability to predict the self-reported health measures with the AAT will provide evidence that we are tracking agency-relevant parameters in the broad agency space. If this is borne out, we will be able to analyze the patterns we see that emerge with specific diseases: Are there canonical differences seen in depression, for example, as opposed to anxiety disorder? How do people reporting OCD symptoms differ with respect to a control population? A data-driven approach to agency should allow us to characterize the unique agency signatures of particular kinds of dysfunctions. It should also enable us to discern the effects of neurointerventions as specific and local as BCIs or DBS, but also, likely, those that are more systemic, such as pharmaceutical interventions.

Finally, we will be able to explore the space of agency itself. Although agency is a favorite topic of philosophers, the concept is not well-articulated. Certainly it is, as Schönau et al. claim, at base a capacity for action. But that capacity has many aspects and comes in many flavors—do we know that there are only four, and that they are *responsibility*, *privacy*, *authenticity*, and *trust*? Could there be more—perhaps many more? And what if our *a priori* notions do not cut nature at its joints? In our work, we are reluctant to draw bright lines so early in the game, although we recognize that the choice of questions to ask out of the multitude of questions we could ask already may make implicit commitments about what matters. Nonetheless, as Supreme Court Justice Potter Stewart famously noted with respect to pornography, we may be able to recognize instances relevant to a phenomenon while being unable to define it. Now, with the tools of big data, we may be able to approach

these fundamental conceptual issues in a novel way. Dimensional reduction techniques on a large AAT-derived data set should reveal candidate agency dimensions in a data-driven way, enabling us to group questions in ways that might suggest how to characterize the corresponding agency dimension. Correlations among these posited dimensions can likewise reveal their interrelationships. It will be of intense interest to see whether the dimensions that emerge are well-characterized by or predicted by the agency map the authors put forth, or whether the complexity of agency is better characterized differently, and how. Finally, the results of this kind of analysis may enable us to circle back and to improve upon the equally useful methods of qualitative analyses such as the Q-ACT that the authors describe. Thus, we hope that multiple ways of attacking this fundamental problem in philosophy and medicine will prove to be synergistic and constructive.

REFERENCES

- Roskies AL 2015. Agency and intervention. *Philosophical Transactions of the Royal Society B: Biological Sciences* 370 (1677):20140215. doi: 10.1098/rstb.2014.0215.
- Schönau A, Dasgupta I, Brown T, Versalovic E, Klein E, and Goering S. 2021. Mapping the dimensions of agency. *AJOB Neuroscience* 12 (2):172–186. [PubMed: 33764258]