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about the mind more generally (e.g., the effect of certain mind–body frameworks on identity and well-being).

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Shifting One's Worldview to Neurocentrism May Be Troubling, But the Evidence That This Is the Cause of Maladaptation in DBS Patients Is Lacking

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Mecacci and Haselager (2014) raise the spectre of DBS causing maladaptation as a result of the conceptual shift from a dualist to a neurocentric worldview. While we agree that being confronted by a neurocentric perspective can indeed be troubling for many, we offer two lines of reasoning that suggest such concerns are misplaced in the case of DBS.

The first assertion is based upon the lived experience of a patient with a chronic neurological disease. If one considers an individual faced with, for example, chronic Parkinson's disease (PD; the most common reason for DBS), the patient likely will have had years of experience with the symptoms of the disease that include not only motor dysfunction but also neuropsychiatric deficits as well. The changes that the disease brings on will have been attributed to changes in brain function, and the realization

that such changes alter key features of cognitive function are likely to be neuroessentializing in and of themselves. If the patient (and families) are neurocentric *naïfs*, it is not unreasonable to expect that their worldview will at least be shifted toward soft neuroessentialism; if they are already soft neuroessentialists, they may even move toward hard neuroessentialism (Reiner 2011). Thus, it is not unreasonable to expect that by the time they are confronted with the prospect of DBS, they will already be in a position that is at least somewhat accepting of a neurocentric worldview.

Having said that, it is germane to note that the effect of DBS is immediate: The moment the stimulator is turned on, behavior changes. In such a scenario, people may very well perceive that they are no longer the person they were only moments ago. Such a sudden change may be

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disorienting insofar as it represents a particularly powerful means of demonstrating the explanatory power of the neurocentric worldview, and this is precisely the sort of maladaptation that Mecacci and Haselager envision. One could argue that if the patients were already at least partly neuroessentialized as a result of the lived experience of having a chronic neurological disease, they may be better able to cope better with their new reality. In the absence of evidence to the contrary, we cannot rule out that the immediacy of the change with DBS will result in maladaptation.

Yet a review of the relevant literature shows little evidence in favor of the view that patients are experiencing maladaptations as result of a conceptual shift in their worldview, and this represents our second line of reasoning for questioning Mecacci and Haselager's conclusions. Indeed, it is reasonable to consider that the psychosocial maladaptations that occur in DBS patients treated for diseases such as PD or OCD may result from causes at one or more of the four following levels:

1. The conceptual shift from a dualist perspective originally held by the patient to the neurocentric perspective needed to explain the DBS treatment (Mecacci and Haselager 2014).
2. Awareness of the stimulator's presence inducing changes in body image (Schüpbach et al., 2006).
3. Resolution of symptoms of a neurological disease changing some aspects of cognition, behavior, and personal identity (Gilbert 2012).
4. Resolution of any chronic disease changing both the patient's personal narrative and identity as well as the patient's family relationships (Bladin 1992; Genardini et al. 2008; Schüpbach et al. 2006; Seaburn and Erba 2003).

Using the principle of Ockham's razor, we would argue that the first place to seek the cause of any such maladaptations is the one with the fewest assumptions. The changes effected by resolution of a chronic disease (4 in the list), and the changes in personality effected by resolution of a chronic neurological disease (3 in the list) both require far fewer assumptions than item 2 or item 1.

Of the maladaptations reported by the authors, while 66% were characterized as "not feeling myself," an essentially equal proportion, 50–71%, were identified as "familial problems." Since these two categories add up to well over 100%, there has to be significant overlap; that is, many patients reporting "not feeling myself" must also be reporting familial problems. Such an overlap would be consistent with the personal identity theories of both Shoda, Tiernan, and Mischel (2002) and Baylis (2011), by which personal identity is dynamically constructed "through personal (intimate) relationships and public (impersonal social and political) interactions." Given the substantial effects on family relations as a result of both the onset and the resolution of any chronic disease, but especially one like PD or obsessive-compulsive disorder (OCD), it is little wonder that patients would say "I no

longer feel like myself" because that web of intimate relationships that defines their personal identity would have dramatically shifted. Because such personal identity theories are consistent with all but the most extreme versions of either dualist or neurocentric theories of mind and body, there is no need to invoke a dualist–neurocentrist shift underlying the personal identity theory. Explanation 4 can stand by itself as a cause of maladaptation.

We draw several conclusions from this analysis:

1. In the absence of empirical data demonstrating maladaptation directly resulting from the shift to a neurocentric worldview, we suggest that given the overwhelming range of difficulties faced by patients with chronic neurological disease, concern about a possible dualist/neurocentric dichotomy resulting from DBS is of very low priority.
2. Patients recovering from chronic neurological disease face daunting challenges as they try to reintegrate themselves and restructure their own and their families' lives. These challenges are independent of the treatment modality, although DBS is particularly challenging because of its immediate effect. The informed consent process should make these challenges clear to patients and their families. Physicians and counselors should be trained and organized to assist patients and their families through the difficult times that follow treatment.
3. Mecacci and Haselager note that an "even more important step has to be taken at a societal and cultural level, where adopting and spreading a scientifically informed and encompassing (i.e., EEC) vision of the mind/body relationship might be crucial not just for the acceptance and appropriate interpretation of DBS therapy, but also for many more neurotechnologies increasingly used in clinical environments" (37). In other words, the really critical concern is not whether a few DBS patients may have been inadvertently pushed into a neurocentric worldview. The critical concern is that the public at large has to come to some broad understanding of the brain as central to self, or we will be faced with an increasing chasm between the capability of modern neural medicine and the ability of patients to deal with the inevitable consequences to their lives, identities, and family relationships.

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Stimulating the Self and Conceptual Frameworks: Brain Matters, and World-Views Are Deeply Rooted

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In their article “Stimulating the Self: The Influence of Conceptual Frameworks on Reactions to Deep Brain Stimulation,” Mecacci and Haselager (2014) raise an important issue and propose some solutions that are certainly innovative but somewhat problematic. In any case, they offer an original perspective to the discussion with two issues worthy of reflection, regardless of whether or not their way of addressing them seems convincing. They suggest that the adverse psychological implications behind a relevant number of postsurgical implantations of deep brain stimulation (DBS) could be partially attributed to a psychological reaction to the new situation. That is, the maladaptations could be caused by the endorsement of a certain conceptual framework related to the mind–brain relationship that influences the patient’s self-interpretation. Consequently, a position different from both dualism and brain reductionism as to the mind–brain relationship might help the patient overcome such maladaptations.

THE BOUNDARIES OF THE PSYCHOLOGICAL DOMAIN

If we take seriously the effectiveness of neurostimulation, we cannot ignore that it affects not only automatic or unconscious behaviors, as it were (such as Parkinson’s tremor or obsessive compulsive disorders), but also decision making, which is believed to be one of the core features of personal identity (Cavanagh et al. 2011; Oyama et al. 2011). In this sense, it is difficult to argue that there is a clear boundary between the stimulation itself and the reactive response to a new “psychological” situation. The

authors admit that “we do not know whether those consequences are due to some alteration of the brain functionality caused by the stimulation, or whether—and to what extent—there is a relevant psychological/cultural component in the phenomenon” (Mecacci and Haselager 2014, 31). But they think that it’s the case that psychological elements play an important role in bringing about the postoperative maladaptations.

The relevant implicit rationale here is twofold: First, one can intervene on the brain to treat some neurological disorders and psychiatric disorders with DBS. Therefore, it is believed that the latter’s cause is physiological, in particular linked to a stimulation of the subthalamic nucleus or the nucleus accumbens. Second, it is believed that there is a psychological cause of different origin for the maladaptive behavioral manifestations subsequent to the implantation of DBS. Leaving aside the fact that one should explain more precisely what is meant by “psychological” when speaking of psychiatric conditions treated by manipulating brain functions, the main point seems to be the following. The maladaptations shown by the patients are in some way similar to delusional conditions (“I feel like a robot”; “I don’t feel like myself anymore”; “I haven’t found myself again after the operation”, as declared by the patients quoted in the article). In particular, these feelings may seem similar to the delusion of alien control due to impairments of the brain motor system (Frith, Blakemore, and Wolpert 2000). And it is believed that monothematic delusions of this kind are mainly caused by disorders of the brain, while the different and often incompatible explanations of the delusions at the cognitive level have not been

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