Measuring Character Change in Neuroscience

Markus Christen,
University of Zurich & University of Notre Dame
Table of Contents

– **Case report**: The complexity of character (change) after intervening in the brain.

– **Historical note**: Establishing a link between character and the brain marks the emergence of modern neuroscience.

– **Measuring “character”**: The experiences made in deep brain stimulation for movement disorders.

– **The ethics of character (change)**: The need to allow understanding of the own character in neurotherapeutic settings.
Case report
**Fig. 1** Representative painting by the patient before deep brain stimulation showing the old pavilion of the Department of Neurology in Kiel (built in 1901), the working place of Hans-Georg Creutzfeldt 1938–1953
Fig. 2  Painting by the patient after implantation of electrodes for deep brain stimulation displayed on the wardround. He labelled this painting 'the search for perfection'. Note the comments written at the bottom of the painting which are logorrhoeic and optimistic.
Historical note
Friedrich Eduard Bilz (1842–1922): Das neue Naturheilverfahren
An exemplary case: Leonore Welt:

*Ueber Charakterveränderungen des Menschen infolge von Läsionen des Stirnhirns.*

*Aus der medicinischen Klinik in Zürich.*

*Von*

*Leonore Welt,*

*prakt. Arzt in Genf.*

Image: Deutscher Lyzeum-Club, 1929 (Brinkschulte 1993)
As it has been shown before, lesions of this part of the brain [prefrontal cortex] do not always lead to character changes; actually, as the small number of observations demonstrate, they lead very rarely to such changes.
With respect to the diagnostic values of character changes we may conclude that, if such changes are present, we can expect a lesion of the ventromedial prefrontal cortex; but one must be aware of the fact that one cannot invert this conclusion, i.e. one cannot say that there are no vmPFC lesions present when we do not observe a character change.
There are two problems of current work with lesion patients: First, recent studies using patients with frontal lobe lesions in moral research promote a neurodeterminism of human moral behavior, which is insufficiently supported by the current state of knowledge. Second, there is a shift in research away from clinical issues towards basic research on human morality (Christen & Regard 2012).
Non-intended effects of DBS: was there a lack of sensibility among researchers/clinicians?  

No!

Christen & Müller 2011
Non-intended effects of DBS: was there *not enough sensibility* among researchers/clinicians?

No!

![Bar chart showing the appearance of groups in studies from 1993 to 2009.](chart.png)

*Christen et al. 2012*
Non-intended effects of DBS: Did the researchers/clinicians take into account the complexity of the phenomenon “character”? **Maybe not!**

![Graphs](image)

Figure 3. (a) Number of tests per issue class (B: behavioral, C: cognitive, D: depression and other mood issues, L: language, Q: quality of life). (b) Number of different tests (first bar in each group), number of accumulated test executions (middle bar), and total number of patients tested (left bar, right scale) with methods of either class I (test scores generated by evaluator), II (self-assessment of patient), or III (test scores emerge from persons affiliated to the patient).

Christen et al. 2012
The ethics of character change
The landscape of “ethical difficulty”

Figure 2. Classification of side effects of STN DBS along the dimensions “measurement complexity” and “relative life impact”; highlighted are four clusters of side effects.

Müller & Christen 2011
Some ethical recommendations

Table 1. Ethical requirements depending on the predictability and the evaluation of the side effects of a therapy

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Predictability of side effects (SE) of a therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The SE of the therapy clearly outweigh its therapeutic effects.</td>
<td>Predictable</td>
</tr>
<tr>
<td>There are conflicting evaluations of the SE by different stakeholders.</td>
<td>Do not begin/stop the therapy.</td>
</tr>
<tr>
<td></td>
<td>Define the authority to decide about the usage of the therapy.</td>
</tr>
<tr>
<td>The therapeutic effects clearly outbalance the SE.</td>
<td>Define a procedure to take individual variability of the impact of the SE into account.</td>
</tr>
<tr>
<td></td>
<td>Not predictable</td>
</tr>
<tr>
<td></td>
<td>Ensure sensibility for novel SE.</td>
</tr>
<tr>
<td></td>
<td>Ensure involvement of different stakeholder’s perspectives during the development of the therapy.</td>
</tr>
<tr>
<td></td>
<td>Define a procedure to decide whether a novel SE is classified as unproblematic or not.</td>
</tr>
</tbody>
</table>

Christen et al. 2012

Enhance the ability of the “patient-system” to get an own understanding of character and of character change in order to allow to reflect upon such effects (as far as this is possible).