Beyond Phineas Gage: Analyzing Morality in Frontal Lesion Patients

P. Molina-Luna, M. Christen, P. Brugger, M. Regard

University of Zurich[UZH]

Brain Research Institute, University of Zurich
Insitute of Biomedical Ethics, University of Zurich
Department of Neurology, University Hospital Zurich
Office of Behavioral Neurology and Neuropsychology Zurich

Introduction

Neuroscientific research on human moral behavior has been historically based on studies with frontal lesion patients. Although there is increasing interest in imaging studies on healthy subjects, the use of frontal lesion patients remains important in experimental studies. We performed a comprehensive literature search of papers presenting cases and/or experimental studies on changes in moral and social behavior following frontal lesions (205 papers reviewed until May 2013). This search indicated that cases in which rare lesions result in alterations of moral behavior are uncommon, and that the prevalence of moral behavior alterations following frontal lesions is unclear (Christen et al. 2012, included 169 papers until 2010).
Nevertheless, current literature emphasizes clear-cut examples – such as the classical case of Phineas Gage – claiming aberrations in moral behavior despite relatively intact cognition. This leads us to conjecture that lesion patients' changes in moral behavior have been presented in a simplified way, tilting the balance towards a neurodeterministic view of human moral behavior. In the context of frontal lesions, this gives rise to questions regarding how we perceive human morality. Importantly, it also leads us to examine how – in the context of moral behavior studies – frontal lesion patients are regarded and treated in clinical settings.

Methods

We designed an anonymized survey directed to researchers identified in our literature search.
First/last authors and authors with more than one publication in the field were included.

The survey assesses two key points:
- Using case vignettes, the researchers' subjective concept of morality.
- Using this concept, the extent to which moral aberrations in frontal lesion patients are expected.

The survey is divided in the following topics:
- Basic demographics
- Professional role and duties
- Experience with lesion patients
- Case vignettes
- Brain lesions and moral/social behavior
- Opinions

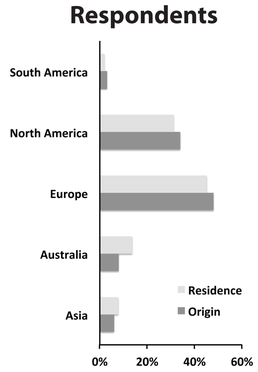
Basic Demographics

Author information

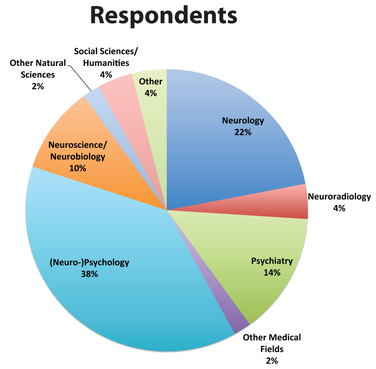
From the total number of authors identified (Total Authors), first/last authors and authors with more than one publication were selected (Selected Authors). Only a subset of authors could be found online (Found Authors).

Total Authors	704
Selected Authors	250
Found Authors	113
Respondents	50
Response Rate	44%
Female Authors	20
Male Authors	30
Average agae (years ± std)	45.5 ± 11.4

Origin of Respondents



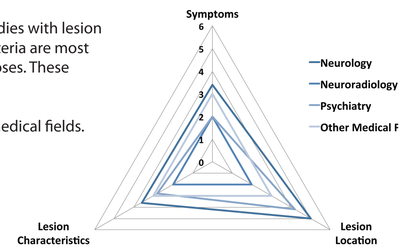
Professional Training of Respondents

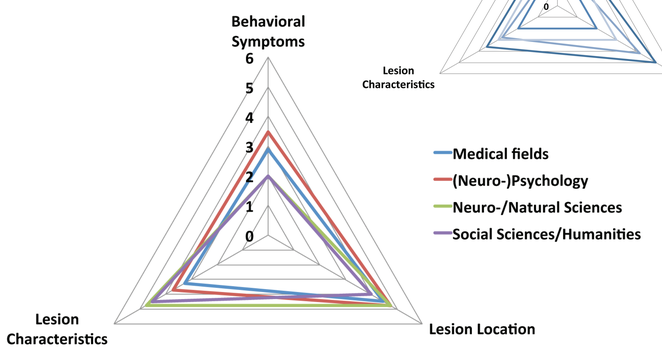


Experience with Lesion Patients

Patient selection for research

Authors were chosen due to their experience in studies with lesion patients. Through a 1-6 scale we assessed which criteria are most relevant when choosing patients for research purposes. These include: behavioral symptoms, lesion location and functional/structural lesion characteristics.
The inlaid figure shows the results for the specific medical fields.

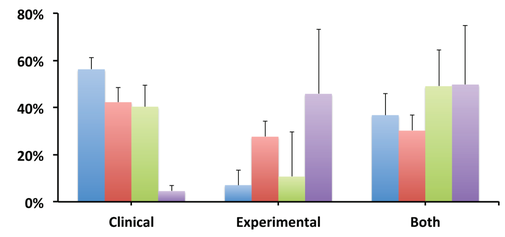


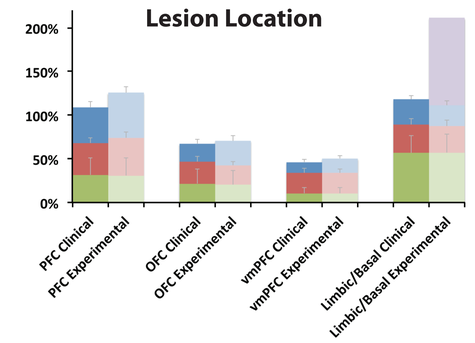


Authors were further asked to estimate the percentage of patients they have seen for clinical or experimental purposes with lesions in the following area: Prefrontal Cortex (PFC), Orbitofrontal Cortex (OFC), Ventromedial Prefrontal Cortex (vmPFC), Limbic/Basal structures.

Work with Lesion Patients

To assess whether the experience with lesions patient is of clinical or experimental nature, authors were asked to estimate the amount of patients they have personally encountered for clinical, experimental or both purposes. Authors are clustered, as previously, according to their professional training.





Case Vignettes

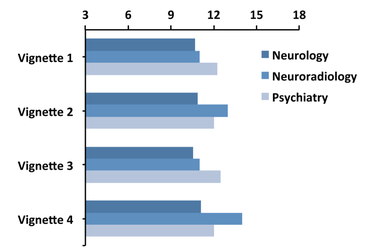
Case vignettes were designed based on behavior observed in patients. Each vignette depicts a situation in which a patient presents dubious or unacceptable moral/social behavior after a brain lesion. Authors were asked to rate the (a)morality of the behavior along three dimensions (society, community, personal) along a 1-6 scale. Values along the three dimensions were summed, resulting in a scale from 3 to 18. Higher values indicate behaviors that are regarded as socially unacceptable or morally aberrant.

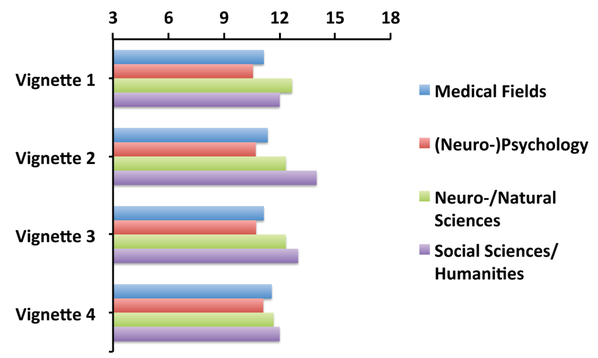
Vignette 1: Ruptured aneurysm results in voyeurism at work.

Vignette 2: Embezzlement in a supermarket chain after concussion.

Vignette 3: Destruction of property and endangerment of strangers after tumor.

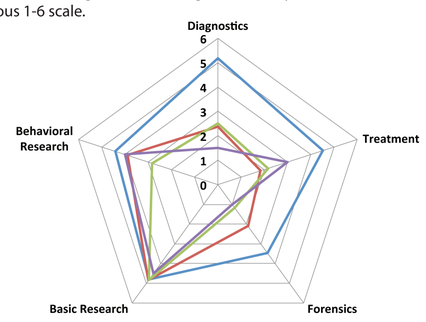
Vignette 4: Exaggeration and embellishment of gunshot accident.



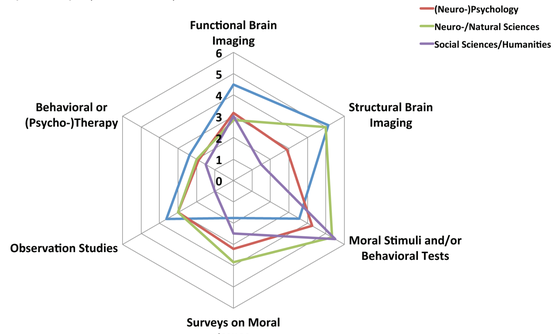


Professional Information

To assess their current professional role, authors were requested to answer on a scale from 1 to 6 which duties best describe their daily routine. Higher values indicate a better representation of daily routine. For further analysis, authors were separated according to their training. Additionally, the methods and techniques employed routinely were assessed on an analgous 1-6 scale.



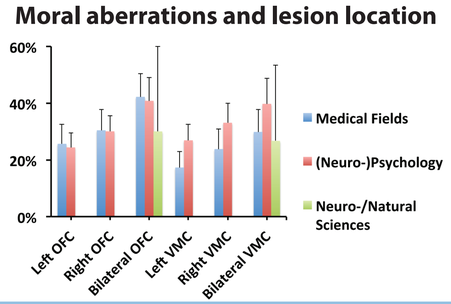
Professional Role

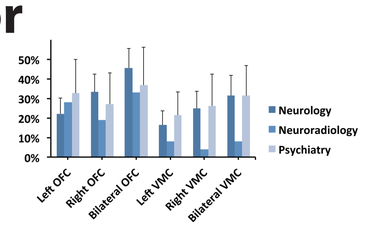


Methods & Techniques

Moral/Social Behavior

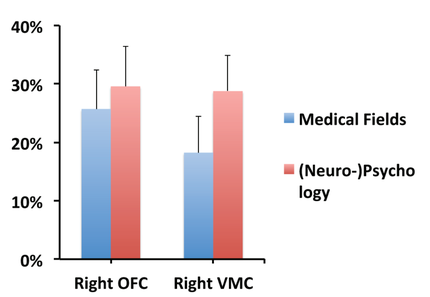
Moral aberrations and lesion location





Authors were asked to assess, according to experience, the percentage of patients that present moral aberrations after lesions of the left/right OFC or left/right vmPFC.
They were also asked to estimate the prevalence of right OFC and right vmPFC lesions.

Right OFC and VMC Lesions



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Christen M & Regard M. Der "unmoralische Patient": Analyse der Nutzung hirnverletzter Menschen in derl Moralforschung. Neurophilosophie und Neuroethik, 2012.

This poster results from a research project started during the
2013 Zürich Spring and Summer School In Neuroethics