from Oliver Sacks, *An anthropologist on Mars*, 1995.

The Last Hippie

Such a long, long time to be gone . . .
and a short time to be there
—Robert Hunter
"Box of Rain"

[...]

One of the most striking peculiarities of the human brain is the great development of the frontal lobes—they are much less developed in other primates and hardly evident at all in other mammals. They are the part of the brain that grows and develops most after birth (and their development is not complete until about the age of seven). But our ideas about the function of the frontal lobes, and the role they play, have had a tortuous and ambiguous history and are still far from clear. These uncertainties are well exemplified by the famous case of Phineas Gage, and the interpretations and misinterpretations, from 1848 to the present, of his case. Gage was the very capable foreman of a gang of workers constructing a rail-

road line near Burlington, Vermont, when a bizarre accident befell him in September 1848. He was setting an explosive charge, using a tamping iron (a crowbarlike instrument weighing thirteen pounds and more than a yard long), when the charge went off prematurely, blowing the tamping iron straight through his head. Though he was knocked down, incredibly he was not killed but only stunned for a moment. He was able to get up and take a cart into town. There he appeared perfectly rational and calm and alert and greeted the local doctor by saying, "Doctor, here is business enough for you."

Soon after his injury, Gage developed a frontal lobe abscess and fever, but this resolved within a few weeks, and by the beginning of 1849 he was called "completely recovered." That he had survived at all was seen as a medical miracle, and that he was seemingly unchanged after sustaining huge damage to the frontal lobes of the brain seemed to support the idea that these were either functionless or had no functions that could not be performed equally by the remaining, undamaged portions of the brain. Where phrenologists, earlier in the century, had seen every part of the brain surface as the "seat" of a particular intellectual or moral faculty, a reaction to this had set in during the 1830s and 1840s, to such an extent that the brain was sometimes seen as being as undifferentiated as the liver. Indeed, the great physiologist Flourens had said, "The brain secretes thought as the liver secretes bile." The apparent absence of any change in Gage's behavior seemed to support this notion.

Such was the influence of this doctrine that, despite clear evidence from other sources of a radical change in Gage's "character" within weeks of the accident, it was only twenty years later that the physician who had studied him most closely, John Martyn Harlow (now, apparently, moved by the new doctrines of "higher" and "lower" levels in the nervous system, the higher inhibiting or constraining the lower) provided a vivid description of all that he had ignored, or at least not mentioned, in 1848:

> [Gage is] fitful, irreverent, indulging at times in the grossest profanity (which was not previously his custom), manifesting but little deference for his fellows, impatient of restraint or advice when it conflicts with his desires, at times pertinaciously obstinate, yet capricious and vacillating, devising many plans of future operations, which are no sooner arranged than they are abandoned in turn for others appearing more feasible. A child in his intellectual capacity and manifestations, he has the animal passions of a strong man. Previous to his injury, although untrained in the schools, he possessed a well-balanced mind, and was looked upon by those who knew him as a shrewd, smart businessman, very energetic and persistent in executing all his plans of operation. In this regard his mind was radically changed, so decidedly that his friends and acquaintances said he was "no longer Gage."

It seemed that a sort of "disinhibition" had occurred with the frontal lobe injury, releasing something animal-like or childlike, so that Gage now became a slave of his immediate whims and impulses, of what was immediately around him, without the deliberation, the consideration of past and future, that had marked him in the past, or his previous concern for others and the consequences of his actions.[9]

But excitement, release, disinhibition, are not the only possible effects of frontal lobe damage. David Ferrier (whose Gulstonian Lectures of 1879 introduced the Gage case to a worldwide medical community) observed a different sort of syndrome in 1876, when he removed the frontal lobes of monkeys:

> Notwithstanding this apparent absence of physiological symptoms, I could perceive a very decided alteration in

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[9] Robert Louis Stevenson wrote *The Strange Case of Dr. Jekyll and Mr. Hyde* in 1886. It is not known whether he knew of the Gage case, though this had become common knowledge since the early 1880s—but he was assuredly moved by the Jacksonian doctrine of higher and lower levels in the brain, the notion that it was only our "higher" (and perhaps fragile) intellectual centers that held back the animal propensities of the "lower."

> the animal's character and behaviour. . . . Instead of, as before, being actively interested in their surroundings, and curiously prying into all that came within the field of their observation, they remained apathetic, or dull, or dozed off to sleep, responding only to the sensations or impressions of the moment, or varying their listlessness with restless and purposeless wanderings to and fro. While not actually deprived of intelligence, they had lost, to all appearance, the faculty of attentive and intelligent observation.

In the 1880s it became apparent that tumors of the frontal lobes could produce symptoms of many sorts: sometimes listlessness, hebetude, slowness of mental activity, sometimes a definite change in character and loss of self-control—sometimes even (according to Gowers) "chronic insanity." The first operation for a frontal lobe tumor was performed in 1884, and the first frontal lobe operation for purely psychiatric symptoms was done in 1888. The rationale here was that in these (probably schizophrenic) patients, the obsessions, the hallucinations, the delusional excitements, were due to overactivity, or pathological activity, in the frontal lobes.

There was to be no repetition of such forays for forty-five years, until the 1930s, when the Portuguese neurologist Egas Moniz devised the operation he called "prefrontal leucotomy" and immediately applied this to twenty patients, some with anxiety and depression, some with chronic schizophrenia. The results he claimed aroused huge interest when his monograph was published in 1936, and his lack of rigor, his recklessness, and perhaps dishonesty were all overlooked in the flush of therapeutic enthusiasm. Moniz's work led to an explosion of "psychosurgery" (the term he had coined) all over the world—Brazil, Cuba, Romania, Great Britain, and especially Italy—but its greatest resonance was to be in the United States, where the neurologist Walter Freeman invented a horrible new form of surgical approach that he called transorbital lobotomy. He described the procedure as follows:

> This consists of knocking them out with a shock and while they are under the "anesthetic" thrusting an ice pick up between the eyeball and the eyelid through the roof of the orbit actually into the frontal lobe of the brain and making the lateral cut by swinging the thing from side to side. I have done two patients on both sides and another on one side without running into any complications, except a very black eye in one case. There may be trouble later on but it seemed fairly easy, although definitely a disagreeable thing to watch. It remains to be seen how these cases hold up, but so far they have shown considerable relief of their symptoms, and only some of the minor behavior difficulties that follow lobotomy. They can even get up and go home within an hour or so.

The ease of doing psychosurgery as an office procedure, with an ice pick, aroused not consternation and horror, as it should have, but emulation. More than ten thousand operations had been done in the United States by 1949, and a further ten thousand in the two years that followed. Moniz was widely acclaimed as a "savior" and received the Nobel Prize in 1951—the climax, in Macdonald Critchley's words, of "this chronicle of shame."

What was achieved, of course, was never "cure," but a docile state, a state of passivity, as far (or farther) from "health" than the original active symptoms, and (unlike these) with no possibility of resolution or reversal. Robert Lowell, in "Memories of West Street and Lepke," writes of the lobotomized Lepke:

> Flabby, bald, lobotomized,
> he drifted in a sheepish calm,
> where no agonizing reappraisal
> jarred his concentration on the electric chair—
> hanging like an oasis in his air
> of lost connections. . . .

When I worked at a state psychiatric hospital between 1966 and 1990, I saw dozens of these pathetic lobotomized patients,

many far more damaged even than Lepke, some psychically dead, murdered, by their "cure."[10]

Whether or not there are in the frontal lobes a mass of pathological circuits causing the torments of mental illness—the simplistic notion first put forward in the 1880s, and embraced by Moniz—there is certainly a downside to their great and positive powers. The weight of consciousness and conscience and conscientiousness itself, the weight of duty, obligation, responsibility, can press on us sometimes with unbearable force, so that we long for a release from its crushing inhibitions, from sanity and sobriety. We long for a holiday from our frontal lobes, a Dionysiac fiesta of sense and impulse. That this is a need of our constrained, civilized, hyperfrontal nature has been recognized in every time and culture. All of us need to take little holidays from our frontal lobes—the tragedy is when, through grave illness or injury, there is no return from the holiday, as with Phineas Gage, or with Greg.[11]

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[10] The huge scandal of leucotomy and lobotomy came to an end in the early fifties, not because of any medical reservation or revulsion, but because a new tool—tranquillizers—had now become available, which purported (as had psychosurgery itself) to be wholly therapeutic and without adverse effects. Whether there is that much difference, neurologically or ethically, between psychosurgery and tranquillizers is an uncomfortable question that has never been really faced. Certainly the tranquillizers, if given in massive doses, may, like surgery, induce "tranquillity," may still the hallucinations and delusions of the psychotic, but the stillness they induce may be like the stillness of death—and, by a cruel paradox, deprive patients of the natural resolution that may sometimes occur with psychoses and instead immure them in a lifelong, drug-caused illness.

[11] Though the medical literature of frontal lobe syndromes starts with the case of Phineas Gage, there are earlier descriptions of altered mental states not identifiable at the time—which we can now, in retrospect, see as frontal lobe syndromes.

more on Phineas Gage story at :

1. Sam Kean: Phineas Gage, Neuroscience's Most Famous Patient, Slate.com, May 2014
   http://www.slate.com/articles/health_and_science/science/2014/05/phineas_gage_neuroscience_case_true_story_of_famous_frontal_lobe_patient.html
2. Antonio Damasio, Descartes' Error, 1994. p.3-33 (Chapters 1 and 2)