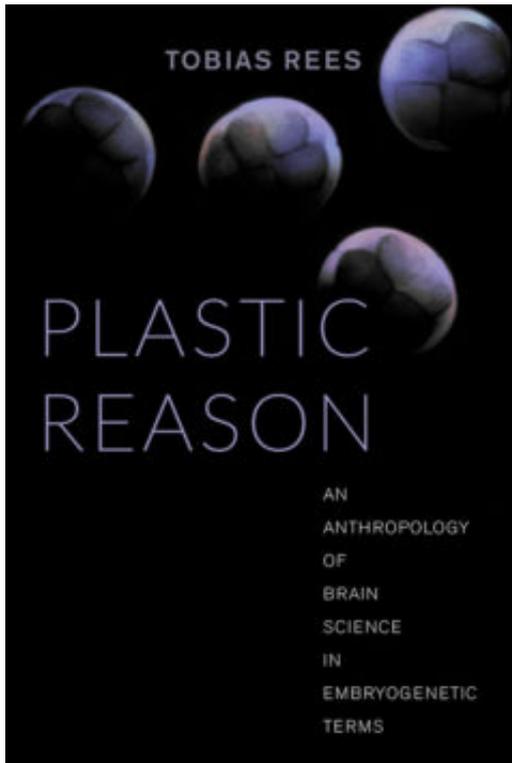


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Tobias Rees's *Plastic Reason*: An Anthropology of Brain Science in Embryogenetic Terms

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[Plastic Reason: An Anthropology of Brain Science in Embryogenetic Terms](#)

by [Tobias Rees](#)

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In the prefatory pages of *Plastic Reason*, Tobias Rees explains that his ethnographic study of the lab of French biologist Alain Prochiantz — one of the earliest proponents, technicians, and conceptual architects of neuronal plasticity — is ultimately “about the emergence of possibilities where before there were none” (xiii). If we are to appreciate the conceptual transformation in neuronal research that took place in France and specifically in Prochiantz’s lab in the late 1990s, Rees insists that we must view this development not only as the formation of a new style of

neuroscientific thinking but also as the emergence of an entirely new object. Rees writes, “Within the roughly one hundred years I cover here (from the 1890s to the 1990s), what the brain is changed many times over. [...] Conceptually speaking, each one of these changes mutated what the brain is, and each mutation changed, however slightly, the analytic focus of the neuronal sciences” (89). *Plastic Reason*, then, has a double focus: on the one hand to narrate and rationalize the emergence of Prochiantz’s specific doctrine of neuronal plasticity and, on the other hand, to take stock of the very object that emerged, “the enactment of a brain that is neither a fixed chemical machine nor an already wired computer, but instead a living organ characterized by ceaseless cellular becoming” (195).

Central for Rees is the claim that Prochiantz’s specific conception of plasticity — namely, neuro-*cellular* embryogenesis that continues into adulthood — was radically different from, and effectively sought to dethrone, the preceding dominant view of plasticity defined by synaptic rewiring. This is the point that remains central for Rees: the most basic material assumptions of the brain were being challenged; plasticity did not simply refer to (synaptic) variability against the backdrop of (neuronal) fixity but, as far as Prochiantz was concerned, brain matter was itself an inexhaustible transformation. “For Alain [Prochiantz] and his colleagues ... neuronal growth, whether of new neurons or of the fine structure, occurred throughout life. [...] [T]he brain was never actually fully developed” (215). Rees argues that for Prochiantz the brain is not merely a machine that reconfigures itself but an always-developing organ, a process of constant self-differentiation.

Plastic Reason is organized into chapters that offer a variety of entry points into Prochiantz’s lab. Together they comprise an ethnographic assemblage that collectively illuminates the combined historical, sociological, theoretical, experimental, and ethical stakes of the research. While each chapter attempts to reckon on its own with the novelty of this emerging account of the brain, they are all also focalized around a fairly specific technical inquiry: can homeoproteins in the brain continue to transfer between cells, thereby maintaining an embryogenetic function, at a neuro-cellular level, into adulthood? To ask whether cellular development continues into adulthood is effectively to wonder whether the human being is always in a state of perpetual neuronal development, never fully nor finally formed.

Yet what Rees recounts is less the technical struggle in experimentally confirming homeoprotein transfer but rather the very difficulty in proposing the possibility of continued developmental activity in adult brains, precisely because this hypothesis flew in the face of the dominant rationality of institutional brain research. Prochiantz’s plasticity “undermined the old

comprehension of what the brain ‘is’ (an immutable structure) and how one has to study it (as a neurochemical machine with the synapse as the only dynamic element)” (50). So *Plastic Reason* is as much a study about the emergence of a new brain-object as it is an examination of French academia and the forces that arbitrate the boundaries between marginal knowledge claims and scientific authority. Prochiantz, a rising star in his early career, became an academic pariah during the 1990s when he began promulgating his unpopular theory of neuro-cellular plasticity, viewed by many of his colleagues as either experimentally baseless, scientifically peripheral, or institutionally unpractical. His lab shrank in size and funding, while his notoriety grew as an anomalous figure who drew more from his relations with French artists than with his fellow scientists. Rees charts Prochiantz’s professional development, however, in order to demonstrate the suppleness of social or “relational” networks and the ways in which these complex and morphing sociological constellations function as webs upon which certain epistemic possibilities, over others, come to be affixed. It was not until the late 1990s and early 2000s, with the experimental confirmation of adult neurogenesis in labs in the United States, that Prochiantz’s work was vindicated. Indeed, in 2006, he was elected professor at the Collège de France.

And so, in this regard, *Plastic Reason* is perhaps most critically a meditation on the very nature of scientific knowledge production. How can a practitioner enact and animate a scientific *possibility* as such where no such possibility yet exists? Should we view this reckoning with the impossible as epistemologically different from, say, the composition of a new scientific theory or the constitution of an innovative experimental object? As Rees suggests, the greatest challenge for Prochiantz did not take place in the lab but in his attempt to overcome a historico-conceptual hurdle — a century-long supposition embedded into the very fabric of neuroscientific reasoning that, in whatever way the brain might be imagined, it would always be imagined as an invariably static object, neuronally fixed and materially immutable. What recourse can scientists have when they seek to press against the very limits of what is institutionally acceptable or conceptually permissible? Experimental results alone may not, Rees suggests, contain the veridical force necessary to transform a premise roundly rejected as impossible into a premise generally accepted as true.

Prochiantz’s course of action was to grapple directly with the presumed impossibility of adult cellular neuroplasticity. This direct confrontation meant adopting a different sort of epistemic labor, a manner of thinking that Prochiantz casually described, what Rees formally labels, a “nocturnal” approach to scientific inquiry. For Rees, Prochiantz’s “nocturnal” labors, which subtended his scientifically standard bench research, comprised a willingness to engage in high speculation and to

follow creative intuitions down whatever paths they might lead. In abstract terms, this meant an attempt “to open a not yet existing conceptual horizon,” to “[think] the yet unthought” (138), to consider “the possibility that things could be different from the way they were currently imagined to be” (102). Somewhat more concretely, Rees documents Prochiantz’s inclination to situate speculative endeavors at the forefront of his research, to engage in a kind of epistemic experimentation, a philosophical poeticism, that relied on intuition, contingency, and association.

The most notable instantiation of Prochiantz’s nocturnal practice involved a kind of genealogical work, a perhaps unexpected activity for a contemporary neuroscientist. Prochiantz confronted the history of biology, reading and rereading the works of embryologists, anatomists, anthropologists, evolutionary biologists — figures as diverse as Claude Bernard, Alan Turing, D’Arcy Thompson (the list is rather long, actually). Prochiantz engaged in this history precisely in order to understand how these former innovators altered the terms of biological research and how they themselves advanced scientific possibilities that were not previously imaginable. Yet Prochiantz’s historical submergences and reconstructions were intentionally unfocused, trans-disciplinary, and almost capricious. As Rees explains, Prochiantz brought “authors together and [treated] them as if they were in a steady conversation, even though they were not” (134).

Yet as Rees reconstructs Prochiantz’s reading list, what emerges is a veritable archive — not a linear or obvious development of theories of the brain’s flexibility but, rather, an unexpected genealogy of the plastic. What holds this archive together, however, is Prochiantz himself — his unruly interpretations and surprising expropriations; it is a genealogy of neuro-cellular plasticity that Prochiantz simultaneously constitutes and creatively re-reads. Over and against the historically entrenched supposition that the brain is (and must remain) neuronal fixed, the hurdle that vocally proclaimed the very thought of adult cellular neurogenesis to be impossible, Prochiantz sutured together a new condition of possibilities on which his own hypothesis and experimental results could find sure footing, historically and conceptually. Rees insists that for Prochiantz, biological matter is a process, a performance, a becoming; this is an observation that Prochiantz can make about the brain by reading from an archive of scientists that never really discuss the brain at all. For Prochiantz, nocturnal work is a productive and insight-inducing recklessness of thought that actively pushes against the limits of scientific possibilities.

Rees seems to imply that the most creative scientists are simultaneously nocturnal epistemologists of sorts. They are not simply capable of gleaning scientific ruptures of the past but, insofar as they can glean those ruptures,

they are inventively inclined to institute ruptures of their own. Prochiantz was cautious not to consider the plastic brain to be a simple exchange of one stable neuroscientific paradigm with another. Rees recounts Prochiantz's continued assertions — fervent and in some cases almost frenzied — that if the plastic brain were to truly be understood as perennially developing, then it must altogether belie the promise of fixity. The plastic brain is fundamentally transforming; it is unstable and “incoherent.” And so must be the science that studies it. This is perhaps the subtlest and most provocative of Rees's underlying claims — a brain defined by embryogenetic incoherence can only be encapsulated by a transformational rationality, a plastic reason.

One of the most compelling chapters in *Plastic Reason* is the last one, organized around the question of ethics. Rees asks, “What venues for living a life, for being neurologically human, have the neuronal sciences opened up since 1891” (198). Rees presents a comparative reading of the ethical possibilities that have inhered in neuronal doctrines since the late nineteenth century in an effort to see what new modalities of ethical self-fashioning are made available in Prochiantz's account of neuro-cellular plasticity. As Rees explains, the ethical implications of the plastic brain are brought into focus when we consider “the particular *ethical space* a given neuronal conception of the brain provides for being human” as well as what “unique *ethical equipment* for living a life it provides to all those who live their life, deliberately or not, as brains” (197). Rees suggests that plasticity offers a kind of ethical promise in its repudiation of biological fixity that no previous neuronal doctrine was able to provide. With plasticity, the human itself can now be conceptualized “from the vantage point of a brain believed to continuously change, to undergo ceaseless morphogenetic transformations” (217). The fundamental attribute of a “neurological human” defined by plasticity is precisely “openness, its openness toward the future, its capacity for ongoing adaptation” (217).

Rees's assertions in this final chapter are both exciting and admirable, given that they are organized around the urgency to consider what ethico-political possibilities can be unearthed from neuroscientific research. And yet it is precisely this analytic unearthing that some readers might find slightly strained. Rees offers a serial examination of major neuronal paradigms through textual readings of their central physiological suppositions from which he draws out their various ethical possibilities. But in some cases, Rees's work of unearthing underlying ethical commitments feels closer to a quick and potentially injudicious extraction of sorts. It raises, perhaps inadvertently, an important question for scholars interested in confronting the boundaries between the science and ethics: how reliably can ethical paradigms be drawn out of discursive systems that are not formalized as ethico-political utterances? How viably can scientific

propositions, on their own, be translated into ethical claims?

Translational scholarship that seeks to excavate the ethical *possibilities* of scientific research risks overlooking the ethical and political constraints that scientific doctrines *actually* afford. Ethical realities inhere in science not just in terms of the possibilities that are theoretically capable of being abstracted from them but because scientific research is ultimately embedded within larger institutional frameworks, power structures, and discursive matrices. There is no doubt that ethical and political norms circulate throughout the brain sciences. These norms in part fashion what researchers, expert readers, lay audiences, experimental subjects, and “neurological humans” will count as acceptable or obligatory. These norms usually determine (regulate, but not necessarily foreclose) what will be ethically available and accessible in the first instance, and they do so through the complexity of institutional, administrative, and discursive effects they have on subjects. This process of normative fashioning is obscured if we immediately and precipitously convert a physiological utterance into an ethical proposition; whatever ethical possibilities neuroplasticity may promise, what it will actually afford once it is fully stabilized as a dominant tenet in neuroscientific research and brain medicine is far from clear.

Rees ultimately characterizes his analysis in this final chapter as a “genealogy of morals,” a way of clarifying the ethical stakes of Prochiantz’s account of neuroplasticity by marking out its historical difference with prior neuronal theories. While he is never explicit about it, Rees does play favorites. Intrinsic value is attributed to the “openness” and transformative potentials of plasticity over the immovably static and mechanical determinations of the fixed brain. Openness is valuable; fixity is not. This is neither unexpected nor reproachable, but it does raise a question of what initially justifies these valuations. In a genuinely Nietzschean fashion, can we not ask: What is the value of these values? Why would any scholar — an anthropologist, a literary theorist, a philosopher — tend to value openness over fixity today? Undoubtedly, someone who defines herself according to her brain may have at her disposal the tools necessary to conceive of herself as transformative and capable of “ongoing adaptation.” But into whom will she, or is she being asked, to transform? What imperatives of adaptation, malleability, and adjustment are being forced upon her? When does openness to the future simply become pliability and compliance — and how can one resist such an appropriation?

These are the sorts of questions that warrant a degree of caution against immediately allying privileged biological concepts with ethico-political categories — that is, in transmuting the transformative openness of biological adaptation into a theory of human liberty. Rees, for his part,

resists the urge to link plasticity to freedom, subtly criticizing the facile ways in which advocates of the older model of synaptic plasticity grounded liberty on the brain's capacity to rewire itself. Indeed, Rees's chapter on ethics is less an argument than an inquiring: what ethical possibilities can plasticity provide for the neurological human? Here I am reminded of an almost passing footnote Emmanuel Levinas makes in *Otherwise than Being* (1974): "The body is neither the obstacle that opposes the soul, nor the tomb that imprisons it, but that by which the self is susceptibility itself. The extreme passivity of 'incarnation' is to be exposed to sickness, to suffering, to death, it is to be exposed to compassion and, as self, to the gift that costs."^[1] Is it disagreeable to substitute "brain" for "body," to read "neurological human" where Levinas writes "incarnate subject?" If not, then perhaps the openness at the heart of Prochiantz's cellular neurogenesis is not an engine of overcoming, but an expression of exposure and vulnerability, an original passivity that could ultimately signal a fundamental responsibility before any kind engagement with liberty. Whether the inevitable stabilization of neuroplasticity within the institution of brain research and biomedicine will make such possibilities available for future neurological humans is perhaps the issue that remains most open of all. These final concerns are not rebukes but merely examples of the rewarding interchanges that *Plastic Reason* facilitates. It remains a compelling ethnographic study of a major upheaval in brain research and a provocative engagement with the nature of scientific knowledge production.

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Notes

^[1] Emmanuel Levinas, *Otherwise than Being or Beyond Essence*, trans. Alphonso Lingis (Duquesne University Press, 2002), 195 n. 12 (translation modified). Emmanuel Levinas, *Autrement qu'être ou au-delà de l'essence* (Martinus Nijhoff, 1974), 139 n. 12.

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