Brain Plasticity: Between Molding and Explosion

In her book *What Should We Do with Our Brain?* (2008) the theoretician Catherine Malabou takes a philosophical journey through contemporary neuroscience. In this book she explores notions of the synaptic self and the proto self, notions which have been outlined and investigated respectively by the prominent contemporary neuroscientists Joseph LeDoux and Antonio Damasio. I should make it clear that, as an amateur, my engagement with Malabou's project is inspirational and motivational, rather than critical or analytical. I want to explore aspects of her research to see if it can help me understand something of the involuntary dynamism, and the notion of the malleable brain, to which the philosophers Giles Deleuze and Henri Bergson so ferociously adhere.

For Malabou, the brain is not a preformed thing:

> [o]ur brain, [she says] is plastic, and we don't know it. We are completely ignorant of this dynamic, this organization and this structure. We continue to believe in the "'rigidity' of an entirely genetically determined brain," [...] (we imagine) a series of fixed, indeed genetically programmed, entities, without any suppleness, without any improvisational ability. (Changeux cited in Malabou, 2008, p.4)[1]

As she goes on to explain, the notion of plasticity[2] directly contradicts the notion of rigidity (2008, p.5). Plasticity designates suppleness, therefore, she says to think of the brain in these terms suggests that it is: 'modifiable, "formable," and formative at the same time.' (2008, p.5) plasticity, she says, operates between the two notions molding and explosion,[3] notions which

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[1] Malabou cites Jean-Pierre Changeux, *The Neuronal Man: The Biology of The Mind* (1985, p. 247, New York: Pantheon)

[2] Malabou refers to an entry in *The Oxford Companion To The Mind*, ed. Richard L.Gregory (Oxford: Oxford University Press, 1987), called *Plasticity in Nervous Systems* (p.623). She goes on to explain that the word 'plastique, from which we get the words plastiquage and plastiquer, is an explosive substance made of nitroglycerine and nitrocellulose, capable of causing violent explosions. We thus note that plasticity is situated between two extremes: on the one side the sensible image taking form (sculpture or plastic objects), and on the other side that of annihilation of all form (explosion)' (Malabou, 2008, p.5).

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when combined and applied to the brain not only demonstrate its ability to receive and create form, but also its ability to detonate that form, to refuse to submit to a model. For Malabou, like Deleuze, the brain's ability to reform itself is initiated in a kind of violence, its facility for transformation, or reformation is preceded by a violent rupture, by a gap that interrupts continuity (see Malabou, 2008, p.73). Far from being a finalized form or thing, the brain, she says, is continually adapting, modifying, and creating itself anew as it comes into contact with that which is outside of it. The brain does not exactly undergo modification because it is itself a modification, a continual modification that is always in the process of being formed.[4] For Malabou, therefore, the brain is never finally made, nor is it a machine with a pre-programmed circuit:

> [h]umans, [she says] make their own brain, but they do not know they are doing so. (Malabou, 2008, p.8) [5]

Implicit in Malabou's claim is the suggestion that the brain does not owe its constant modification to conscious choice, but to its unconscious, involuntary capacity to interact with its environment, to its ability to incorporate alterity. In other words, it is to the brain's unconscious, involuntary ability to receive and destroy form, to its plasticity, that she attributes its vitality and creativity (Malabou, 2008, p.8).[6] It is because of its non-conscious capacity for

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determinism' (Malabou, 2008, pp. 72-73). She uses the following quote from Bergson's book *Spiritual Energy* (1920) to corroborate her point: 'When we consider the mechanism of voluntary movement in particular, the functioning of the nervous system in general, and in fact life itself in what is essential to it, we are lead to the conclusion that the invariable contrivance of consciousness, from its most humble origin in elementary living forms, is to convert physical determinism to its own ends, or rather to elude the law of the conservation of energy while obtaining from matter a fabrication of explosives, ever intenser and more utilizable. It will then require an almost negligible action, such as a slight pressure of the finger on the hair-trigger of a pistol, in order to liberate the required moment, in the direction chosen, as a great amount of energy [...] To make and utilize explosions of this kind seems to be the unvarying and essential preoccupation of life, from its first apparition in protoplasmic masses, deformable at will, to its complete expansion in organisms capable of free actions' (Bergson, 1920, cited in Malabou, 2008, p.73).

[4] A reference to Deleuze's book *Difference and Repetition*, within which he says: 'the self does not undergo modifications, it is itself a modification' (Deleuze, 1968, p.79).

[5] Malabou refers to a host of philosophers and neuroscientists to corroborate her argument. For example: Deleuze (p.36 and pp.39-40); Bergson (pp.33-34); Damasio (pp.57-59 and pp.62-66); LeDoux (pp.57-62).

[6] According to Malabou, citing Damasio, 1999, 'every event coming from outside necessarily comes to affect homeostasis and calls upon "another level of cerebral structure"' [the outside, she says, is] 'charged with transforming maintenance into creative ability' (...) According to her this transition from 'homeostasis' to 'self-generation' cannot be made 'without rupture or gap.' (Malabou, 2008, pp. 74-75)

modification that the brain can be understood as involuntarily creative, so how does the notion of brain plasticity affect the notion of coherent identity, or what Malabou calls a person's personality?

Referring to Joseph LeDoux's notion of the synaptic self, Malabou goes on to locate the emergence of a kind of polymorphous personality amidst the brain's malleable synaptic connections. According to her:

> if we can accept the idea that personality derives from a constellation of established connections, then we can also accept that personality is reformable or re-formable (Malabou, 2008, p. 68).

To put it very simply, the brain's capacity to integrate disturbances from outside of itself, (see Malabou, 2008, p.75) enables a kind of 'organic personality' (Malabou, 2008, p.8) to emerge, and for new, alternative, unanticipated personalities to keep on emerging throughout a person's life. We may conceive of our brains as genetically determined, and of ourselves as coherent, integrated personalities, but our personalities, along with the synaptic connections in our brains, are constantly and involuntarily changing. For Malabou, after LeDoux, the involuntary synaptic connection and reconnection processes at work in the brain play an integral role in the formation and reformation of a person's personality.[7] Personality as it is outlined in her thesis is only ever provisional. It is fluid and changeable, and, like the brain, it always in the process of being formed.

For Malabou and LeDoux the notion of the synaptic self suggests that the possibility of maintaining the impression of a coherent personality is, in itself, a staggering feat. The very prevalence of plasticity within brain systems would suggest that chaos could quite easily reign, LeDoux puts it this way:

> the fact that plasticity does occur in so many brain systems […] raises some interesting questions. How does a person with a coherent personality- a fairly stable set of thoughts, emotions, and motivations- ever emerge? Why don't the systems learn different things

[7] LeDoux himself puts it this way, the self, he says, is synaptic 'a synthesis of all the plastic processes at work in the brain' (LeDoux cited in Malabou, p.58).

> and pull our thoughts, emotions and motivations in different directions? What makes them work together, rather than as an unruly mob? (LeDoux, 2003, p.304)

For LeDoux the answer to these questions does not lie with the notion of a centralized controlling consciousness. On the contrary, according to him, it is the unconscious, or non-conscious, processes at work in the body and brain that underlie a functioning personality. It is these processes that enable the impression of a coherent self to emerge. According to him these unconscious processes are the rule rather than the exception, so much so, he goes on to say, that the thoughts, feeling and actions of a person can often be described as automatic. We automatically engage with our environment without the intervention of consciousness. Consciousness, he says, is generally only informed after the fact, that is after something has already started to happen, or as it gets under way. Seen from this perspective the impression we have of ourselves as a coherent and integrated personality is at least partially formed by the unconscious habits, skills, memories, and routines that establish the synaptic connections in our brains: 'People don't come preassembled' LeDoux says, 'they are glued together by life' (LeDoux, 2003, p.3). But the glue that holds LeDoux's patchwork self together is fragile, the connections, as we have seen, are plastic and pliable. When the synaptic connections in our brains break, or are broken, when our habits of seeing and thinking are interrupted and disrupted, LeDoux's patchwork self begins to unravel, it is then that our motivations and emotions are potentially pulled in several different directions at once and we begin to lose any sense of ourselves as a coherent, integrated personality; but it is also then that our personalities are potentially forced to unconsciously reform anew, enabling a new, malleable, changeable, polymorphous personality to form and reform, again and again differently.[8]

[8] As a point of clarification, I should add that the term unconscious as it is used here does not refer to the Freudian notion. According to LeDoux the notion of the unconscious covers all the things that the brain does without consciousness being aware, these functions are as varied as:

> regulating the heart rate, breathing rhythm, stomach contractions, and posture, to controlling many aspects of seeing, smelling, behaving, feeling, speaking, thinking, evaluating, judging, believing, and imagining (LeDoux, 2003, p.11).

LeDoux refers to knowledge of serious brain trauma, surgery, epilepsy, and aphasia. His research is extensive, precise and firmly rooted in his subject, neuroscience. My survey of his work, and that of Catherine Malabou's, has been brief and schematic, an amateur picking over of the parts that are most relevant to me and my written and visual projects.