



The neural basis of what? Discontents in defining “human nature”

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INTRODUCTION

Historian Ellenberger (1970) has identified in the history of psychiatry and brain science “the trend that consists in describing and understanding psychological and psychopathological phenomena in terms of real or hypothetical brain structures”, a trend he called a “brain mythology”. The rise of neuroscience in the last two decades has certainly given it a new significance. It is clear that neuroscience is extending its territory toward psychosocial, moral and cultural attitudes. The neuroscientific question “how does the human brain work?” has become more and more inseparable from the question “what does it mean to be human?” We may observe how contemporary neuroscience participates in the embodiment of the mind in the brain. Vidal (2009) calls “brainhood” the idea that “the brain is necessarily the location of the *modern self*”. This historical and epistemological situation generates conflicting claims and controversies, which are the evidence of the tensed relationship among neuroscience, social sciences and humanities today.

Firstly, there is a tension between the neural and the social bases of the human mind (i.e. its competences, behaviours and attitudes) and there is a tension between individual identities and generic categories of people supposed to share neural configurations. These controversies are closely linked to the development of brain imaging as a possibility to visualize individual brain processes and construct cerebral types by subtracting and averaging imaging data (Posner and Raichle, 1994). They are also part of the history of understanding what being human means and of the conflict between “free will” and “biological shaping”. This conflict has been recently revived by the rise of neuroscience and by some social and political controversies related to the concepts of identity and personhood. In this short article, I would like to suggest that a more specific historical contextualization of these tensions and conflicts may help

us to better understand the contemporary epistemological debate between neuroscience and social sciences.

READING HUMAN IDENTITIES IN WESTERN THOUGHT AND PRACTICES

Brain imaging constitutes one chapter of a longer history related to the embodiment of mind, self and identity in Western thought. This could be illustrated by various and often curious historical theories of this embodiment. For instance, the rather marginal work of Italian mathematician Cardano (1501–1576), otherwise known for his method for solving third degree equations. In his *De Metoposcopia* (written in 1558 and published a century later; see Cardano, 1658) he proposes to read the identity and the destiny of men in their forehead wrinkles. He schematizes them as a seven-line staff on which planets inscribe their influence with marks in their flesh. Cardano’s epistemic hypothesis stems from a long tradition of physiognomy, the art of reading human characters through similarities with animals, formalized by Italian physician Della Porta (1535–1615). In his *De Humana Physiognomoniam* (Della Porta, 1586), he considers the human being as the “perfection of Creation” and as the condensation of the diverse qualities that animals have. The particular likeness of an individual with an animal, according to Della Porta, is a sign of deviation from perfection and this is how an individual’s character is portrayed.

We obviously no longer believe in such an analogical conception of the world in which the purpose of knowledge was supposed to identify the connections between the movements of the macrocosm (the universe) and the microcosm (men) both created by “The Divine Intelligence”. Nevertheless, from an epistemological point of view, these theories share a general structure with contemporary theories, including brain imaging in neuroscience. These theories are characterized firstly by a general conception of nature and of the human being; secondly,

by a hypothesis of influence; thirdly, by the attempt to develop a practical technique that enables to read the signs that define individual uniqueness.

These premodern theories on human characters help us to understand the history of identity embodiment as a series of debates about its location and its determinations (in the skin, the face, the organs, and so forth). In this sense, one could say that neuroscience involves the same quest for location and determination, but it naturalizes the shaping of identity and locates it in the brain. Whether identity is formed internally or externally has always been the controversial problem of determinism. This is particularly true for phrenology, a theory often presented as a “mistake” but that anticipated modern neuroscience. For Gall (1758–1828) “the exercise of our liking and our faculties, regardless of the principles we adopt, is subject to organic influence” (Gall, 1825). He acknowledges the influence of society and education on identity, but considers innate conditions to be the most determining:

“We must therefore admit that each animal, according to its organization, has received from nature industrial skills, instincts, inclinations, determined talents, and that the power of the things from outside, from the institution and the education is simply to make more or less modifications.” (Gall, 1825)

Psychiatrist Pinel (1745–1826), who commented on Gall’s work, was very sceptical about locating in the brain any “skills, instincts, [or] inclinations”, and even doubted that madness was located there. In his famous *Traité médico-philosophique sur l’aliénation mentale* (Pinel, 1809), he argued that except for “idiotism” it was impossible to link mental alienation with the shape of the skull or brain injuries, and stated that “The head of the insane is approaching, in this point of view, well-formed heads”.

Following Morgagni (1682–1771), he admits that abnormalities in insane brains can be observed like “lymphatic effusions in the ventricles of the brain, congestion of blood vessels, changes in the choroid plexus and corpus callosum, small concretions calculated in the pineal gland, etc.” But he underlines that “it must be acknowledged that in other brains of insane, there is no such physical injury, no alteration in the structure of its parts”. Since he saw no essential relation between insanity and the brain, Pinel developed his “Moral Treatment”. Within the paternalist and philanthropic context of the time, this treatment consisted in a benevolent caretaking in which patients were to develop behavioural and intellectual self-control under the guidance of the doctor.

Gall (1825) disagreed with Pinel:

“After he has painted after nature, and in vivid colours, the highest degree of imbecility, after reporting specifically on the smallness of the heads of these idiots, in brief, after he has found the truth, Mr Pinel does not yet have the courage to seize it.”

Two centuries later, their disagreement is reminiscent of the tensions between psychiatry and neuroscience, and more generally of the controversies about the location of identity and the nature of its determinations. These tensions and controversies are not metaphysical, but result from contemporary techniques for neuroscientific investigation such as brain imaging.

READING “ENTITIES” AND/OR “IDENTITIES” INTO BRAINS

What does brain imaging show? From a technical and general point of view, the visualizing techniques like Functional Magnetic Resonance Imaging, Positron Emission Tomography, Single Photon Emission Computed Tomography make visible anatomical configurations, dynamics of metabolism through specific chemical tracers, cerebral spatialization of patterns of activities in experimental and/or clinical situations. Difficulties arise when we try to process and interpret these data.

This can be illustrated by results obtained in neuroscience, which explicitly claim to

demonstrate the “neural bases” of “social behaviours”, “emotions”, “intentionality” or “subjectivity”. For instance, Bartels and Zeki (2000) and Zeki and Romaya (2008) have tried to identify “Neural bases of romantic love” and “Neural correlates for hate”. The difficulty emerged less from the experimental protocol (studies of cerebral states generated by stimulation) than from the interpretation of the brain images it produced. It consisted in transforming visual and spatial *traces* produced experimentally into *ontologies*:

“In summary, our results show that there is a unique pattern of activity in the brain in the context of hate. This pattern, while being distinct from that obtained in the context of romantic love, nevertheless shares two areas with the latter, namely the putamen and the insula. This linkage may explain why love and hate are so closely linked to each other in life.” (Zeki and Romaya, 2008)

On the one hand, this kind of research follows the “psycho-physiological principle” reminded more than a century ago by Flournoy (1854–1921): “everything that happens in the soul has a physical correlation, and the determination of this correlation is the ambition of any researcher” (Flournoy, 1901). But, on the other hand, the conclusion illustrates a circular hermeneutics. “Love” and “hate” are defined as “emotional states”. In the experimental protocol, these “emotional states” are converted into differential reactions to visual inputs. These differential reactions are technically expressed into voxels spatialized in patterns. These patterns are interpreted as specialized subsystems of the brain. These subsystems are considered as physiological localizations of subjective experiences. On the rhetorical level but not in the experimental design, these localizations “in the brain” are merged with emotional phenomenology “in life”. At the end of the process, “love” and “hate” are transformed in “biological sentiments”, in authors’ own words.

Of course, researchers sharing this hermeneutics and developing this rhetoric are not necessarily naïve. We know that the highly competitive market of scientific publishing tends to provoke

an overestimation of the significance of results to seduce scientific and popular media. But the problem could be deeper and could involve the epistemology that wants to reach the scientific understanding of “human nature”. This important and difficult question was formulated perceptively by French psychologist, philosopher and psychotherapist Janet (1859–1947). His 1924–1925 course at the Collège de France – where he occupied the chair of Experimental and Compared Physiology – was titled “A Study of Love and Hate”. The tone is sarcastic, but the argument is of particular relevance even today:

“The main reason for the failure of visceral theories of emotions is that these phenomena are extremely commonplace and are roughly the same for all emotions. [...] [T]hese theories are predicated on a methodological mistake consisting in moving from a very complicated phenomenon to a very simple one, in this case from a feeling to a physiological change. This reminds me a candidate at an examination who was asked: ‘What is sodium sulphate?’ He answered: ‘It’s a compound of atoms’.” (Janet, 2005)

CONCLUSION

The brief outline of this historical debate draws our attention to the need for a more integrative approach to the understanding of complex human phenomena. In order to meet this challenge, one would probably need to summon the expertise of different disciplines. Today, neuroscience, social sciences and humanities need to consider that disciplines do not exist *per se*, but are contingent and limited ways of knowing reality and understanding real life problems. Scientific enquiries made on the complexity of what being human means need an open conceptual and technical scrutiny of methodologies, paradigms, data analysis and interpretative frameworks. This requires a critical analysis of the tensions and controversies that put in opposition and define scientific disciplines; it also requires the will of going beyond them, in particular by opening one’s own discipline to other “epistemic cultures” (Knorr-Cetina, 1999). This is certainly what will characterize future research in neuroscience.

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