

From Spinoza to the socialist cortex: Steps toward the social brain *

Charles T. Wolfe
Unit for History and Philosophy of Science
University of Sydney
c.wolfe@usyd.edu.au

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Abstract

The concept of 'social brain' is a hybrid, located somewhere in between politically motivated philosophical speculation about the mind and its place in the social world, and recently emerged inquiries into cognition, selfhood, development, etc., returning to some of the founding insights of social psychology but embedding them in a neuroscientific framework. In this paper I try to reconstruct a philosophical tradition for the social brain, a 'Spinozist' tradition which locates the brain within the broader network of relations, including social relations. This tradition runs from Spinoza to Lev Vygotsky in the early 20th century, and on to Gilles Deleuze, Toni Negri and Paolo Virno in recent European philosophy, as a new perspective on the brain. The concept of social brain that is articulated in this reconstruction – some early-20th century Soviet neuropsychologists spoke of socialism and the cortex as being "on the same path" – overcomes distinctions between Continental thought and the philosophy of mind, and possibly gives a new metaphysical framework for social cognition.

"Subjectivation, événement ou cerveau, il me semble
que c'est un peu la même chose."¹

We have not yet left the Decade of the Brain proclaimed by George Bush *père*, which was supposed to be the Nineties but shows no signs of ending; however, something has changed, perhaps in keeping with communitarian stirrings that are felt in various places across the globe, in rejection of

'methodological individualism'. Consider the study of cognition. From its individualistic beginnings in seeking to model 'agent intelligence', discover the neural correlates of consciousness or perhaps find 'localized' brain areas that would explain various mental functions, this field or rather cluster of fields has begun to take something of a 'social' turn in the past ten to twenty years, with the publication of books, anthologies and journal issues called *Social Neuroscience*, *Social Brain* and such, picking up momentum in the past five years.² Topics such as imitation, empathy, 'mind-reading', and even group cognition have come to the fore. Outside of the specifically 'neuro-' or 'cognitive' or 'embodied' arenas, there has been a fresh wave of reassessment of the pragmatists, notably John Dewey, for their 'social theory of mind', and their overall theorization of mind as a set of practices within the world of action, augmenting ideas that in the 1960s were associated with the philosophy of the later Wittgenstein (meaning as use, forms of life, and so on); cognitivists and philosophers of perception have also sought to emancipate themselves from 'behaviorism' or other constraints by appealing to Heidegger-as-read-by-Hubert-Dreyfus (an avatar of the philosopher of *Geworfenheit*, the Black Forest and the 'authentic path' of an ecological culture in which he suddenly becomes a cutting-edge theorist of skill, agency, and embedded cognition), and to 'ecological' thinking in the sense articulated by the psychologist of perception J.J. Gibson.³ In short, from the study of cognition to very diverse corners of the philosophical landscape, the social dimension of mind, intellect or action has come to the fore.

But I will be interested in a different locus of the social here: the *brain*. And differently from the newly emerged field of social neuroscience, the social brain I shall discuss here might also be called 'The Spinozist Brain' or, in a more mysterious turn of phrase, based on a longer formulation from a 1920s Bolshevnik psychologist, Aaron Zalkind, 'The Socialist Cortex'. I shall clarify this expression later on, but for now would like to emphasize that the expression 'social brain' should be understood in specifically a Spinozist sense. Expressed in historical terms, I wish to reconstruct a tradition of

thinking about the brain as social which is ultimately Spinozist in nature, via Marx, Lev Vygotsky and the contemporary philosopher Antonio Negri – the last two of whom explicitly refer to Spinoza’s philosophy as a basis for their projects. One of the points I will make in light of this reconstruction is that the Marxist hostility to cognitive science might have to be reconsidered to some extent. (Marx himself uses the expression ‘social brain’.⁴) Or, put differently, an incidental accomplishment of my reconstruction of this tradition should be to make it harder for politically motivated critiques of cognitive science and artificial intelligence to claim that theories of intellect and action that seek to involve the brain are necessarily individualistic, ‘reactionary’, in the service of the military-industrial complex, and so forth.⁵ If anything, the danger will be from the side of the ‘group mind’, as we shall see in closing.

I shall proceed in five steps: after a brief review of recent discussions of social cognition, I shall try to make explicit the Spinozist context for the social brain; next I shall summarize some key ideas of the ‘Soviet school’ (Vygotsky, Luria), then move from the ‘socialist’ to the ‘avant-garde’ brain (which are really two ways of describing the same thing, as we shall see); finally, I discuss the ‘Italian’ moment of the social brain, with Negri and Virno, including some reflections on tools and prostheses, and conclude with some considerations on the social brain and the group mind.

Varieties of social cognition

Obviously not all ‘social brains’ or rather their conceptualizations, are equal. Social epistemology, the emphasis on the primacy of emotions and the importance of ‘common notions’ are not all the same. The ‘social’ dimension that is being emphasized in the discussions of ‘social intellect’,⁶ which culminated in the notion of ‘Machiavellian intelligence’ and its presence in the primate world, is that of the individual’s capacity to interact successfully with social groups, to predict and manipulate behavior, to make and break promises, and so forth. The energetic demands of such a complex situation

are ultimately presented as responsible for the large size of primates' brains, so that some evolutionary anthropologists and their collaborators in related fields took to calling the Machiavellian Intelligence hypothesis, the 'social brain hypothesis'.

The 'social' in 'social cognition' focuses notably on mirror neurons, which indicate the existence in the brain of a particular recognition or decoding of *action* and thus of the imitation of action,⁷ implying an understanding of other people's intentions, goals and desires. Mirror neurons, found in the ventral premotor cortex of macaque monkeys, are activated both when the monkey executes grasping actions (e.g. grasping a peanut) and when it observes someone else (or another monkey) making grasping actions, or even the preparation of a motor act. Mirror neurons appear to distinguish between biological and nonbiological actions, responding only to the observation of hand-object interactions and not to the same action if performed by a mechanical tool, such as a pair of pliers; more recent research has shown the presence of other mirror neurons which respond to the sound of known activity (such as the crunching of peanuts). Somewhat modifying the earlier research which stressed the difference between the goal-directed activity of intentional, biological agents and the activity of inanimate tools, recent work done with Japanese macaques in Atsushi Iriki's Lab for Symbolic Cognitive Development has indicated that training in tool use over several months produces changes in neural activity such that certain neurons now respond to a rake as if it were an extension of the hand. Indeed, that this training in tool use is successful at all is a major discovery and challenges received knowledge.⁸

Imitation had already been pinpointed in the late nineteenth century by the American psychologist James Mark Baldwin (of 'Baldwin effect' fame): "By imitation the little animal picks up directly the example, instruction, mode of life, etc. of his private family circle and species."⁹ Since the early Nineties Cacioppo and Berntson have used the term 'social neuroscience' to describe their work, but this has rather little to do with our interest in the

social brain, as the focus seems to be chiefly on correlations between neural states and behavior.¹⁰ Closer in spirit to the tradition I shall be discussing is the study of the culturally and socially constructed nature of the brain, which more recently has focused on its necessarily ‘networked’ dimension – the ‘mind-like properties of social groups’, in the words of Ed Hutchins, the chief theorist of ‘distributed cognition’; for an early, and broader statement of what we might call the cultural scaffolding of the mental, consider this passage from a 1962 paper by Clifford Geertz:

[T]he accepted view that mental functioning is essentially an intracerebral process, which can only be secondarily assisted or amplified by the various artificial devices which that process has enabled man to invent, appears to be quite wrong; the human brain is thoroughly dependent upon cultural resources for its very operation; and those resources are, consequently, not adjuncts to, but constituents of, mental activity. In fact, thinking as an overt, public act, involving the purposeful manipulation of objective materials, is probably fundamental to human beings; and thinking as a covert, private act, and without recourse to such materials, a derived, though not unuseful, capability.¹¹

However, these different approaches that stress the role of culture, social institutions and so forth in structuring the mind, still do not make ontological claims about the *brain* itself. Instead, we are interested in the social *and materialist* variant of the claim “the brain possesses an ontology too.”¹²

Under the influence of J.J. Gibson, an influential paper by Andy Clark and David Chalmers, and in a different vein the ‘enactivist’ approach to cognition proposed by Varela and others, ‘ethological’ and ‘ecological’ approaches to the study of brain, body and mind have become mainstream; they are simply part of the framework for understanding the behavior of an organism. But the environment that’s studied there still tends to be viewed in terms of stimulus and response (the red spot of paint that the little bird pecks at), and not in terms of the *symbolic world*, the historically, socially and culturally determined world of representations, of role-playing, of recognition in which we actually live and act. In fact, symbolic practices are not a mere, external “cultural environment” in which “brains” lie floating. Instead, both

these practices and the organ called 'brain' possess a fundamental plasticity, and we need to understand them together.

But rather than seek to broker agreement between various schools of thought, or retreat behind the safe posture of the intellectual historian relating the discovery of the 'fact' that our selves or minds, which turn out to be our brains, are socially produced and perhaps determined, I would, as indicated above, like to analyze a *tradition* out of which a unique concept, 'the social brain', has emerged, from the post-Cartesian metaphysics of Spinoza to its neurological and Marxist reprisals in Vygotsky and Negri.

This will not however be a study in the history of Marxism – suffice it to say that the concept of social brain appears in various passages in the works of the 'autonomist' Italian Marxist thinkers Toni Negri and Paolo Virno, where they use it synonymously with the even more mysterious expression "General Intellect," derived from the so-called 'Fragment on Machines' in Marx's *Grundrisse*, his notebooks of the late 1850s which Negri 'rediscovered' as a source for another, heterodox Marxism in celebrated lectures given at the École Normale Supérieure in Paris in the late 1970s, at the invitation of Louis Althusser.¹³ The *Spinozist tradition of the social brain* runs concurrently from Spinoza to Marx and his reinterpretation by Negri, and from Spinoza to the neuropsychologists Lev Semyonovich Vygotsky and Alexander Romanovich Luria in Russia in the 1920s-1930s. (They worked together notably at the Institute of Experimental Psychology in Moscow, starting in 1924, until Vygotsky's untimely death from tuberculosis in 1934, at the age of 37.)¹⁴ The story could be extended to include both the 'coevolution' approach to brain and language proposed by Terrence Deacon and, in a more 'American' and 'therapeutic' vein, the type of 'affective neuroscience' proposed by Antonio Damasio. Indeed, claims about the embodied, embedded nature of cognition, or the ultimate 'commonness' of its contents, are inseparable from an affective component, as in Spinoza, and Vygotsky noticed this, authoring a manuscript on Spinoza's theory of the emotions or 'affects' which was published posthumously; Spinoza's *Ethics*, which he had

received as a gift from his father at a young age, remained his favourite book throughout his life.¹⁵

Networks and common notions: some Spinozist basics

Discussions of 'person', 'self', 'experience', even when they bring in an embodied, material dimension, frequently appeal to a *first-person* concept of experience. This is usually opposed to a *third-person* view, typically presented as the point of view of the natural scientist with her measuring instruments. Many philosophers hold that we will *never know what it is like* to have someone else's first-person experience. One trait shared by all the thinkers discussed here, from Spinoza to Negri, is that they do not hold this view. We might call this the difference between internalists and externalists. If the internalist holds that "States, or experiences . . . owe their identity as particulars to the identity of the person whose states or experiences they are," the externalist holds that "no fact is only accessible to a single person,"¹⁶ and finds it merely a sign of laziness or potential mistakes that it is easier to consult oneself than to consult Nature. An unexpected ally of externalism is Bergson, who declares: "Why should I go, against all appearances, from my conscious self to my body, then from my body to other bodies, while in fact I am located from the outset in the material world in general, and gradually limit the center of action which will be called 'my body', thereby distinguishing it from all other bodies?"¹⁷ Or Dewey: "There is nothing in nature that *belongs* absolutely and exclusively to anything else; belonging is always a matter of reference and distributive assignment."¹⁸ Spinoza, too, is an externalist.

In an important proposition of the *Ethics*, Spinoza declares that "The order and the connexion of ideas is the same as the order and the connexion of things."¹⁹ Spinoza locates the individual within a world of relations; to be an individual is in fact nothing other than being a particular intersection in a giant universe of relations. This is what it is to be a finite *mode* of an infinite

substance. One might think of a connectionist model, a neural net in which particular links are reinforced. Within this Spinozist universe of relations, any such intersection, whether it is a stone, a Fanta can, an animal or me, strives to persevere in existence, as the finite mode it is; this striving is the *conatus*.²⁰ What this implies for Spinoza's view of the 'subject' or 'agent' is that she will not be defined by her interiority, by private mental states, *a fortiori* private and foundational mental states. An individual is a certain quantum of striving, and thereby a certain relation between different points in the total causal network. And the difference between a live individual and a dead individual is simply that each is a different 'ratio' of motion and rest (*ratio motus et quietis*).²¹

Exactly as a contemporary practitioner of 'social' or 'affective' neuroscience might have it, the passions are not properties of an essential human nature, or an isolated individual, but rather of a relational spectrum between a plurality of individuals. Instead of Descartes' *cogito ergo sum* Spinoza says *homo cogitat*, 'man thinks'²²: there is no foundational self, but always a process – a network. Body and mind (and hence emotion and other forms of cognition; ideas and bodily states, etc.) are interrelated as particular relations within this network: "the order of the actions and passions of our body coincides in nature with the order of the actions and passions of the mind."²³ In this sense we should not overly emphasize a possible tension between a 'rationalist' tendency in Spinozism towards the second and third kinds of knowledge, and an 'affective' tendency.

Alexander Luria's "monistic" critique of psychology is explicitly Spinozist.²⁴ He thinks that both Feuerbachian materialism and psychoanalysis contribute to this monistic approach, unlike the 'soul'-oriented tradition of philosophical psychology. (Vygotsky disagreed with this essay for inappropriately trying to synthesize Freudianism and Marxism without acknowledging their specific differences.) In Luria's view, psychology was too dualistic – either too mechanistic, with no recognition of *activity*, or too vitalistic,²⁵ with no recognition of the causal (and thus deterministic)

relations within which life, including mental life, takes place – and it has been this way at least since Descartes' *Passions of the Soul*. Similarly, Vygotsky proposed a Spinozist 'reform' of psychology, arguing that

thinking is nothing other than a function of the brain. Mental life does not have an independent existence; following Spinoza's definition, thinking is not a substance but an attribute. A 'psychic' [or 'mental' – CW] phenomenon does not exist in itself but is rather (...) a necessary moment in a complex psychophysical process.²⁶

The first Spinozist point was an *ontological* one, about the nature of the world as a total set of interconnections within which we find ourselves as embodied agents (a 'relational' claim familiar in a different form, perhaps, to readers of Michel Callon and Bruno Latour: what they call 'actor network theory'). The second Spinozist point is the *non-independence of mind and brain* with regard to this world. What is missing so far is the '*self-sculpting*' element, which falls under the heading of emotions or affects. Vygotsky adds in another text that

Spinoza [...] was a determinist and, in contrast to the Stoics, claimed that man has power over his affects, that the intellect may change the order and connection of the passions and bring them into accord with the order and connections that are given in the intellect. Spinoza expressed a correct genetic relationship. In the process of ontogenetic development the human emotions get connected with general sets both in what regards the individual's self-consciousness and in what regards his knowledge of reality.²⁷

And he regularly emphasizes the *affective* dimension of communication (in stark contrast to what we would now think of as the information-theoretic approach to communication). This third point, acknowledging the 'primacy' of the affects, occurs in independent fashion in Vygotsky, in Negri and in Damasio, each time with reference to Spinoza. For instance, it's precisely inasmuch as we *belong* to a greater causal world that we are capable of effecting changes in ourselves and internalizing knowledge from the outside (this is also Spinoza's doctrine of liberation as emendation). The British philosopher Derek Parfit expressed precisely this insight of Spinoza's when he described the change that came over him once he began thinking about people, and the world as a whole, in reductionist terms:

Is the truth depressing? Some may find it so. But I find it liberating, and consoling. When I believed that my existence was such a further fact [like a soul or something existing separately from one's experiences], I seemed imprisoned in myself. My life seemed like a glass tunnel, through which I was moving faster every year, and at the end of which there was darkness. When I changed my view, the walls of my glass tunnel disappeared. I now live in the open air. There is still a difference between my life and the lives of other people. But the difference is less. Other people are closer. I am less concerned about the rest of my own life, and more concerned about the lives of others.²⁸

Now, given these three points, if we add a fourth and last one, it will take us to the 'social brain': it is the "common notions" we have which make our persons - and, Negri will add quite consistently, our brains - *common*. Common notions are conceptions of things "which are common to all" (*Ethics* II, proposition 38). There are common notions shared between bodies, and the more I 'have' or 'know' them, the more I have adequate knowledge of body, and more materialistically, the more my body has in common with other bodies, the more my mind is capable of perceiving things adequately (*ibid.*, proposition 39). The common notions allow us to step beyond the consideration of singular things and see (some of) the greater network-machine beyond us: we then see how finite modes are produced by an infinite substance. They are not to be confused with an aesthetic or sensory modality such as the *sensus communis*. Put differently, with reference to the affects: they are necessarily social, being about 'otherness' or 'exteriority'. For example, laughter and sobbing are distinctly human features activated by limbic structures; importantly, *they are the first two social valorizations that children make*, and they induce responses in others that are highly predictive of emotional states.²⁹

Let's move now from the Spinozist context to the *socialist cortex* (in the language, summarized, of one Bolshevik child psychologist in the 1930s, but also of Vygotsky himself, as we shall see). If this sounds like a leap from the quiet, cautious lifestyle of Bento Spinoza, one should bear in mind the explicit political ramifications of his metaphysics (to be precise, the two are on the same plane): Spinozism is *the*, or at least *a* key form of 'absolute democracy',

understood as a situation in which spontaneous practices that are generated by civil forms of interaction and cooperation are never taken as 'fixed' by the State. As Negri notably has done much to emphasize, Spinoza holds that all other forms of government are warped, constraints on human society, whereas democracy is its natural fulfillment.³⁰

The socialist cortex

Given this Spinozist framework, the first real 'pass' towards the vision of the brain itself as social – of cerebral architecture as reflecting changes in the linguistic, social and cultural environments – was made by Lev Vygotsky and his collaborator Alexander Luria in Russia in the 20s-30s. Vygotsky died quite young but he managed to lay the foundations for a variety of fields of inquiry (he and Luria are founders of neuropsychology, along with Kurt Goldstein,³¹ and he is a first-rank figure in social psychology, linguistics and developmental psychology). Among the unpublished manuscripts he left behind, one was on *Spinoza's Doctrine of the Emotions*, in light of but also as the basis for a 'psychoneurology'. The context in which the ideas that concern us appear is in Vygotsky's work on the development of language in the child. It has powerful resonances with 'Baldwinian evolution', an understanding of evolution which allows for behavioral adaptation to precede and condition major biological changes, so that when "useful behavior spreads within a population and becomes important for subsistence, it will generate selection pressures on generic traits that support its propagation"³² (particularly in the case of language: the acquisition of new traits by members of the population changes the social environment and hence sharply intensifies the selection pressures on members of subsequent generations to acquire language), or again, "that successful learners will do better in evolutionary competition even though what is learned is not inherited"³³; this is also referred to as the 'Baldwin Effect'.

It may not be surprising that the intellectual trajectory of the brilliant Soviet neuropsychologist intersects with another fan of Spinoza, the great social reformer of the early twentieth century, John Dewey. For Dewey, thought is necessarily symbolic and symbolism is necessarily social, hence *the mind is social*. Another way of putting this, or possibly a component of it, is to say that there are sources of experience outside the individual:

We live from birth to death in a world of persons and things which is in large measure what it is because of what has been done and transmitted from previous human activities. When this fact is ignored, experience is treated as if it were something which goes on exclusively inside an individual's body and mind. It ought not to be necessary to say that experience does not occur in a vacuum. There are sources outside an individual which give rise to experience.³⁴

Experience and action or behavior are primary for Dewey (as presumably for all pragmatists), and he believes behavior can be 'culturally' selected for in parallel to natural selection, a view which seems to be influenced by Baldwin: "one form of life as a whole (is) selected at the expense of other forms. . . . What difference in principle exists between this mediation of the acts of the individual by society and what is ordinarily called natural selection I am unable to see."³⁵ However, Vygotsky found Dewey's Aristotelian extension of the 'tool' metaphor (language now becoming the tool of tools) too metaphorical, too broad.³⁶ Another difference between them has to do with the status of animals, which do not possess thought for Dewey, whereas Vygotsky integrates into his system a good deal of Wolfgang Köhler's work with apes, prefiguring the contemporary primate studies I mentioned above. But for present purposes these differences are irrelevant; what remains important is that they share an extreme emphasis on *activity*, that is, thought and the brain understood as action, as activity.

Vygotsky describes linguistic activity as necessarily intersubjective: learning a concept involves invoking it, linking it with the performance procedure and external information for which it stands. He calls this the "outside-inside" principle, namely, that symbolic thought first represents external action, and only later becomes internal speech (i.e., thought).³⁷ He

argues that concepts and functions exist for the child first in the social or interpersonal sphere and only later are internalized as intrapsychic concepts. Contra Piaget in particular,³⁸ Vygotsky argues that we don't move from a solitary, 'autistic' or 'egocentric' starting-point towards a gradual socialization, but rather from socialization towards individuality. In these different visions of child development, Piaget looks for universal laws of development, whereas Vygotsky always stresses the plurality of social environments as an irreducible factor in development. But the lessons to be learned go beyond child psychology:

Thus the central tendency of the child's development is not a gradual socialization introduced from the outside, but a gradual individualization that emerges on the foundation of the child's internal socialization.³⁹

In the Spinozist terms outlined above, *we don't compose the network(s), they compose us*. So far, this is pretty well known – we've just restated the necessarily social character of *mind* or *intelligence*. Granted that the individual is social and cannot be defined without reference to social factors as primary as the relation of child to mother, what is new is something further, and tied to plasticity: there may even be evidence of consequences in our central nervous system derived from early social interaction. *Past experience is embodied in synaptic modifications*. The functional organization of the human brain can be said, in both the Vygotsky-Luria sense and in Deacon's sense, to reflect socially determined forms or types of activity. As Alexandre Métraux puts it, the origins of the higher psychological functions such as thinking, believing, wanting, etc. are not to be sought in the brain or some hidden spiritual entity called 'spirit' or 'mind', but in the activity of the members of a society.⁴⁰ These higher functions, one can add, emerge out of "the dialectical interaction between specific biological structures (embodiment) and culture (situatedness) through a specific history of development (epigenesis)."⁴¹

More dramatically put, as Luria does:

The fact that in the course of history man has developed new functions does not mean that each one relies on a new group of nerve cells [...]. The development of new 'functional organs' occurs through the development of new *functional systems*, which is a means for the unlimited development of

cerebral activity. The human cerebral cortex, thanks to this principle, becomes an organ of civilization in which are hidden boundless possibilities.⁴²

He adds that

Social history ties the knots that produce new correlations between certain zones of the cerebral cortex.⁴³

Now we begin to see something new, namely what I referred to as “the socialist cortex”: the Bolshevik child psychologist Aaron Zalkind declared (as quoted by Vygotsky) that “The cortex is on a shared path with socialism, and socialism is on a shared path with the cortex.”⁴⁴ A kind of avant-gardism!

And Vygotsky himself asserts that

History, changing the human type, depends on the cortex; the new socialist man will be created through the cortex; upbringing is in general an influence upon the cortex.⁴⁵

If this were a longer study it would be useful at this point to look into the question of Vygotsky’s Marxism. He rejected most of the attempts in his day to link Marxism to psychology – including, as we saw, one by Luria – as being inadequate and misconceived; his claim that human mental functions are irreducibly *social* does not have to be seen as *per se* derived from Marxism, although he connects himself to this tradition in many other ways, but can also be connected to the French sociological tradition of Émile Durkheim, Lucien Lévy-Bruhl, and Maurice Halbwachs.⁴⁶ However, the claim that mind/brain must be understood as “the aggregate of internalized social functions,” once relations have become functions for the individual,⁴⁷ is explicitly derived from Marx’s Sixth Thesis on Feuerbach: “Human essence in its reality is the sum of social relations.”⁴⁸ That is, Vygotsky is seeking to put cerebral flesh onto the Marxian ontological claim about relations.

The avant-garde brain

The new Socialist man will be created through the cortex ... Notice, however, that Vygotsky's 'socialist cortex' stands or falls as a concept without Marxist theory. We would be more likely today to speak of plasticity, of the effect of various ecological dimensions on cerebral development, including the role of maternal care in hippocampal plasticity in young rats⁴⁹ and the effects of cortical microstimulation (a type of experimentation originally pioneered by Wilder Penfield in the 1930s, on epileptic patients) in "quantifying the relation between perception and neuronal activity" and thereby, "inducing a phenomenal state"⁵⁰; more speculatively, instead of specifically calling the cortex the organ for socialism, we would point, following Terrence Deacon, to the manifestations in cortical architecture of our symbolic, linguistic, and even cultural life (a notion which is closely related to current debates over 'niche construction'), or, following J.J. Gibson and Ed Hutchins, we would point to the ways in which perception is necessarily 'scaffolded' and cognition 'distributed'.

We are a 'symbolic species', in Terrence Deacon's phrase, not because symbols float around in our bloodstream, but because "symbols have played a major role in shaping our cognitive capacities in ways that are complementary to their special functional demands"⁵¹; "language has given rise to a brain which is strongly biased to employ the one mode of associative learning that is most critical to it,"⁵² namely, "the most extensive modification to take place in human brain evolution, the expansion of the cerebral cortex, specifically the prefrontal cortex, reflects the evolutionary adaptation to this intensive working memory processing demand imposed by symbol learning."⁵³ Hence there is a 'co-evolution' of language and the brain. We have learned since at least Walter Benjamin to recognize the *historicity of perception*; Luria recognized this through his experiments on visual illusions during trips to Uzbekistan in the 1930s; different subject groups, depending on their degree of Westernization, had a more or less high chance of seeing the illusions: "the more the subjects had dealt with abstract aspects of everyday practice, the less their vision was natural," with visual-motor

recollection playing a key role – *and this recollection being, not a biological invariant* but a process ‘determined’ by socio-historical processes.⁵⁴

We might say, ‘The cortex is the locus of avant-gardism’. Think of Deleuze’s phrase: “Creating new circuits in art means creating them in the brain” (“Créer de nouveaux circuits s’entend du cerveau en même temps que de l’art”)⁵⁵ Indeed, there is an entire aesthetic dimension of our construct which I have not discussed here, the first instance of which is Deleuze’s determination of the brain in its plasticity (for instance with reference to Antonioni, in the cinema books). Much like in Benjamin, this is the double-barreled idea that a *new kind of brain* is required to grasp new spatio-temporal, perceptual, chromatic, affective arrangements, such as the modern city, the neo-realist city, etc., and conversely, these arrangements *give rise to* a new kind of brain. It is a very unique understanding of neural plasticity. Interestingly, Deleuze’s approach to the brain also has the advantage of bypassing the usual *linguistic* theories of the mind, or of getting one stuck in debates over the status of representations. And one recalls the vehemence with which Deleuze rejects attempts to apply linguistics to cinema: when he invokes a ‘cerebral’ dimension in his discussions of perception, image, time and so forth, it is not in order to reduce the ‘artistic’ dimension to a manageable set of quantities or even processes to be studied by a nefarious neurophilosopher (even one with additional firepower from CAT and fMRI scans); it is a way of opening onto the openness of perception without immediately sealing it off into linguistic categories.⁵⁶

Indeed, one dimension of the tradition of the ‘social brain’ that is currently popular is ‘neuroaesthetics’, not in the sense of finding neural correlates of aesthetic experience (promoted by scientists such as Semir Zeki or Jean-Pierre Changeux), but in Warren Neidich’s sense that stresses neural plasticity in relation to the aesthetic environment. Much as one can say ‘You don’t see with your retina, you see with your cortex’ (Christof Koch), one can add ‘Avant-gardism and its reliance on the plasticity of perception happens in and through the cortex’. From Mriganka Sur’s “rewired ferrets” to the

recently studied young rats whose hippocampus develops differently depending on what kind of maternal care they receive, and onto the Benjaminian realization of the historical conditioning of our forms of perception, we are all avant-gardists in a sense; the same sense in which, according to Deacon, “prefrontal overdevelopment has made us all *idiots savants* of language and symbolic learning.”⁵⁷

The idea is that the brain itself, less in its ‘static’, anatomical being than in its ‘dynamic’, physiological being – *in actu*, then – displays features which reflect its embeddedness in or belonging to the social world. The externalist-Spinozist point to be derived here is that we can only have knowledge about the inner states of others, and indeed, of our own, thanks to the overall structure of symbolic activity (à la Deacon) which externally exhibits the existence of such states, and further, creates the structure in which such states emerge. Most people don’t realize that Vygotsky and Luria *meant the brain itself* when speaking about these dynamic, self-transformative features; they usually describe these as belonging to *mind* or *intellect*. But Vygotsky and Luria were materialists! (Both in the Marxist sense as seen above with respect to the embeddedness of the person in the world of networks – ‘relations’ – and in the more naturalistic sense that they believed intellectual processes could be explainable in terms of, or at least in a causally integrated relation to, cerebral processes.) The brain for them is no longer just an ‘organ’ mediating between mind and society, through language – not just a “physiological abstraction, an organ cut out from the totality of the skull, the face, the body as a whole,” as Feuerbach put it.⁵⁸ Extending from the social mind to the social brain is a major step *towards*, or *for* materialism. However, neither neurally correlated social cognition nor even Machiavellian primates seem to display anything like the activity of the ‘socialist cortex’, our shorthand for the transformative dimension of the plastic, socially plastic brain. For this we need not only Spinozist affects (along with his reduction of the universe to relations between portions of motion and rest), but a theory of transformation. Behind Vygotsky and Negri, there is also Marx.

General intellect

As I mentioned at the outset, the notion of social brain appears in Marx's *Grundrisse*, notebooks VI-VII, a text known as the "Fragment on Machines" which has had particular influence on the Italian autonomist tradition of Marxism. There, Marx speaks of the "general productive forces of the social brain."⁵⁹ The idea is that humanity's increasing use of automation and of developing networks of communication and transportation has brought about a kind of metaphysical shift in who and what we are, seen here from the angle of labour:

... [T]he production process has ceased to be a labour process in the sense of a process dominated by labour as its governing unity. Labour appears rather as a conscious organ, scattered among the individual living workers at various points of the mechanical system; subsumed under the total process of the machinery itself, as itself only a link of the system, whose unity exists not in the living workers, but rather in the living (active) machinery, which confronts his individual, insignificant doings as a mighty organism.⁶⁰

Later on in the text, Marx returns to this almost Laplacian level of contemplation and now uses the expression "general intellect" (in English in the original; the provenance of this expression is unknown):

... [N]ature builds no machines, no locomotives, railways, electric telegraphs, self-acting mules etc. These are products of human industry; natural material transformed into organs of the human will over nature, or of human participation in nature. They are *organs of the human brain, created by the human hand*; the power of knowledge, objectified. The development of fixed capital indicates to what degree social knowledge has become a *direct force of production*, and to what degree, hence, the conditions of the process of social life itself have come under the control of the general intellect and been transformed in accordance with it.⁶¹

What Marx is saying is that the real 'operator' or 'agent' of transformation, indeed the sole remaining actor in this process, is the social brain; it has become the productive force itself. In the words of Paolo Virno, "Rather than an allusion to the overcoming of the existent, the 'Fragment' is a sociologist's toolbox and the last chapter of a natural history of society."⁶² That is, it is meant as a description of empirical reality.⁶³ The actor is neither the

machines by themselves nor the old-fashioned humanist 'autonomous rational animal', but rather the 'General Intellect', which resides both in humans and in intelligent machines. Comparisons have been made between this idea of 'General Intellect' and Teilhard de Chardin's 'noosphere' (roughly, a vision of an ultimate stage of development of the universe in which increasing complexity but also technological interrelation and interdependence produce a kind of 'pure mind', total intelligence, total reflexivity, as the final outgrowth of a process that began with basic forms of matter, moving towards atoms and molecules, organisms and ultimately the human mind itself),⁶⁴ and indeed there is something uncomfortably spiritualistic about the idea, as if intellect were more real than a piece of flesh or silicone. This may indeed be a Hegelian residue in Marx, a residue of *Geist*, and is also probably why General Intellect and its twin concept, 'immaterial labour', have been the targets of so much hostile criticism from the part of more orthodox Marxists, who feel as if Grandpa gave away the store, so to speak.

If I am emphasizing the term 'social *brain*' here, it's precisely to show that it's part of the real ('wet' rather than 'dry') natural world, not a virtual, strictly informational network. Further, just because the brain is irreducibly social does not mean that it is an 'empire within an empire' or 'kingdom within a kingdom' (in Spinoza's famous phrase from the Preface to Book III of the *Ethics*, in which he rejects the idea that we are somehow apart from the rest of Nature, an *imperium in imperio*). I refer back to the Spinozist ontology of relations and find support in this also from Negri's recurring invocations of 'ontology' as a political necessity.⁶⁵

The Spinozist brain, the social brain cannot be extracted or abstracted from this universe of relations (recall Vygotsky's arguments against Piaget's 'egocentric' perspective). As such, it cannot or should not be confused with either of two major positions or attitudes within twentieth-century European thought:

– with the phenomenological outlook (according to which “Man thinks, not the brain,” in Erwin Straus’ words⁶⁶), or with Varela’s enactivist model, which is rich and full of possibilities but hardly socio-political ones; Varela is our Piaget, in a sense: a new idealist, a new metaphysically grounded solipsist for whom the Self is self-positing, self-grounding rather than constituted in and through relation, or challenges of the ‘outside’, whether this is construed as a Darwinian environment or a Spinozist causal universe.⁶⁷ If we were not speaking of the brain we could be phenomenologists of the social world; but as I have emphasized, we are in materialist territory here.

– with the classic distinction between natural sciences and human sciences, *Naturwissenschaften* and *Geisteswissenschaften*, which its very name seeks to overcome: this distinction is crucial for thinkers like Husserl, Heidegger and Sartre,⁶⁸ but also the Frankfurt School. No distinction here between the brute, inanimate world of nature, animals and machines on the one hand and a free, spiritual world of self-interpreting *Dasein* on the other hand. Suffice it to recall here the charming formula Negri proposed for understanding Deleuze-Guattari’s *Mille plateaux*: that it was the last great work of the *Geisteswissenschaften*, but where *Geist* was replaced by the brain.⁶⁹

Scaffolding, tools and prostheses

I have said that the social brain is not wedded to a concept of ‘privacy’ or ‘interiority’, the way the Cartesian cogito, but also the phenomenological self (or body, in its embodied variant) are. It is an *externalist, relational* concept. In a sense, the novelty of the social brain appears most striking in regard to a kind of garden-variety, hermeneutical self. If we recall that Vygotsky’s concepts are born out of a reflection on linguistic development, and that the ‘affective’ dimension that both Vygotsky, Negri and Virno draw out of Spinoza is ‘always already’ social – such that the general intellect itself is permeated with the “linguistic cooperation of a multitude of living subjects”⁷⁰ – we can see a bit better why the distinction between the natural

and the 'hermeneutical' is of little use here. Ontologically there is no hard and fast border between the natural and the artificial, and thus between a world of amoebas and cane toads on the one hand, and a world of Byrons, Hölderlins or Mandelstams on the other hand. The potential of an agent is inseparable from what Negri calls the 'set of prostheses',⁷¹ essentially the possible set of "scaffolding," networks and technological extensions of our perception, cognition and action. The idea of "scaffolding," which has been associated with Andy Clark in recent discussions of cognition (and Clark takes the idea from J.J. Gibson's work in the Sixties), is that we are inseparable from the "looping interactions" between our brains, our bodies, and "complex cultural and technological environments."⁷² In other words, our brains have the talent for making use of the environment, "piggy-backing on reliable environmental properties,"⁷³ which is in fact a far more economical and *swift* action procedure than processing representations of objects. Scaffolding is one of the vehicles humans employ, so that language, culture and institutions *empower* cognitions.⁷⁴

On this view, the brain is not a central planner but possesses a "scaffolding" which is inseparable from the external world.⁷⁵ Indeed, the biological functioning of our brains themselves "has always involved [using] nonbiological props and scaffolds,"⁷⁶ with direct consequences for brain architecture itself: "a youngster growing up in a medieval village in twelfth-century France would literally have different neural connections than a twenty-first-century American adolescent who has spent serious time with computer games."⁷⁷ There is no longer a real separation between body and extension, brain and tool. Vygotsky speaks of "psychological tools" which alter the flow of mental functions by use, such as the knot in the handkerchief: "When a human being ties a knot in her handkerchief as a reminder, she is, in essence, constructing the process of memorizing by forcing an external object to remind her of something; she transforms remembering into an external activity."⁷⁸ But the concept of tool is still too instrumental, that is, too *external*. Indeed, in his day Vygotsky was attacked by Party psychologists for

‘virtualizing’ the concept of tool or that of labor, and allowing for ‘mental’ factors such as culture to be determinations, rather than strict economic factors.⁷⁹ Given the degree of ‘openness’ of the central nervous system, and on the ‘personal’ level, our ability to identify with *non-biological* extensions of our body (as has been shown in great detail in experiments by V.S. Ramachandran, Atsushi Iriki and others, from diverse perspectives), the ‘artificialist’ perspective, in which body and prosthesis, indeed, body and tool, *merge*, is not so far off. What Negri speaks of in Spinozist terms as a kind of commonness implies that there is no longer a separation between brain and tool as two distinct entities.⁸⁰ In Negri’s terms,

The tool [...] has entirely changed. We no longer need tools in order to transform nature [...] or to establish a relation with the historical world [...], we only need language. Language is the tool. Better yet, the brain is the tool, inasmuch as it is common.⁸¹

The brain is “common” inasmuch as it is constituted by and inseparable from the network of relations to which we belong. What Spinoza’s common notions, Marx’s General Intellect and the Vygotskyan ‘socialist cortex’ indicate is precisely this commonness, as opposed to the ‘classic’ idea of thinking as a solitary, contemplative activity (I turn to some potential pitfalls of this commonness below). Negri puts it strongly:

The metaphysics of individuality (and/or of personhood) constitutes a dreadful mystification of the multitude of bodies. *There is no possibility for a body to be alone.* It cannot even be imagined. When man is defined as individual, when he is considered as an autonomous source of rights and property, he is made alone. But one’s ownness does not exist outside of the relation with an other. The metaphysics of individuality, when confronted with the body, negates the multitude that constitutes the body in order to negate the multitude of bodies.⁸²

The ‘social’ in the ‘social brain’ means that we cannot achieve the privacy of a Cartesian or Husserlian meditator, contemplating the world, but also that we can never be truly cut off from it; the ‘brain’ in the same expression means that we are not just dealing with a formal property of an arrangement of thoughts or otherwise construed mental states, but with an embodied, biological, natural agent.

Envoi

To sum up. First, there is no absolute ontological separation between an individual agent and her brain, and the total network of affects, objects and structures around her. "Subjectification, event or brain – aren't these much the same thing?"⁸³ Second, individuation is an effect of power, both in the Vygotskian sense that 'I' am a product of socialization, and not the other way round, and in the Spinozist sense that the more 'extensions' I have – a notebook, a computer, a pen, a knot in my handkerchief, a friend's telephone number, a Party membership card, and so forth – the greater my power of acting will be. As Althusser said somewhat whimsically, recalling an earlier era: "a Communist is never alone."⁸⁴ Not just in a trivial sense of 'greater influence', but because (recall the idea of common notions) I will have more ideas of more bodies. Does the individual disappear in the nets of this reticulated network? No, for the above reason (connection is an increase in power), and also because what Félix Guattari called the "production of subjectivity" is only possible *because* of the presence of common components in the world of brains: it is not like a popularity contest where I am pushed to 'connect' with ever more people! Third, the social brain concept presented here is definitely not reducible to the individual's manifestations of a social world around her, since on the contrary (*pace* Vygotsky, Deacon and others) cerebral architecture reflects, however minutely, forms of social, linguistic, cultural organization. Does the group then have a 'group mind'?⁸⁵ A unified, constrained, "transsubjective reality"⁸⁶? The foregoing discussion does not necessarily entail that – and indeed, that the brains of a young rat, a young child, an American teenager and a Russian chess master respectively reflect various epigenetic, environmental traits does not at all imply that a club, a sect or a mob needs to be described as possessing a 'mind'.

I have simply tried to show that there is a way of thinking about the brain which retains a socio-political dimension while at the same time dealing

with naturalistically specifiable features of development; a genuinely *materialist* perspective. From the social dimension of mind – materialized through ethological and single-neuron studies, ontologically founded with the doctrine of common notions and of being as relation – through the fundamental plasticity of the brain and the remodelling by language and culture of the functional architecture of the cortex: this is the Spinozist tradition of the social brain.

Endnotes

* Thanks to Deborah Hauptmann and Warren Neidich for their invitation; to Katja Diefenbach, Luc Faucher, John Protevi and Georg Theiner for useful suggestions.

1. Deleuze in conversation with Toni Negri in 1990 (originally in *Futur Antérieur*), in Deleuze, *Negotiations*, p. 176.
2. Dorothy Cheney, Robert Seyfarth, Barbara Smuts, "Social relationships and social cognition in nonhuman primates"; Leslie Brothers, "The social brain"; Robin Dunbar, "The social brain hypothesis," and the brand-new collection ed. by Dunbar *et al.*, *Social Brain, Distributed Mind*.
3. See Losonsky, *Enlightenment and Action*, pp. 8-9; Clark, *passim* including his *Microcognition*, pp. 63-66, 132-135, and Wheeler's *Reconstructing the Cognitive World* (which argues that we don't even need to normatively impose a 'Heideggerian AI' à la Dreyfus; it comes on its own).
4. Marx, *Grundrisse*, pp. 694, 709.
5. The most eloquent version of this slightly paranoid critique (and the Rand Corporation, DARPA and others will keep such theorists busy for generations to come) is the long, anonymous text entitled "L'hypothèse cybernétique," in the post-Situationist journal *Tiqqun* 2 (2001), p. 40f.
6. Humphrey, "The social function of intellect" (originally 1976), reprinted in Byrne & Whiten, eds., *Machiavellian Intelligence*; see also the sequel volume of 1997, Whiten & Byrne, eds., *Machiavellian Intelligence II*.
7. Gallese, Keysers & Rizzolatti, "A unifying view of the basis of social cognition"; Gallese & Goldman, "Mirror neurons." A major anthology on imitation is Hurley and Chater, eds., *On Imitation*, vol. 1 of which contains several presentations papers by Rizzolatti *et al.*
8. Blakemore, Winston & Frith, "Social cognitive neuroscience: where are we heading?", p. 217; Gallese, Keysers & Rizzolatti, "A unifying view of the basis of social cognition," p. 397. The research from Iriki's RIKEN lab on macaque monkeys (but also on certain rodents that have also been trained to use tools) is usefully summarized in Laura Spinney's profile "Tools maketh the

monkey,” and in the lab’s report “Using tools: the moment when mind, language, and humanity emerged.”

9. Baldwin, “A new factor in evolution,” p. 440; Depew, “Baldwin and his many effects,” in Depew & Weber, eds., *The Baldwin Effect Revisited*, p. 7. I won’t be able to discuss Baldwin in this paper but his views concerning language as a supplemental level beyond Darwinian evolution offer intriguing resonances with Vygotsky and Negri.

10. See e.g. Cacioppo & Berntson, “Analyses of the social brain”; Cacioppo, Berntson & Adolphs, *Essays in social neuroscience*.

11. For Hutchins, see his *Cognition in the Wild*; a recent example of ‘distributed cognition’ work is Alač’s “Working with Brain Scans.” After writing the earlier versions of this paper I discovered Cole and Wertsch’s “Beyond the Individual-Social Antinomy in Discussions of Piaget and Vygotsky,” which makes some of the connections here (notably between Vygotsky and the idea of ‘distributed cognition’), but does not mention the actual relation to the *brain*. Geertz’s quote is from his essay “The Growth of Culture and the Evolution of Mind,” p.76; thanks to John Sutton for this reference.

12. Metzinger & Gallese, “The emergence of a shared action ontology,” p. 549.

13. Negri, *Marx beyond Marx*. For further background on *Autonomia* see the prefaces by Yann Moulier and Matteo Mandarini to Negri, *Politics of Subversion* and *Time for Revolution*, and Lotringer and Marazzi, eds., *Autonomia*.

14. The only work I am aware of which makes a connection between the autonomist Marxist theory of the ‘social brain’ and Vygotsky’s landmark research at the intersection of social psychology, developmental psychology, linguistics and neuroscience is Virno, “Multitude et principe d’individuation”; Virno was himself active in the former movement.

15. Vygotsky, “Spinoza’s Theory of the Emotions” and for his biography, Valsiner and van der Veer, *The Social Mind*, p. 324f. On the idea that Spinoza anticipated contemporary ‘affective neuroscience’ (from Damasio to Gallese’s study of mirror neurons), see the short but useful commentary by Ravven, “Spinoza’s Anticipation of Contemporary Affective Neuroscience.”

16. Respectively, Strawson, *Individuals*, p. 97 and Dretske, *Naturalizing the Mind*, p. 65.

17. Bergson, *Matière et mémoire*, pp. 46-47.

18. Dewey, *Experience and Nature*, p. 192.

19. Spinoza, *Ethics*, II, prop. 7
20. Spinoza, *Ethics*, III, prop. 6. This striving is frequently misread outside of Spinoza scholarship as being specifically 'vital' or 'biological', including in Damasio's version where it becomes a particular disposition of cerebral circuits such that an internal or external stimulus will induce them to seek out their well-being or survival. For a rather touching expression of the 'goalless drive' quality of the conatus, see Boris Achour's 'Conatus' video series, such as <http://borisachour.net/index.php?page=conatus-le-danseur>.
21. Spinoza, *Ethics*, IV, prop. 39, building on II, prop. 13, Scholium (the "little physics" of the *Ethics*), especially lemmata 1, 7, scholium; *Short Treatise*, II, 14.
22. Spinoza, *Ethics*, II, axiom 2. For a nice summary, see Morfino, "Ontologie de la relation," § 5.
23. Spinoza, *Ethics*, III, prop. 2, scholium.
24. Luria, "Psychoanalysis as Monistic Psychology" (1925), in Luria, *Selected Writings*.
25. In the yet unwritten history of vitalism (a project in which I am partly engaged), a study of Vygotsky's and Bakhtin's respective critiques of vitalism would make an interesting chapter. See the unknown text by Bakhtin on Driesch translated in Frederick Burwick & Paul Douglass, eds., *The crisis in modernism. Bergson and the vitalist controversy*. It is possible that, despite the former's invocation of a common cause between socialism and the cortex, both Vygotsky and Bakhtin (with Spinoza on their side) would not fully follow the Deleuzean-Negrian immanentist and vitalist gesture to make the brain itself a locus of resistance, since this would lead into contradictions: (a) all humankind possesses such brains, yet (b) not all of humankind is either 'avant-garde' or 'revolutionary'; I am responding here to an objection first put to me by Katja Diefenbach. However, one might reply that the brain is a tool...
26. Vygotsky, "The genesis of higher mental functions," quoted in Métraux, "Die zerbrochene Psychophysik," p. 197 (my translation from the German).
27. Vygotsky, "On Psychological Systems," in Vygotsky, *Collected Works*, vol. 3, p. 103.
28. Derek Parfit, *Reasons and Persons*, p. 281.
29. Deacon, *Symbolic Species*, p. 419.

30. On the role Spinoza played in the radical thought of Negri, Balibar and others, see the very detailed (but turgid) review essay by Céline Spector, "Le spinozisme politique aujourd'hui."
31. Van der Veer, "Some Major Themes in Vygotsky's Work," p. 5.
32. Deacon, *Symbolic Species*, p. 345.
33. Bechtel and Abrahamsen, "L'explication mécaniste."
34. Dewey, *Experience and Education*, p. 39.
35. Dewey, *Early Works*, p. 50, quoted by Depew, in Depew & Weber, *The Baldwin Effect Revisited*, p. 28, n. 3. Valsiner and van der Veer's ambitious book *The Social Mind* contains chapters on Baldwin, Dewey and Vygotsky (as well as George Herbert Mead, Pierre Janet and a variety of lesser-known figures chiefly from the history of social psychology).
36. Vygotsky, *Mind in Society*, p. 53; Vygotsky, *Collected Works*, vol. 3, p. 88.
37. Bargh, "Bypassing the will," p. 50; see Bruner's introduction to Luria, *The role of speech in the regulation of normal and abnormal behavior*; Donald, *A mind so rare*, p. 250.
38. Chapter 2 of *Thinking and Speech* (formerly translated as *Thought and Language*) is devoted to Piaget, as is chapter 6, in part. See also Cole and Wertsch, "Beyond the Individual-Social Antinomy in Discussions of Piaget and Vygotsky."
39. Vygotsky, *Thinking and Speech*, ch. 7, in Vygotsky, *Collected Works*, vol. 1, p. 259.
40. Métraux, "On Luria and the mind-body problem" (ms.), § III.
41. Zlatev, "Epigenesis of Meaning in Humans and Robots," p. 190.
42. Luria, "Vygotsky and the Problem of Functional Localization," in Luria, *Selected Writings*, p. 279. Luria is developing themes from Vygotsky's "Psychology and the Theory of the Localization of Mental Functions," translated in Vygotsky, *Works*, vol. 3.
43. Luria, "Vygotsky and the Problem of Functional Localization," in Luria, *Selected Writings*, p. 279.
44. Aaron Zalkind, quoted in Vygotsky, *Pedologija Podrotska*, vol. 1 (Moscow, 1929), p. 14; quoted in van der Veer & Valsiner, *Understanding Vygotsky*, p. 320.
45. Vygotsky, *Pedologija Podrotska*, quoted in van der Veer & Valsiner, *Understanding Vygotsky*, p. 320.

46. In particular Halbwachs' *Cadres sociaux de la mémoire* (1925), which stressed the 'reconstructive' dimension of memory; see Kozulin, *Vygotsky's Psychology*, pp. 122-123. For a different view which emphasizes the Marxist dimension more strongly see Wertsch, *Vygotsky and the Social Formation of Mind*, p. 58f., and Eilam's "The Philosophical Foundations of Aleksandr R. Luria's Neuropsychology," § 2 (the paper is on Luria, but contains various remarks on Vygotsky). The most apt formulation is Métraux's: Vygotsky's "consistent Spinozist viewpoint" is also a "consistent Marxist viewpoint" ("Die zerbrochene Psychophysik," p. 206). I find the latter reading more convincing (see the image of the cortex and socialism) but it is clear that Vygotsky, like Lukács, Althusser or Negri after him, has to invent a heterodox form of Marxism.

47. Vygotsky, "The genesis of higher mental functions," in Wertsch, ed., *The Concept of Activity in Soviet Psychology*, p. 164.

48. "das menschliches Wesen (...) in seiner Wirklichkeit ist das Ensemble der gesellschaftlichen Verhältnisse."

49. D.L. Champagne, R.C. Bagot *et al.*, "Maternal care and hippocampal plasticity: Evidence for experience-dependent structural plasticity, altered synaptic functioning, and differential responsiveness to glucocorticoids and stress"; L.A. Smit-Rigter, D.L. Champagne, J.A. van Hooft, "Lifelong Impact of Variations in Maternal Care on Dendritic Structure and Function of Cortical Layer 2/3 Pyramidal Neurons in Rat Offspring."

50. Respectively, Romo, Hernández *et al.*, "Somatosensory Discrimination," pp. 387-388 and Bickle & Ellis, "Phenomenology and Cortical Microstimulation," p. 159. The experiments on macaque monkeys showed that a range of cognitive processes could be initiated and consummated on the basis of artificial stimuli delivered to specific columns of the somatosensory cortex. For more discussion of the implications of this research see my essay "Un matérialisme désincarné."

51. Deacon, "Multilevel selection in a complex adaptive system," p. 95.

52. Deacon, *Symbolic Species*, p. 336.

53. Deacon, "Multilevel selection in a complex adaptive system," p. 100.

54. Métraux (ms.), § III; Luria, "Towards the Problem of the Historical Nature of Psychological Processes," p. 269.

55. Deleuze, *Negotiations*, p. 60 / *Pourparlers*, p. 86, and the almost visionary discussion of the brain, art and color in *L'image-temps*, p. 266, n. 20 (along with

chapter 8 as a whole, which comprises a section entitled 'Donne-moi un cerveau', 'Give me a brain').

56. This Deleuzian approach to the brain is sometimes associated with Francisco Varela's notion of autopoiesis (emphasizing the self-organizing nature of life and mind – autopoietic systems essentially produce *themselves* as *individuals* whereas 'allopoietic' systems are, like regular machines, defined by an external output), but this model lacks any recognition of the *social*. Specifically on Deleuze's "neuroaesthetic," see John Rajchman's excellent discussion in *The Deleuze Connections*, pp. 136-138.

57. Deacon, *The Symbolic Species*, pp. 413, 416.

58. Ludwig Feuerbach, *On the Dualism of Soul and Flesh* (1846), in A. Schmidt, ed., *Anthropologischer Materialismus. Ausgewählte Schriften*, p. 177. Compare Bergson's image of the brain as the "bureau téléphonique central," as a mere "intermediary" between sensations and motions" (*Matière et mémoire*, pp. 26, 198) ... which Vygotsky finds too dualistic! (Vygotsky, *Collected Works*, p. 125). See overall chapter 3 of Bergson's book and Deleuze, *Cinéma 2*, p. 274.

59. Marx, *Grundrisse*, p. 694.

60. *Grundrisse*, p. 693.

61. *Grundrisse*, p. 706, emphasis his own.

62. Virno, "Multitude et principe d'individuation," section on "Marx, Simondon, Vygotski"; Marx, *Grundrisse*, p. 709.

63. Virno, "General Intellect."

64. Gere, "Brains-in-vats."

65. On the meaning of 'ontology' in Negri see my essays "Materialism and temporality" and "Antonio Negri's ontology of Empire."

66. Straus, *Du sens des sens*, p. 183.

67. Hence it is understandable that Luria was critical of Kurt Goldstein, another (brilliant) forerunner of Varela's, whose theory of organism makes it very much a solitary, creative and anomalous entity within the broader world of animate nature (I discuss the concept of organism further in "La catégorie d' 'organisme'"). See e.g. Luria, "Vygotsky and the Problem of Functional Localization," in Luria, *Selected Writings*, p. 277. After all, Luria, referring to himself and Vygotsky, spoke approvingly of "Pavlovian psychophysiology" as having "provided a materialist underpinning to our study of the mind" (*The Making of Mind*, p. 41).

68. In his famous “Matérialisme et révolution” (1946), Sartre describes materialism as an irrationalism, which removes man from the sphere of free, *verstehendes* action and forces him into a world of biological, then physical conditioning. Reason is then “captive, manœuvrée par des chaînes de causes aveugles” (*Situations philosophiques*, p. 86). Man as empire within an empire indeed! One might speak of ‘knee-jerk humanism’ here ...
69. Negri, “On A Thousand Plateaus,” § II.
70. Virno, “Les anges et le general intellect.”
71. Negri, “Alma Venus,” § 16b. These texts are also republished in Negri, *Time for Revolution*.
72. Clark, *Natural-Born Cyborgs*, pp. 11, 43. Clark intersects here with a good deal of recent cultural/literary/media theory (when it concerns itself with the relation between fiction, embodiment and technological forms) – see in particular Haraway’s “cyborgs” and Hayles’ “posthuman” subjects. But Clark is unique in that he speaks from *within* cognitive science – which also entails that there is no utopian dimension to his theory. Clark is not calling for a new hybridity or seeking to usher it into being.
73. Clark, *Being There*, p. 45.
74. *Being There*, pp. 21, 87.
75. On scaffolding, see Clark, *Being There*; for an original discussion of plasticity-remapping-‘cultured brain’ see Neidich, *Blow-Up*; some brief discussion in my essay “De-ontologizing the Brain.” Neidich’s idea has its own potential for being restated as a new form of what phenomenologists call ‘self-affection’, just as Marxist-operaist General Intellect has a potential to be restated as Pure Mind: ultimate idealism.
76. Clark, *Natural-Born Cyborgs*, p. 86.
77. Hayles, “Flesh and Metal: Reconfiguring the Mindbody in Virtual Environments,” p. 300.
78. Vygotsky, *Mind in Society*, p. 51; “The instrumental method in psychology.”
79. A.A. Talankin, speaking at the First All-Union Congress on Psychotechnics and the Psychophysiology of Labor, Leningrad, 1931. He also attacks Vygotsky on the related charge of importing ‘Western’ concepts from Freud and Gestalt theory into Soviet psychology. See van der Veer & Valsiner, *Understanding Vygotsky*, p. 377.
80. Negri, *Kairos. Alma Venus. Multitude*, § 16bis, p. 84.

81. Negri, "Alma Venus," § 16b. One can see resonances here with the work of Donna Haraway (with the focus on the category of prosthesis and the primacy of artificiality). And in works such as *Empire*, Hardt and Negri speak favorably of our posthuman, inseparably simian, human and cyborg nature (a viewpoint which is again fully Spinozistic), but they also distance themselves from "hybridity [as] an empty gesture" (p. 216), perhaps on political grounds.

82. Negri, "Towards an Ontological Definition of the Multitude," emphasis mine.

83. Deleuze in conversation with Toni Negri in 1990 (originally in *Futur Antérieur*), in Deleuze, *Negotiations*, p. 176.

84. To be precise, in his reflections on the critique of the personality cult, Althusser wrote: "In the beginning, we were few, and John Lewis is right: we were 'speaking in the desert', or what some thought was the desert. But one should be careful of this kind of deserts, or rather know how to trust them. Actually, "we" were never alone. Communists are never alone" (in *Réponse à John Lewis*, p.78). And at the end of his life, in his autobiography, he reprised the theme: "I was quite solitary or alone as a philosopher, and yet I wrote in the *Reply to John Lewis*, 'a Communist is never alone'" (*L'avenir dure longtemps*, ch. 14, p. 196; translation mine). Thanks to Yoshihiko Ichida for the reference.

85. Compare the recent discussion of 'group minds' in Philip Pettit, "Groups with minds of their own," and Rob Wilson, "Collective memory, group minds, and the extended mind thesis." For a helpful discussion of the pros and cons of the notion of group cognition see Georg Theiner and Timothy O'Connor, "The Emergence of Group Cognition."

86. At a meeting a few years back I was intrigued by Margarita Gluzberg's visual and theoretical performance "How to get beyond the market..." which proposed a kind of group mind achievable through aesthetic/hallucinatory means. However, this was quickly denounced as 'dangerously close to Fascism' by a loyal Frankfurt School theoretician, Diederich Diederichsen. So we might then ask, is the social brain fascist? Clearly, if we are speaking in a Spinozist context, the answer is No: one of Spinoza's chief concerns is to overcome a condition in which the 'multitude' is manipulated by political fear. He is the preeminent thinker of 'absolute democracy', as indicated above. As to our biological characteristics in and of themselves, unfortunately it is harder to make them bear some innately emancipatory role, albeit perhaps a potential one.

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