The Mismeasure of Thought: Some Notes on Organization, Scale and Experimentation in Politics and Science

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Abstract: This text is a new instalment in the ongoing research project carried out by the *Circle of Studies of Idea and Ideology* on the notion of an "impersonal emancipation". By this, we understand the proposition that the perspective from which one should probe and evaluate the effective features of our political space should not be that of individual consciousness and experience, but rather the artificial perspective generated by organizational processes of competing levels of complexity and abstraction as the political space we seek to grasp. In order to further our comprehension of this idea, we will read Fredric Jameson's concept of cognitive mapping through Hayek's theory of social complexity, Alain Badiou's phenomenology and Robert Rosen's approach to model theory.

Key words: collective organization, cognitive mapping, modeling

" at a time when the universal nature of spiritual life has become so very much emphasised and strengthened, and the mere individual aspect has become, as it should be, correspondingly a matter of indifference, when, too, that universal aspect holds, by the entire range of its substance, the full measure of the wealth it has built up, and lays claim to it all, the share in the total work of spirit that falls to the activity of any particular individual can only be very small"

Phenomenology of Spirit, Hegel

'How mad would he have to be to say 'He beheld
An order and thereafter he belonged
To it?"

In a Bad Time, Wallace Stevens

§1

This text is a new instalment in the ongoing research project carried out by the *Circle of Studies of Idea and Ideology* on the notion of an "impersonal emancipation"[1]. By this, we understand the proposition

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1   The original formulation of the term was presented by Oliveira 2015. For previous contributions to this research, please refer to Tupinambá 2014, pp.219-236, Tupinambá 2016, pp.156-193; CSII 2017, pp.347-364. As well as Yuan Yao's contribution to this same issue of Crisis and Critique. In Portuguese, a more comprehensive bibliography can be found here: https://www.ideiaeideologia.com/o-circulo

that the perspective from which one should probe and evaluate the effective features of our political space should not be that of individual consciousness and experience, but rather the artificial perspective generated by organizational processes of competing levels of complexity and abstraction as the political space we seek to grasp.

Taken solely as a claim about the analysis of capitalist societies, this proposition does not add much to the Marxist tradition of ideology critique and critique of political economy, both of which have always emphasized the mystifying effects that accompany the self-transparency of our personal experiences. It is rather as a *constructive* thesis about political militancy that the proposition of "impersonal emancipation" gains some interest, as it places new constraints on how we might approach key components of political life, especially the question of collective organization. What would it mean to think political organizations not as "instruments" in an already constituted strategic view, but as "organs" capable of interacting with a dimension of social reality that is both epistemologically and ontologically inaccessible to us as individual militants?

In this contribution I will approach this theme by arguing for the pertinence of three notions which have become important operators in this research, but which still lack any proper elaboration within this context. These are the concepts of *organization*, *experimentation* and *scale* - and, more importantly, their articulation within the sphere of collective political constructions. Through a debate with Fredric Jameson's concept of "cognitive mapping", I intend to argue that collective organizations - due to the very thing which makes us usually distrustful of them: their tendency towards *autonomization* from those who participate in them - can function as an alternative synthetic perspective from which to evaluate and intervene upon the political world. However, this thesis depends on a perspective-shift, from an approach to politics based on "experience" to one based on a political concept of "experimentation". Furthermore, the process through which organizations paradoxically detach themselves from their material basis, and which demands us to associate thinking to political experimentation, does not only lead us into an impersonal or formal space, but also implies the possibility of a change in the *scale* through which actions and agency are conceived.

§2
But before we can engage with these three concepts, it is important to understand how they emerged, still as vague notions, within the study of impersonal emancipation carried out by *CSII*. The scope of this research project can, in fact, be delineated through a rudimentary schematism, linking two oppositions: personal/impersonal (P/I) and domination/emancipation (D/E).

$$\begin{array}{ccc} \textbf{(1) P.D +} & \text{————} & \textbf{(2) I.D +} \\ & & \\ \textbf{(3) P.D +} & \text{————} & \textbf{(4) I.D + I.E} \end{array}$$
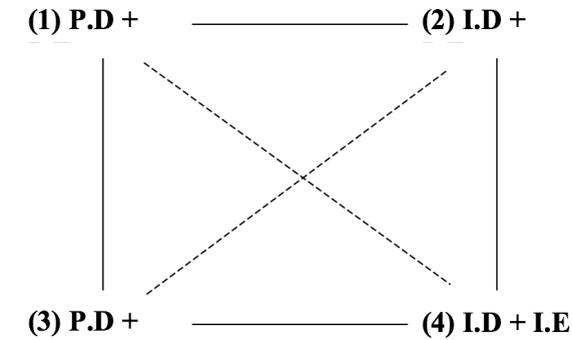
Let us briefly walk through them:

1. One can maintain that capitalism is a social form that is based on personal relations of domination (**P.D**), power structures which are masked under the mystifying abstractions of economy and value. If this is the case, then the struggle against capitalism, in order to be effective, must also be a personal or direct struggle between key social groups, and victories and failures are to be evaluated in terms of personal loss and gain on both sides (**P.E**).

2. One can maintain that capitalism is a social form in which, perhaps for the first time, social domination is truly abstract (**I.D**) - and excessive personifications of its power are in fact how one loses track of its actual logic. But if we are held in check by abstractions, then our struggle against capitalist sociality must be directed towards the concrete, in order to avoid getting caught up in these impersonal circuits (**P.E**). A consequence of this position is that the evaluation of what it means to transform the world becomes caught up with the difference between the concrete and the abstract: the more impersonal the world remains, the less we have changed it.

3. One can, on the other hand, agree with the critical assessment of

the first position, but disagree with the orientation of our political struggle, defending that capitalism remains caught up in the history of direct violence and domination (**P.D.**) and that is precisely why we must fight for the proper establishment of abstract and impersonal structures, based on common rationality and formal liberties, for example (**I.E.**). In this case, just like in the second position, the criteria for evaluating failure and success remains entangled, but in reverse, with the increase or decrease in personal or impersonal social relations.

4. The last position agrees with the second in defending that capitalism is essentially an abstract form of domination (**I.D**), but it also agrees with the third position, affirming that our struggle must move within the realm of impersonal abstractions (**I.E**). In a sense, it also agrees "ontologically" with the first position, in that it also maintains that there must be a certain common terrain between causes and effects, problems and solutions, and therefore seeks to evaluate social transformation within the sphere of abstractions and impersonal relations.

Even though positions **(3)** and **(4)** both feature the idea of a struggle towards or within the impersonal, it is only the fourth one which truly spells out the specific constraints of our current research[2].

The first condition, already implicit in the very connection between **I.D** and **I.E**, is that we adhere to a principle of "ontological homogeneity"[3]: the principle that causation and entailment depend on a certain common logical space, without which one element cannot affect another - in other words, only certain forms of abstraction have the adequate "infrastructure" to intervene upon other homogeneous abstractions. This first condition implies, therefore, that "impersonal emancipation" cannot only mean emancipation *from* the personal, rather pointing to a different *domain* of struggle, which might very well be indifferent to our individual or concrete situations. It is within this discussion that the notion of "scale" has emerged as a crucial theoretical question, since approaching

impersonality and abstraction as *domains* or *spaces* implies a theory of how different levels of sociality might co-exist with a certain degree of indifference to each other.

The second constraint of our research informs the first one as morphogenesis informs morphology - it is the principle of "autonomization"[4]: we do not assume the existence of a given formal field, but rather approach it through a consideration of the processes through which such "affective" and logical spaces are effectively constituted. This principle further informs what "impersonal emancipation" might mean, since it includes into the consideration of abstract spaces both the problem of how to subjectively relate to what comes to exceed us personally and the problem of identifying and taking hold of the means capable of objectively generating such independent spaces. It is primarily this question - the understanding of how structures can gain autonomy over their structuring conditions - which has led us to a renewed confrontation with the notion of organization.

Finally, a third constraint that comes with adopting the perspective of impersonal emancipation addresses the need for *cognitive unification* of our critical and constructive models - we could call it a principle of "world-building"[5]. Given that there is an ontological homogeneity between domination and emancipation (first condition), and given that this logical homogeneity is not guaranteed, but must be somehow generated and maintained (second condition), then it is also required of a project of impersonal emancipation that it be able to reformulate capitalist problems from within the perspective of this new "transcendental" point of view. For example: a theory of impersonal emancipation cannot be a theory for militants *about* the society of work - understood as the "other" of our own political project - it must rather be a theory *for militants in a society of work*, constructing a unified metric for dealing with work, leisure and political activity[6]. The need to produce unified models in which both our critical analysis of reality and our extrapolations towards future events are held together not by our conscious activity or our ideals, but by a single theoretical model brought

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2   Evidently, it is not a matter of arguing which one of the four positions best describe the actual world of radical politics, as much as recognizing that the fourth position is the least developed one of them. Regardless of how we view the interaction of these different poles in concrete struggles, or which currents of political thought we might try to map onto them, the fact remains that it is in our best interest to deepen our understanding of what "impersonal emancipation" might effectively mean.

3   This principle was first developed in the context of a Žižekian theory of transference, in Tupinambá 2016, pp.133-146

4   See *Real Abstraction and the Autonomization of Value* in Crisis and Critique Special Issue Vol I, n.II, pp.131-147

5   Discussions surrounding the need to "own the means of production of problems" in CSII have appeared in the debate between Gabriel Tupinambá and Edemílson Paraná through the virtual platform of the Boitempo publishing house - a co-authoured book, with the participation of Sabrina Fernandes, is currently under preparation.

6   See Tupinambà 2017.

us to the notion of "experimentation" as the name of a certain type of activity which "tests" hypotheses about the world which are inaccessible to any sort of direct experience.

Organization, scale and experimentation - these three ideas are in fact deeply interrelated here: the capacity for organizations to acquire some autonomy over those who constitute it can lead us to an indirect participation in spaces whose alternative scale make them logically irreducible to the measure of our individual experiences - spaces, therefore, which we can learn about only through experimentation, rather than through any sort of direct access. These experiments - which, respecting the principle of homogeneity, would have to be organizational in nature - can interact with other forces of similar ontological constitution - insofar as they are formally homogeneous in terms of the scale in which they consist as causally efficacious entities - leading us to situated knowledge of these abstract structures as well as a more reliable metric to the effects of our interventions.

§3

In a famous essay from 1998, Fredric Jameson put forward the concept of "cognitive mapping" - in fact, this term was presented more as a challenge than as a concept, since it would involve producing "the concept of something we cannot imagine" (Nelson & Grossberg, 1998)[7]. The task at hand, complicated by the fact it taps into the domains of artists and art critics in order to recuperate the didactic function of aesthetics, proposes an extrapolation of Kevin Lynch's theory of the "mental map of the city", presented in *The Image of the City* (Lynch), to the "totality of class relations on a global (...) scale" in a way that also lead to a new interpretation of Louis Althusser's famous definition of ideology as the "imaginary representation of the subject's relation to her real conditions of existence" (Althusser,). Just as Lynch associated urban alienation to the incapacity of city dwellers to represent for themselves the structure of their own urban spaces, Jameson seeks to define a special type of aesthetic alienation which prevents political actors from picturing the complex social and economic structures in which they move.

To track this dimension of aesthetics, Jameson proposes a periodization of three stages of capitalism, indexed by the way the spaces of capital's

self-valorization relate to the phenomenological constitution of the individual's world[8]. Firstly, there is the phase of "market capitalism". Here, the process concerns not so much the spatial expansion of capitalism so much as the transformation of "some old sacred and heterogeneous spaces into geometrical and Cartesian homogeneity, a space of infinite equivalence and extension", the "slow colonization of use value by exchange value" (1998). Aesthetically, the figuration of such new world gives rise to different forms of realism, that is, to the need of representing a social situation that remains of a similar "scale" as previous social formations, but which is now held together by a secular transcendence. In other words, the subjective experience of the world - the basic material for art - was at this point still conformal with the social and economic life which allowed for such individual experience space, what had changed was mostly the shift from a religious to a secular explanation of how these two poles related to one another.

However, this minimal compatibility between "a phenomenological description of the life of an individual and a more properly structural model of the conditions of existence of that experience" would be broken by the second phase of capitalism, that of imperialism or "monopoly capitalism" (1998). Here, and specially with colonial expansion, a scission is produced between lived experience and social structure, so that what is phenomenologically available to the individual "becomes limited to a tiny corner of the social world" while the conditions for such experience are scattered throughout the globe. This brings about a situation in which "the truth of that experience no longer coincides with the place in which it takes place" (1998) - the more one experiences one's individual situation as an authentic one, the furthest away from the truth of that experience one is. This underlying tension informs, ultimately, the historical conditions for modernism, in all its different orientations: to seek formal strategies to circumvent and tackle the fact that there is no continuity between the individual apprehension of the world and the social structures which conditions the individual experience of oneself and others.

But this scission - so easily recognizable as a main theme in XXth century's art as well as philosophy - still presupposed some basic *unity* within each of these incongruent domains. Imperialism, after all, was based on the staggering expansion of a certain common logical space, just as critical theory recognized identity and uniformity as the markers

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7   The most comprehensive and interesting use of the concept is not to be found in Jameson's work, but in the book by Toscano and Kinkle 2015

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8   A more detailed analysis of this periodization is presented in the book which developed the intuitions of this original essay, Jameson 1992

of bourgeois individualist ideology. This basic assumption, however, is challenged in the "late capitalism" phase, which Jameson also calls that of "postmodernism". Here - which is where we currently are - we must no longer account only for a discontinuity between the individual experience and social structures of an expanding capitalism, but rather for the simultaneous discontinuities which compose the "multidimensional space" of a capitalism itself - which, at places, still preserves islands of "bourgeois private life", while at others disperses itself in the "unimaginable decentering of global capital itself" (1998). This new situation can no longer make do with an indirect access to a larger, but intrinsically homogenous social space, through reference to formal experiments which are capable of cognitively inscribing us into an arid field of social sense. Instead, it exposes us to a further decomposition of that original secularization process of the transcendental: its *multiplication* into several heterogeneous and fragmented spaces, unsynthesizable by a single social logic. A sign of the deadlock imposed by this new situation, Jameson suggests, would be the increasing auto-referential character of contemporary art, its reliance on - and almost coincidence with - the multiple technical and technological means of aesthetic expression available today as well as the "omnipresence of the theme of paranoia, as it expresses itself in the seemingly inexhaustible production of conspiracy plots of the most elaborate kinds" (1998).

Jameson's focus, however, is not with artistic practice, nor with the historical conditions for art critique today. His concern with cognitive mapping stems from the fact that the capacity to map the complex world of contemporary capitalism bears directly on the capacity of political practice to act upon it, and to evaluate and transmit the result of these actions: there can surely be a politics that outright abdicates from any attempt to localize itself with respect to capital as a historical totality, but without this mapping, "there can be no socialist politics" (1998). The example of the the Black Revolutionary Workers, in Detroit in the 60's, is mobilized by Jameson to demonstrate that the issue of how to *generalize a political model of relative local success* brings the problem of cognitive mapping into the center of very practical political concerns. "How to build a national political movement on the basis of a city strategy and politics", "how to represent a unique local model and experience to people in other situations" (1998) - these questions involve the underlying problem of how to cross certain scale-thresholds that separate political organizations and the space in which they act without the access to some basic element in the local configuration which would guarantee us a coherent representation of the whole.

Nancy Fraser, in the occasion when Jameson first introduced this proposal, was quick to ask why such a task should have anything to do with aesthetics - "why wouldn't it be a task for critical social science?" (1998) - to which Jameson answered with a reference to the Althusserian distinction between science and ideology. Science would have access to the real precisely because its formal models are independent from the individual space of experience, while the problem of cognitive mapping concerns, like Althusser's theory of ideology, how one represents the complex conditions of existence in capitalism to these very subjects. Unlike Althusser, however, Jameson has a more ambivalent understanding of what "representation" means: rather than treating it "as the synonym of some bad ideological and organic realism or mirage of realistic unification", Jameson considers it as being essentially a matter of "figuration" (1998) - a problem of giving *form*, rather than of giving *sense*, to something. This alternative approach allows him to separate two problems that are indistinguishable in Althusser's theory: there is the question of ideology - of how representations mediate our access to the social reality - and there is the question of alienation - of the different capacities of these representational spaces to map and model the properties of our real conditions of existence. There can be, therefore, ideologies of different degrees of alienation, insofar as there are different ways to "picture" the complexity of our social world. The "crisis in Marxist ideology", as Jameson calls it, derives in part from the abdication of the challenge to produce a representation of the world from the standpoint of socialism, within which - and against which - capitalism could be pictured in its totality.

But while there are unquestionable merits in shifting the emphasis from the question of meaning to the question of form in matters of representation, Jameson's answer to Fraser moves too quickly in equating the aesthetical challenges of cognitive mapping with the realm of the ideological. The issue concerns not so much the problem of "mappings", but rather the presuppositions that come with the qualification of their "cognitive" purpose. It is most certainly true that, amongst the conditions of modern science, there is the requirement that the statements and derivation rules that compose different formal systems be allowed an intrinsic formulation, so that one might follow them beyond the point where scientific statements concur with our conscious individual intuition. But by abiding to Althusser's definition of science as a process (ideally) "without a subject" - a view very much in line with the French epistemological tradition, always keen

on downplaying the experimental dimension of science, epitomized by Francis Bacon, in favor of the more "platonic" scientific genius of Galileo - Jameson ends up discarding another crucial distinction that could be introduced into this problematic, the question of the underlying organizational procedures which allow scientists to arrive at a point of view which is not in the measure of their own individual existences. Rather than distinguishing science and ideology in terms of "subjectless" and "subjective" modeling strategies, one might therefore separate the two by stressing that ideology is the imaginary representation of the real conditions of existence for *an individual subject* - in opposition to "figurations" which might be accessible *only within organized practices where subjectivity and individuation are not coincidental*.

This distinction is impossible, however, when our reference to "cognition" already implies "commensurability with consciousness". A reference which also clouds the fact that Althusser's theory of ideology did not simply deal with how the complex reality of capitalism is deformed into representations that "naturalize" this reality, rather stressing that ideological interpellation takes place through concrete practices that participate in the process of our own subjective individuation. The question of cognitive mapping could, if extended in this direction, cut across the science/ideology divide: there are representational spaces which map *onto* the individual subject, while others map onto *other* individuated instances - for example, the writing material of a set of theorems in a formal system or, perhaps, the body constituted by a collective political organization[9].

The concept of cognitive mapping brings us back, in this way, to the three terms we previously singled out: the question of how to *organize* practices which project the individual subject onto a formalism that is commensurate with the *scale* of social processes, removing us from us the our space of subjective experience in favor of an *experimental* capacity to picture and "sense" information about this otherwise inaccessible social and political space.

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9   This is exactly what Alain Badiou accomplishes with his theory of the communist Idea - he writes: "the communist Idea is the imaginary operation whereby an individual subjectivation projects a fragment of the political real into the symbolic narrative of a History. It is in this sense that one may appropriately say that the Idea is (as might be expected!) ideological." (Badiou 2010 p.5). Notice here that the Idea is defined by the subjectivization of the individual by a political real, not by the reduction of politics to the measure of the individual.

§4

Through Jameson's schematic periodization of three historical sequences, we tracked the changing relations between "a phenomenological description of the life of an individual and a more properly structural model of the conditions of existence of that experience", looking to understand under which conditions the latter could be made to "fit" with the former - a matter of ideology, while the opposite fit would concern science. Jameson called these relations "models" or "maps", emphasizing that these different sequences do not simply pose challenges of how to represent the "content" of social relations - questions of who or why things are the way they are - but rather of producing new *forms* for the figuration of the social world. This suggests that the underlying ontology behind the theory of cognitive mappings deals not in "individuals" and "collectives" as two substantial strata, so much as in terms of how to correlate the organization of individuals (i.e. narcissism), the organization of representational spaces (aesthetics) and the organization of complex social structures (political economy) - an alternative reconstruction of his proposal which takes seriously the idea that cognitive mappings are concerned with *modeling formal relations* and not only with "making sense" of capital.

This approach also has the benefit of localizing our critique of Jameson's more phenomenological take on cognition, since it distinguishes *two* mappings, rather than just one:

| psychic space (narcissism) | formal system (representational) | social system (class relations) |
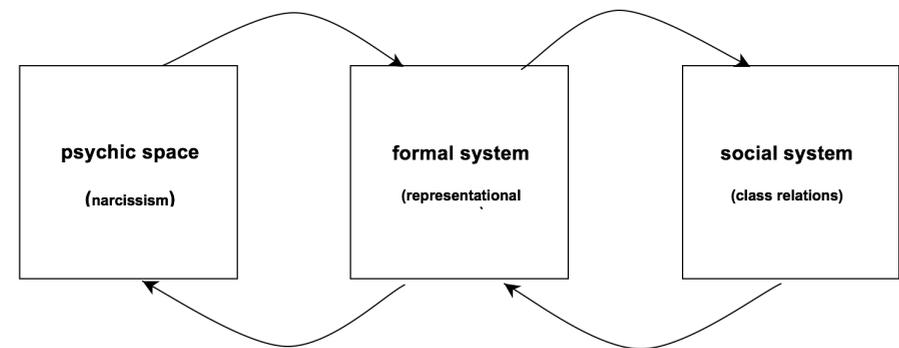
With this tripartite construct, we can distinguish between mappings that represent the world to "individual subjects" - themselves understood here as *particular mappings between representational spaces and individual self-apprehension* - and those mappings which represent the social world to some other synthetic "cognate", itself incongruent with our

self-apprehension, and which therefore demands of us some preliminary conformity process if we are to have access to what this intermediary space can apprehend in terms of information about the social totality. So, when we think cognitive mapping in terms of the partial conformity of three different "types"[10] of organization - personal, representational and social - themselves "mappable" to each other not due to their *material* - since psychic representation, artistic and scientific forms and social relations are "made" of different things - but due to their *organizational* structure, we also unearth two hidden parameters in Jameson's idea.

Firstly, as we already mentioned, the aesthetic problem of mapping social structure onto lived experience brings into play the problem of how to "conform" *both the world and the individual* to a formal space that is somewhat independent of them - this would be, for example, the problem of how to orient oneself "subjectively" in a domain "without a subject", in the case of mathematics, or, better put, how to *displace the point of synthetic apprehension* from our cognitive standpoint to that of the formalism itself. It is this displacement which ideology *prevents* us from accomplishing - since it reduces the world to the measure of what can be individually *experienced* - and which scientific practice allows us to participate in - through the artificial engagement with practical *experiments*[11].

But more than this: when we distinguish between three, rather than two, terms in this modeling relation, highlighting the practical and artificial status of experiments and formal systems, and therefore the challenge of how individuals relate to them, we also create a separate index to account for two ways in which cognitive mapping might be hindered by organizational transformations in social history: there can be a deficit in the modeling capacities of formal systems - be them artistic or not - as well as a deficit in our capacity to "accede" to the synthetic standpoint of these models - either due to the complexity of the formal system, or due to the effects of the social system onto the individual's own organization. This, in fact, could perhaps justify a slight alteration in our schema:

These dotted vectors - closer to causal relations than modeling ones - make explicit that transformations in capitalist society can lead to new constraints on how individuals might relate to the possibility of alternative synthetic perspectives.

Jameson justifies the ideological character of cognitive mapping by claiming that "you can teach people how this or that view of the world is to be thought or conceptualized, but the real problem it is increasingly hard for people to put that together with their own experiences as subjective individuals in daily life", adding that "the social sciences can rarely do that (...) they do it at the moment that social science becomes an ideology, and then we are back at aesthetics" (1998). This explanation in fact reinforces our alternative reconstruction of Jameson's idea, as it distinguishes between the capacity of social science to capture relevant information about social relations from its capacity to remain commensurate with individual subjectivity. When he claims that "aesthetics is something that addresses individual experience rather than something that conceptualizes the real in a more abstract way" (1998) we can read this claim in two ways: as a general principle that rules over the *two* mappings, serving both as an evaluation criteria for how well individuals can relate to a formal apparatus and for the formalisms own capacity to model complex social phenomena, or as a special principle, which concerns the question of how we might incorporate ourselves into the alternative synthetic point of view created by a formal procedure. By not distinguishing between the two, Jameson ends up flirting with a rather populist approach to political thinking, in which the need to tailor political processes to the measure of individual consciousness gives

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10   For the sake of this study we have not discussed what it means to distinguish between "types" of organization and what is the relation between organizational spaces and their material substrates. This additional investigation - in fact a central one - will be the topic of our next contribution.

11   An alternative formulation of this same distinction can be found in *Organization and Political Invention* (CSII, CT&T) under the theory of ideology as "instituted ignorance".

an *epistemological value* to the discursive strategies that allow us to signify social complexity, as well as to individual leaders who represent the individual perspective within the political sphere, instead of allowing us to formulate the issue of political adhesion as the additional - even if overlapping - question of how individuals might interact with useful cognitive maps that nonetheless do not map "onto us".

§5

There is an interesting schism to consider in Jameson's periodization of the three phases of capitalism, most notably with the consolidation of the disparity between lived experience and social structure in the imperialist sequence. The famous question of social planning versus market economy could in fact be approached through the prism of cognitive mappings, because the moment that capitalist economy established this cognitive disruption between our capacity to experience the world and the social structure underlying this experience, two political solutions were proposed to this predicament. Before capitalism brought about the incommensurability between the lived and the structured, we could say that modernity was defined, as Jameson proposed, by the task of becoming *responsible* for the previously transcendental destiny of society. Leftists and conservatives were both concerned, at least since the French Revolution, with the double challenge of conceptualizing social organization without the aid of a transcendental guarantee, basing it rather on work and the understanding of individual and social needs - hence the birth of classical political economy - and of picturing in which direction we would like society to develop - hence the birth of Leftist and Right-wing orientations in politics. This meant that politics was trapped between two simultaneous commitments: one to *social totality* - the task of thinking the general logic of social interactions - and another to *political responsibility* - the task of envisioning society as something which we must account and answer for, individually and collectively. These commitments were largely compatible, insofar as "market capitalism" still adhered to social structures basically commensurate with our individual phenomenological space, where the concept of responsibility had a clear meaning.

However, with the colonial consolidation and the rise of monopoly capitalism, these two commitments become increasingly incompatible, and - risking here an absurd simplification - we could say that the Left became increasingly defined by the political task of social responsibility, while liberalism established itself by focusing almost exclusively on

the theoretical requirements of dealing with social complexity. This is reflected, for example, in the tendency of XXth Marxism to ontologize labor as a sort of basic - and highly reductive - formal principle for the modeling of social structure, a constructivist approach which allows us to track responsibility throughout social formations by adhering to the underlying transitive principle that we can map the totality of class relations by following what happens to manual workers, insofar as they form the building block of society as a whole. Strategically, this translates into the search for a way to plan society's direction by controlling the interaction of its constitutive parts. Historically, it appears today as the almost absolute inhibition before the history of XXth century socialism, as we become trapped between the need to be fully accountable for the disasters that took place and incapable of doing so without some theory of complex autonomization[12]. Theoretically, still, this focus on social responsibility could be considered "materialist" because it found direct analogies with well-known ideas from physics and thermodynamics, which had promoted, with classical mechanics, the view that one can in fact predict future states of a system by an analytical investigation of the previous states of its constitutive parts[13]. But this approach also created an increasing schism within Marxism itself, which Slavoj Žižek has called a "parallax" between the critique of political economy - which had to follow the developments and increasing abstract character of the value form in capitalist societies - and the political view of militancy - which still sought to orient itself by what could be directly perceived and accounted for "on the ground" of social relations[14], a dualism which arguably still structures most debates within the Marxist practical and theoretical field.

But for those who privileged the problem of socio-economic complexity over the question of political responsibility, claiming that the most responsible thing to do politically was to let the market "decide" the best social equilibrium between its interacting parts, the theoretical challenge was quite distinct. Friedrich Hayek, perhaps the paradigmatic example of this approach, was quite aware that social complexity required us to rethink the capacity of individuals to grasp "at once" the information and knowledge needed to steer society one way or another. In *Rules*

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12   See Hamza and Tupinambá 2016, pp.427-441

13   See Rabinbach 1990

14   Žižek 2006, p.283

and Order[15], the first volume of *Law, Legislation and Liberty*, he argues against the "cartesian" view that men always make their institutions in accordance to a predetermined design, and that the better an institution responds to this design, the better it is for society: "it is simply not true that our actions owe their effectiveness solely or chiefly to knowledge which we can state in words and which can therefore constitute the explicit premises of a syllogism. Many of the institutions of society which are indispensable conditions for the successful pursuit of our conscious aims are in fact the result of customs, habits or practices which have been neither invented nor are observed with any such purpose in view."[16] For Hayek, it is precisely because the most important social institutions are born through the complex and impersonal interactions of our habits and social existences that they are commensurable with the equally complex and impersonal production of knowledge about society by society - the most important of these institutions today being that of *market price*[17]. By constraining the design of institutions to the "size" of our individual cognition, we also constraint their capacity to acquire meaningful information about the social totality.

It is worth understanding the basis of Hayek's argument, as it contains, despite his dire political conclusions, some brilliant insights into the correlations between the three organizational spaces we have distinguished in Jameson's concept of cognitive mapping. To follow his theory, we must understand the distinction between "explicit" and "implicit" rules (Rules and Order): the former are rules which are relatively simple, so that we can state them in general form as a commandment that can be executed, while the latter are *impredicative*, or at least too complex to be reduced to a general statement in a natural language - we can know an implicit rule only by examining a certain set of its applications and recognizing certain local and regional patterns. Hayek is particularly interested in showing that explicit rules are just a case of lower *complexity*, they describe simpler phenomena - usually those that can be understood as mechanical ones, and thus relate to systems that, like a machine, can be artificially *designed and fabricated*. Orders that are the spontaneous product of the interaction of several irreducible parts, and which therefore produce spaces of higher degree of complexity, are *not* isomorphic with machines and therefore cannot

be stated as these simpler rules or ordenation principles. To use the terminology proposed by Stephen Wolfram (New Kind of Science), we could say that classical mechanics, dealing with natural phenomena that are isomorphic to a mechanism, is of a lower degree of complexity than the human mind and its cognitive capacity, hence mathematics was able to model them into explicit formal rules, capturing the law of certain phenomena "at once" through a formalism of higher complexity. The human mind, however, is "computationally equivalent" - its equally as complex - to another mind, which is why it cannot grasp its own rule structure into an explicit model, and, furthermore, it is potentially *less complex* than the system formed by the social interaction of men, which is then "computationally irreducible" to our conscious apprehension.

By first performing this critique of the possibility of adopting a reductionist approach to economics, barring the generalization of formalisms from classical physics to social phenomena, Hayek opens up the question of *how* the human mind, with its either equal or lower degree of complexity, might grasp information about the social system it inhabits. This is where social institutions displaying a higher degree of complexity that our own design could endow them with come into play: prices, for example, arise not by human design, but through the interactions of commodity exchange - but precisely because of this, prices can capture information about the general implicit rules of society which could not be otherwise made intelligible. In a decentralized and partial way, "the price system [is] a kind of machinery for registering change, or a system of telecommunications which enables individual producers to watch merely the movement of a few pointers, as an engineer might watch the hands of a few dials, in order to adjust their activities to changes of which they may never know more than is reflected in the price movement.[18] In other words, Hayek sees that price systems are the formal systems onto which information about society can be mapped - they function as economic cognitive mappings that are too complex for individual cognition, but which can nevertheless be partially read by "the man on the go".

Even though the direct equation between organization and complexity might excessively privilege some of the presuppositions of the cybernetic approach to organization and morphodynamics[19], it is nevertheless clear that Hayek's analysis of the interaction between individual, formal and social systems in terms of their order-structures - complex or simple,

15   Hayek 1973

16   Hayek 1973, p.11

17   Hayek 1945

18   Ibid., p.527

19   See Dupuy 2009 and Rosen 1999

spontaneous or designed, etc - reinforces our previous view that the ontological backdrop of the problem of cognitive mapping concerns above all the problem of relating organizations of different "scales" and producing interactions between them which can capture meaningful data about these spaces of irreducible complexity.

As it is well-known, however, Hayek does not go as far as extending his critique of constructivism to include a new concept of social responsibility: his treatment of society as a complex system, and his concern with criticizing the socialist view of economic planning, led him to merely dismiss the political question of political orientation, putting his trust in the capacity of such spontaneous social ordering to find the best equilibrium point between the social fragments it organizes[20]. Still, his understanding of price as special formal systems capable of mediating between social complexity and individual subjects does not only show a remarkable similarity with our view of cognitive mapping as being composed of two separate modeling relations, but it could also help us to shed perhaps an interesting and innovative light into the worn-out theme of commodity fetishism.

§6

Marx famously defined fetishism in the first chapter of *Capital* as the situation in which "the social character of men's labor appears to them as an objective character stamped upon the product of that labor" - but our usual reading of this transformation focuses solely on the types of relations brought into play here: "a definite social relation between men" assumes the "fantastic form of a relation between things". Accordingly, concepts such as "alienation", "reification" and "fetishism" all highlight the fact that what has taken place is the transformation of human relations into relations between objects or objectified people. But this qualitative shift is in fact conditioned by something else, the quantitative - or better, the *scalar* - mismeasure between the two sides of fetishism: it is, after all, not the social relations between *two* men that appears as the relation between *two* commodities, but rather "the sum total of the labor of all these private individuals" that is expressed in the exchange value of any two commodities, or a commodity and the money-commodity in particular.
It is highly significant that Marx distinguishes the fetishistic inversion

from the process through which the simple form of value - x of commodity A being made equivalent with y of commodity B - gives rise to the total form - x of commodity A made equivalent to a given proportional quantity of *any* other commodity - and finally to the money-form - where the value of any term in this infinite series of commodities is expressed in terms of a proportionate amount x of a single commodity. We could expect these two processes to be of a same character, insofar as both of them express a vast set of interactions in terms of a simpler or reduced interaction: the sum of human relations in the productive sphere appearing as the relation between a smaller set of commodities, the sum of value relations in the circulation sphere appearing as the relation between these commodities and a particular one, money. But here we see Hayek's distinction between degrees of complexity, between fabricated and spontaneous processes, coming into play: money does in fact capture some information about the general space of value in capitalist social formations - we can orient ourselves locally by comparing prices - because it is a complex and "spontaneous" institution, which we interact with, but cannot fully plan or design, while the relation between a few commodities - placed in exchange due to the design of two or more individual buyers and sellers - is incapable of expressing the "social character of men's labor", given that this social character is of a higher degree of complexity that this equivalence function. It is this second form of transformation - of a complex social system into the individual "scale" - that properly warrants the name of fetishism.

This reading could perhaps justify the addition of a fifth feature to the other four that Marx lists when describing the properties of the money-form in capitalism: measure of value, means of payment, something that can be hoarded, and its function as world-money (Capital). We could add to this list, following Hayek and Jameson, its function of serving as a *decentralized cognitive mapping* of a more complex socio-economic structure. This function is not reducible to that of measuring value because it does not concern the determinate relation between any two given commodities exchanged at a given instant, but rather money's capacity to track, through the fluctuations in price, information about economic crises, political turbulences and other features of the capitalist economic space. That is, while not requiring us to take cognizance of the totality of social interactions, money serves as a mediator between two heterogeneous scales, or levels of complexity, allowing its bearer to have information about processes that are "too big" to be directly grasped - a function that does seem strangely close to the classical modern

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20   Jean-Pierre Dupuy, the proponent of a "Leftist Hayekianism", proposed an interesting reading of Hayek's contributions and shortcomings in Dupuy 1989

aesthetic issues concerning representation and the sublime.[21]

It is crucial to note, however, that this is not an entirely new proposal. In a way, Alfred Sohn-Rethel's claim that the structure of value in market exchange is isomorphic to that of Kant's transcendental subject (Intellectual and Manual Labor) could be read in this precise sense, as a statement concerning the emergence, through the act of exchange, of a synthetic point of view that has its own specific properties and which is therefore irreducible to that of conscious actors of commodity exchange. In *Intellectual and Manual Labor,* Sohn-Rethel was mostly interested in the "genetic" aspect of this correlation, since it provided him with a historical materialist explanation to the rise of philosophical and scientific categories in Western thinking, and he did very little to develop its political implications - mostly using his theory to settle the debate over there being "two sciences", a proletarian and a bourgeois one, and to reiterate a Leninist interest in Taylorism, which he foresaw as a possible opening to another logic of "social synthesis" than that of commodity exchange, a way to capture the complexity of "the total sum of labor" through different formal means. But the general acceptance that social practices can produce new "transcendentals" has certainly other, far reaching consequences.

§7
We have seen (in §2) how the investigation into "impersonal emancipation" is an attempt to think political action in capitalist societies under three conditions or principles: (a) the principle of *ontological homogeneity* between causes and effects, so that abstract forms of social domination might be countered by equally complex and abstract forces and political structures; (b) the principle of *autonomization*, which requires us to rethink how militants subjectively relate to institutional structures and abstractions, as well as what it means to actively and logistically promote the autonomization of political organizations, and (c) the principle of *theoretical unification,* namely, that we do not allow the previous two conditions to segment our theoretical model into a critical one, which analyses capitalism, and a constructive one, which has categories only fit for political struggle - or, in the terms we later developed, this condition states that we should not split our political project into a theory of social complexity that is opposed to our theory of political responsibility.

After this, we turned to Fredric Jameson's plea for the development of a practice of "cognitive mapping" (§3) that is capable of picturing the space of "late capitalism", which has acquired a degree of complexity and multi-dimensionality which has led previous aesthetic projects into a deadlock. Recognizing that Jameson's challenge taps into the same conceptual field as our less analytical project of impersonal emancipation, we proposed (in §4) a reformulation of his concept in order to highlight (a) that Jameson's phenomenological approach to cognition constraints the analysis of the two separate mappings which a cognitive modeling of society in fact requires and (b) that the first of these two relations, the one that connects individuals to formal systems, could offer us an alternative route, where the synthetic point of view onto which cognitive mapping pictures the world might very well be a "prosthetic" one, immanently created through material practices - as in the case of artificial experimentation in sciences, or through social organization, in politics.

This led us to a brief analysis of Hayek's theory of prices as decentralized machines that capture partial informations about social complexity (§5). Critical as we are of his political views, we turned to Hayek as he represents the solution that liberalism proposed for Jameson's diagnostics of the schism between lived experience and social structure: while Marxism relied on analogies with mechanics and thermodynamics in order to reduce complexity to the measure of a more classical theory of political subjective responsibility, Hayek brutally minimized the issue of political subjectivity and focused on extracting the consequences for knowledge and cognition of the increasing complexity of market relations in capitalism. Having recognized that his theory of prices demonstrates the epistemological value of formal systems embedded in social institutions and which mediate our access to knowledge of social structure, we turned to Marx's theory of fetishism (§6) to argue that this same property can be found, in implicit form, in his value theory, provided we take notice of the change in scale that underlies the transformation of the "relations between people" into "relations between things" and the transformation of the total form of value into the money-form. We also hinted that Alfred Sohn-Rethel was already aware of the usefulness of these "prothetical" points of social synthesis, when he recognized the role of commodity exchange in giving rise to the transcendental point of view required for philosophy and modern science to effectively emerge.

But we are now back where we started, as the need to force together the perspectives of social complexity - which leads to a view of social

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21   Žižek 1989

institutions as epistemological mediators in our access to social knowledge - and political responsibility - which brings into play the propositive and strategic dimension of political militancy - amounts, precisely, to an alternative definition of "impersonal emancipation". That is, the capacity to displace to another instance, irreducible to our individual self-apprehension, the synthetic point of view which is capable of "sensing" information about the social space - as an apparatus for cognitive mapping of the world - as well as of offering an alternative metric, only indirectly or partially accessible to us, with which to evaluate the success and failure of our political interventions.

Even though Jameson helped us to introduce the epistemological value of cognitive mappings, it was by moving back from aesthetics to political economy, with Hayek and Marx, that we were able to address the ontology of such a practice, dissecting its basic components not in terms of types of practice - aesthetical, political, and so on - but of organizational spaces and finding in the questions of scale and complexity a homogeneous measure to deal with the constraints of multiple mappings between them. But, as we stated in our introductory remarks, our main concern is not with the development of critical theory, but rather with renewing the approach to collective organization, proposing that we recognize the capacity of certain social institutions to introduce us into dimensions of the political space which are inaccessible from our own direct cognitive stance. And this constructive or propositive view cannot be found either in Hayek nor in Marx, even though it is clearly palpable in Jameson's formulation of the challenge. It is perhaps only in Alain Badiou's thinking that we can find the appropriate tools to bring together Jameson's propositive view while simultaneously exiting the domain of aesthetics as an ideological or superstructural realm[22]. In fact, the three terms we have been trying to implicitly track in this study all have explicit correlates in Badiou's *Logics of Worlds*, a book which remains mostly unexplored in terms of its implications for political practice. There are striking similarities between Badiou's theory of the *subjectivized body* and our approach to the question of "organization", between his *objective phenomenology* and the way we want to consider the question of "scale" and the theory of *organs and decision points* and the question of "experimentation" - even though the proper assessment of these ideas will have to wait another opportunity. For now, let us only introduce a minimal sketch of his conceptual framework.

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22   It has been the merit of a fellow researcher, Yuan Yao, to have demonstrated in his text *Value and Appearance* that Alain Badiou's "objective phenomenology" could be used as a basis for a new approach to Marxist value theory, one in which extracts from the theory of fetishism the objective dimension of real abstractions (see Yao). His most recent contribution, featured in this same edition of *Crisis and Critique*, further develops this intuition.

Rather than concerning himself with the ideological interpellation of individuals through material practices, Badiou focuses his theory on the question of "incorporation": of conceiving the structure of processed through which singular individuals can come to *compose* the consistency of a body whose rules and constraints for affection are irreducible to the domain of their own causal existence as individual bodies. In order to distinguish between the "underlying" and the "incorporated" domains - accepting that they constitute at least partially independent logical spaces, with their own rules of entailment, negation, etc - Badiou develops a revolutionary approach to phenomenology, demonstrating that we do not need any reference to a subject, an spectator or a consciousness in order to distinguish between the "standpoints" from which an organization appears as just a collection of individual bodies of its members and the perspective from which it consists as a somewhat autonomous body of its own. These two "transcendentals" - leading to two distinct "scales" of existence, of "many individuals" and of "a collective" - are in fact objectively inscribed in the formal constraints of the logical space in which the organization is inscribed. But for this approach to be properly consistent, then the theory of how we might *compose* bodies irreducible to our own measure must be supplemented by a theory of how we might *dispose* of these alternative metrics, given that it has no transitive relation between the indexing of objects by two different transcendental standpoints. This is where the concept of "organs" is introduced, as the set of operations a body can locally produce in order to index the rest of the world to its own "measure", a form of treating the world so that information formally and logically compatible with the standpoint of the body can be produced. Having no means to dispose of an experience of the world from the standpoint of the collective as a body, we still can produce experiments which, point by point, uncurtain the concrete effects of such a body in *its* world.

§8
The movement between the theory of cognitive mappings and Badiou's objective phenomenology might seem hard to justify at first. In fact, nothing could seem farther away from Jameson's call for an aesthetic discipline than Badiou's use of category theory. Is this recourse to arid formalisms not, after all, precisely what Jameson sought to avoid when he opted for inscribing the project of cognitive mappings into the ideological rather than the scientific domain[23]? An answer here requires

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23   A good measure of the incompatibility between Jameson and Badiou can be found the former's account of the latter's work in Jameson 2016

two steps: first of all, Badiou's philosophical approach to phenomenology is not directly concerned with politics or art - it is not even directly concerned with our own world: the stakes of *Logics of Worlds* are rather set by the task of thinking what it means to "appear" in the most general possible sense. The recourse to mathematics is warranted precisely because it offers us a situated and determined way to think no situation in particular - and, in the case of category theory, it offers us a very rich and sophisticated approach to mappings in general. This leads us to the second part of the answer, as there is in fact a direct passage from the topic of mappings between natural, social and formal systems to category theory.

"The domain of mathematics lies entirely within the inner private, subjective world; ironically, however, that domain is also considered the most objective of realms" [24] - this is how Robert Rosen introduces his approach to theoretical biology, through category theory. A considerable part of his work has been dedicated to the question of the appropriate formal approach to biology and one of the cornerstones of this project is the affirmation that "inferential entailment (between propositions) and causal entailment (between external events) are the only two modes of entailment we know about" [25]. From the "surprising fact (...) that these two different realms of entailment run so much in parallel" [26], Rosen constructs both his critique of a certain type of modeling relation established between them - very much akin to the improper generalization from physics and mechanics into other realms, which we briefly mentioned - as well as his own alternative approach.

At the heart of his project lies a profound intuition: that the study of modeling relations between formal systems can function as a sort of "back door" into the modeling relations which we establish between formalisms and natural systems. Since the inner workings of causal entailment remain, in themselves, beyond the grasp of a scientific approach, the proper way to study how a certain theory might "read the book of nature" is to construct a sort of speculative laboratory, composed only of formal systems, so that we can look at what it means to capture the determinate forms of entailment of a system through another. This intuition, which leads the theoretical biologist towards an engagement with category theory, in fact relies on an understanding of mathematics

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24   Rosen 1999, p. 89

25   ibid

26   ibidem

and mathematical modeling that can be equally found in the works of Albert Lautman and Alain Badiou, namely, the recognition of a dialectics of homogeneity and heterogeneity within mathematics.[27] Regions of mathematics are homogeneous enough to each other so that we might interpret the formal propositions of, say, geometry, through algebra - but, at the same time, these regions are heterogenous enough so that such relations do not result in a mere tautological re-statement of the initial formal propositions. A non-geometrical treatment of trigonometrical series can lead to new discoveries - like Cantor's set theory - just as modeling number theory through logical propositions led Frege to revolutionize formal logic.

A first approach to the question of modeling requires us to consider this very simple diagram:
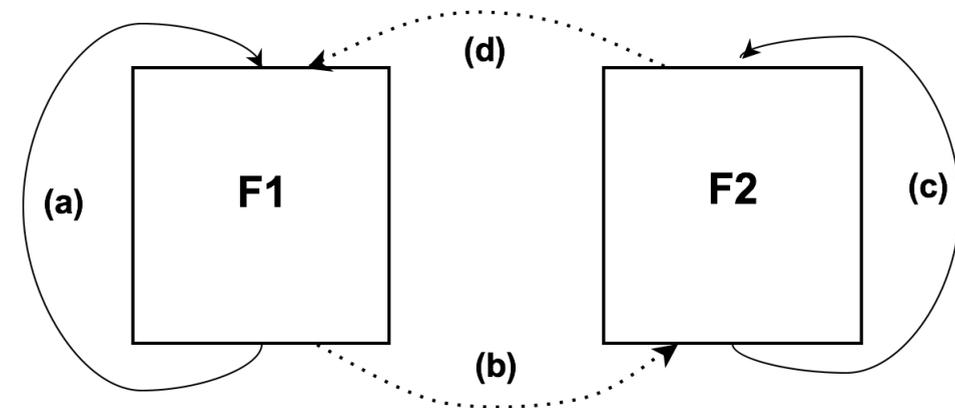
Here we have two formal systems, **F1** and **F2**, with their respective inferential structures, **(a)** and **(c)**, and the two extra mappings which compose a modeling relation - **(b)** and **(d)**. The continuous arrows **(a)** and **(c)** represent the internal entailment procedures in each system, so that, if we have a proposition **P1** in **F1**, the application of the rules of derivation **(a)** would lead us to a new proposition **P2** equally consistent in **F1**. The same for a proposition **S1** in **F2**: **S2** would be a derived proposition of the application of **(c)** to **S1**. This simple diagram allows us to define what a modeling relation is: if the encoding of P1 into **F2** as **S1**, through **(b)**, followed by the application of **(c)**, producing a proposition **S2**, followed

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27   Badiou 2007

by the decoding of **S2** into **F1,** through **(d)** always arrives at the same proposition **P2** that we would obtain by applying **(a)** to **P1** - that is, if the two paths *always commute, for any P in F1*- then we can say that **F2** is a model of **F1.**

Even though this seems a rather simplistic diagram, it already allows us to formulate some important ideas. First, it allows us to consider a formal definition of *prediction*. Say we have no or restricted access to the entailment structure in **F1** - that is, we cannot directly derive **P2** from **P1** solely with the resources provided by our grasp of the initial formalism. The alternative path through **F2 (b-c-d)**, which has shown to be commutable with the path through **(a)**, can then lead us to arrive at **P2** through an alternative route. This definition can be given a temporal interpretation in physics, insofar as we can manage to "run ahead" of a certain mechanical interaction and predict a future state through theoremic proofs within our formalism, but more generally it shows that the modeling relation can provide us with a way to "unpack" inferential structures which, within a certain entailment system, might obscure possible results within that very system. As we said, whole fields of mathematics are based upon the possibility of enriching our comprehension of a given formal region by the derivation of new theorems through the recourse to these heterogeneous "mixes"[28].

But a second thing this diagram shows, and that is highly important for us, is that the encoding and the decoding arrows are not entailed by either **F1** or **F2.** The decision of *how* and *what* to encode from one system to another cannot be internally motivated by any of the related formalisms. It is neither a geometrical nor an algebraic proposition that the solutions to systems of polynomial equations "express" intrinsic properties of geometrical spaces, this modeling relation relies on a certain *creative decision* that is irreducible to the formalisms being mixed together:

"The first matter of importance is to note that, from the standpoint of the formalisms being compared, the encoding and decoding arrows are unentailed. In fact, they belong to neither formalism, and hence cannot be entailed by anything in them. The comparison of two inferential systems, like **F1** and **F2**, thus inherently involves something outside the formalisms, in effect, a creative act, resulting in a new kind of formal object, namely, the modeling relation itself. It involves art."[29].

....
28   Lautman

29   Rosen 1999, p. 54

To which Rosen adds:
"The second matter concerns whether this creative act can itself be formalized, i.e. whether the study of comparison of formalisms is itself a formalism. In a nutshell, the answer is *yes, in a sense.* THe name of that formalism is the Theory of Categories; the qualification is that Category theory, like Number theory, liek Set theory or like natural languages themselves, cannot be formalized (...) Indeed, many mathematicians have wondered aloud, over the years, whether Category Theory is even a part of mathematics. However, Category Theory comprises in fact the general theory of formal modeling"[30].

With this, Rosen helps us to locate the immanent point of passage between Jameson's aesthetic concern with the art of mapping between structure and phenomenological experience to Alain Badiou's approach to the problem through category theory - a theory which was born from the concern with turning the "creative act" of mapping and comparing formalisms into a formal object in its own right. The capacity of Category Theory to treat the comparisons between formalisms as formal objects themselves allows Rosen to propose a more rigorous critique of the underlying issue which, for him, prevents the advancement of theoretical biology: the identification of scientific modeling and mechanistic formalisms. This is not our focus of interest here, but it is worth considering the difference between comparing formal systems amongst themselves and comparing natural and formal systems, as this shift in perspective invisibilizes the formal theory of encodings and decodings at the same time as it brings forward the problem of experimentation.

The formalization of the mapping between systems is what interests Rosen in category theory, as we mentioned, and the reason for this is that, when we approach the problem of modeling directly within the context of natural sciences - which implies dealing not with two heterogenous *formal* entailment structures, but with the relation between *formal* and *causal* entailment - we lose the formal status of the modeling mappings, and therefore the possibility of rationally assessing *how* we chose to encode this or that aspect of nature into our models.

....
30   Ibid., p.54

(d)

(a)   N   F   (c)

(b)
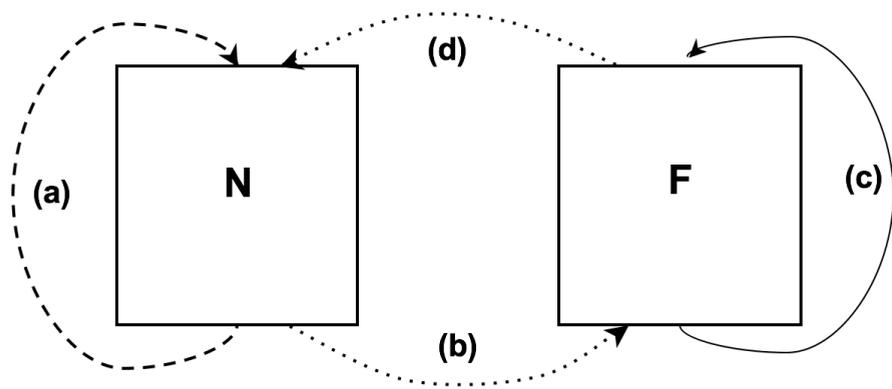
Assuming there is such a thing as a "natural law"[31], without which science would be meaningless, this schema depicts a natural system **N** and a formal one **F**, with their respective - and now ontologically distinct - entailment structures **(a)** and **(c)**. The question, for natural science, is then how to encode data from **N** into **F** - through an encoding relation **(b)** - so that the derivation of propositions within **F**, through its own entailment rules **(c)** might later be decoded through **(d)** into new - and verifiable - information about the natural system **N,** that is, the question of how to predict something about **N** through **F**. Given that we do not have access to the causal laws themselves **(a)**, if we manage to encode data from **N** through **(b)**, derive new propositions through **(c)** and then verify, through **(d)** that these formal results correspond in some way to the new situation of **N**, as if we had just let causality "work by itself", then we can say that system **F** is a model of the natural system **N**.

Here, as in the case of the comparison of two formal systems, arrows **(b)** and **(c)** are unentailed by the systems they connect, but also, unlike the previous situation, given the need to compare causal and formal entailments, these modeling relations cannot even be treated as formal objects in their own rights, since mappings are only conceptually rigorous objects when we are dealing with the mapping between regions of mathematics[32]. On the other hand, this essential heterogeneity of natural science is also what endows these two arrows with very special determinations: for example, a crucial problem of encoding becomes the issue of *measurement* - of making N and F "co-mensurate" - which

in classical mechanics might concern the association of a *number* in **F** to an *event* or phenomenon in **N**. The problem of experimentation therefore enters the picture at the very point where mappings are no longer guaranteed by the underlying homogeneity between what is being mapped.

A future instalment of this research will require us to engage in more detail with Rosen's "relational biology" as it provides us with a novel approach to the concept of organization which bypasses complex systems theory - which he understands as a more "ptolemaic" theory of organization - and opens a new way to think about experimentation with and within organized systems. But it suffices to mention here that it is through category theory that Rosen comes to a pure concept of organization, totally separated from the particulars of its material realization but nonetheless rich in intrinsic determinations, with its own entailment structures and an alternative "grammar" to that of the physics of the inorganic and its underlying reliance on the concept of "state"[33] - in other words, Rosen *constructs the concept of organization out of a theory of mappings*, further imbricating these two threads which we have been trying to force together throughout this study. This is an essential result for us - and a crucial aspect of Badiou's project, which we will also discuss in our next contribution - for one very specific reason: if we were to accept that the formalism which can capture the relevant properties of organizations - their degrees of order, the relations between its components, the logical space constituted by its topology, etc - is the same formalism that could respond to the challenges faced by the theory of cognitive mapping, we might be ready to suggest that *collective organizations also have the aesthetic function of registering information about social spaces.*

....
31   "Natural law makes two separate assertions about the self and its ambience: 1. The succession of events or phenomena that we perceive in the ambience is not entirely arbitrary or whimsical; there are relations (causal relations) manifest in the world of phenomena; 2. The relations between phenomena that we have just posited are, at least in part, capable of being perceived and grasped by the human mind" (58)

32   Badiou 2007

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33   Rosen 1999.

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