

# NATURALIZING MIMETIC THEORY

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## 1. MIMETIC THEORY AS SCIENCE

This paper is about Mimetic Theory [MT] and its efforts to constitute itself as science. Its proponents know quite well that MT is *not only* a science. But if it is even partly a science, with as ambitious a goal as to account for everything from “the neuron to the eschaton”, to quote Robert Hamerton-Kelly’s phrase, then it cannot shy away from confronting established scientific paradigms. Among its closest neighbors and potential rivals we find an emerging and powerful paradigm that results from the convergence of many disciplines: cognitive science, most especially cognitive psychology and cognitive anthropology; life sciences, in particular the neurophysiology of cognition; evolutionary theories and their many ramifications, in particular into the human sciences; the so-called “sciences of the artificial”, most notably artificial intelligence and artificial life (aka synthetic biology); and a good chunk of the human and social sciences under the sway of the rationalistic paradigm (economics, game theory, rational choice theory, and the like); not to mention the philosophical disciplines that cement those fields and hold them together or the technologies that implement them increasing thereby the power that human beings exert over the natural world including themselves. For want of a better word I will call this paradigm the “dominant paradigm” since its avowed ambition is to conquer the vast continent of the sciences of Man *lato sensu*.

The encounter of MT with the discovery of “mirror neurons” illustrates the relative lack of preparedness of the former for this kind of confrontation. Not rare were the proponents of MT who enthusiastically and hastily claimed that it had found there its biological foundations and that its validity had thereby been proven. This claim is at best naïve for at least two reasons:

1) All but the most die-hard reductionists would agree that the proposition “Man is a super-mimetic animal” is a scientific evidence even if the biological mechanisms responsible for it remain unknown.

An analogy might be illuminating. After the works of such geniuses as Sadi Carnot, Lord Kelvin, and Clausius, the scientific world was certain that the so-called second principle of thermodynamics (i.e. in an isolated system the state function known as entropy cannot decrease) was indeed a universal law of physics and that, for instance, the efficiency of a steam engine producing work from heat was limited by an absolute threshold given by a certain formula. However, the attempts to account for this principle in terms of the properties of a collection of molecules whose degree of agitation could be measured by the Kelvin (or absolute) temperature- all those attempts, which constitute what is known as statistical mechanics, failed miserably until fairly recently. But those were challenges for, and failures of statistical mechanics, not at all for the second principle of thermodynamics.

In 1933, Walter Benjamin wrote: “There is none of man’s higher functions in which his mimetic faculty does not play a decisive role.” The truth of this proposition is beyond any reasonable doubt. It is therefore a challenge for the neurosciences, and cognitive science more generally, *but not for MT*, to account for this fact. A would-be cognitive science that would prove incapable of it should simply be discarded.

2) Mainstream cognitive science didn’t wait for MT to become aware of the discovery of mirror neurons to appropriate it. Since MT is incompatible with some at least of the basic tenets of cognitive science, the challenge that it has to face is daunting. Rather than risking the ridicule of claiming possession of a good that unbeknownst to it someone else already laid their hands on, MT must show that such early appropriation was made illegitimately. MT has no choice but confront cognitive science and, more generally, the “dominant paradigm”. Its academic future – which, to be sure, is not its sole concern – depends on this confrontation.

## 2. MIMETIC THEORY AS THEORY OF MIND

### 2.1. Some pitfalls in the naturalization of the mind

How the human mind emerged from the natural world is a fundamental issue that all theories of mind that purport to be scientific have to tackle. I will contrast two of them in this paper: analytic philosophy of mind inasmuch as it chose to ally itself with cognitive science; and the implicit theory of mind at the heart of MT.

In my philosophical history of cognitive science<sup>1</sup>, I have defended the view that the naturalization and the physicalization of the mind attempted by cognitive science and analytic philosophy of mind is hampered by its very reliance on the folk-psychological account of human action in terms of the desire-belief model. A theory of mind that sticks to this model is not amenable, I submitted, to natural laws. Therein reside the chances of MT to achieve what analytic philosophy of mind has not yet, and probably will not, because it cannot, achieve. For MT is radically incompatible with the desire-belief model of human action, which it has fully demystified by showing that neither desires nor beliefs are autonomous<sup>2</sup>.

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<sup>1</sup> Jean-Pierre Dupuy, *The Mechanization of the Mind*, Princeton University Press, 2000; new edition, *On the Origins of Cognitive Science*, Cambridge, Mass., The MIT Press, 2009.

<sup>2</sup> Analytic philosophy of mind is divided today between two camps, one named “Theory Theory” [TT], the other “Simulation Theory” [ST]. TT has it that people read other people’s minds by attributing to them mental states from which they derive explanations and predictions regarding their behavior. By contrast ST posits that the observer uses his *own* mental mechanisms to predict the mental processes of others. The discovery of mirror neurons has given a boost to ST. It is not surprising that the major founder of ST, philosopher Alvin Goldman, collaborated with one of the discoverers of mirror neurons, Vittorio Gallese, to draw the philosophical implications of this discovery. Their joint article “Mirror neurons and the simulation theory of mind-reading” [*Trends In Cognitive Sciences* - Vol. 2, No. 12, December 1998] has become a classic. In it we can read: “Mind-reading is the activity of representing specific mental states of others, for example, their perceptions, goals, beliefs, expectations, and the like. It is now agreed that all normal humans develop the capacity to represent mental states in others, a system of representation often called folk psychology. [...] The hypothesis explored here is that mirror neurons are part of – albeit perhaps a rudimentary part of – the folk psychologizing mechanism.” What is remarkable in this quote is that ST, no less than TT, claims to provide a scientific, physicalist account of folk psychology. The fact that

According to the desire-belief model, actions find their reasons *and* their causes in *mental states*, called desires (aka preferences) and beliefs (aka representations, etc.). The pertinent explanation of an action consists in showing that its description in the form of a proposition [“Peter grasps a bottle of beer”, or in another version, “Peter decides to grasp a bottle of beer”, or, still in another version, “Peter forms the intention to grasp a bottle of beer”] is the conclusion of a practical syllogism, in which the major is a proposition that expresses a desire [“Peter wants to quench his thirst”] and the minor is a proposition that expresses a belief [“Peter believes that drinking a beer will quench his thirst.”] Ever since Bertrand Russell, such propositions expressing desires and beliefs are called “propositional attitudes”.

The problem encountered by the analytic or cognitivist paradigm is that it searches to “naturalize” the mind in a way that preserves something that ordinary psychology takes for granted, namely that the contents of mental states have *causal* relevance in the explanation of our behavior. For a long time the obstacle seemed insurmountable, because philosophy of mind had convinced itself that the semantic content of a mental state, as described by its conditions of truth and of reference, depends on the entire physical and social environment of the subject; but if this content is supposed to have causal power in the physicist's sense, it can only be conceived in terms of the intrinsic properties of the mental state. It therefore appeared that the theory of mind could be naturalized only at the cost of depriving properties and mental states of all causal efficacy in so far as they are mental--thus making them pure "epiphenomena."

One of the most original theoretical proposals for overcoming this obstacle is the "anomalous monism" advocated by Donald Davidson in a famous 1970 article called "Mental Events."<sup>3</sup> Davidson postulated that every mental event is identical to a physical event; nonetheless there is no identity relation between classes or types of mental events and classes or types of physical events. In holding that properties, whether mental or physical, are just such classes of singular events, this philosophical position combined an

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MT has started a collaboration with Vittorio Gallese, as testified by this volume, is significant.

<sup>3</sup> In Donald Davidson, *Essays on Actions and Events*, New York, Oxford University Press, 1980.

ontological monism---i.e., the view that ultimately "there are" only physical events---with a dualism of concepts and properties---i.e., mental concepts are irreducible to physical concepts. Such a non-reductionist monism is "anomalous" in the following sense: while mental events cause other mental events as well as physical events, the relation of causality connects events with one another only insofar as they are events of the world, independently of whatever description, mental or physical, that we may give of them. The causal relation refers to a law of physics. By contrast, an explanation that involves mental concepts, after the fashion of the explanations furnished by ordinary psychology, cannot instantiate any strictly deterministic law in the physicist's sense---whence its non-nomological, or "anomalous," character. In short, though mental or psychological concepts enjoy an explanatory autonomy, ontologically the relation of causality does not involve the mental insofar as it is mental. This remains an epiphenomenon (one hardly dares say "superstructure").

Reviewing the various attempts that have been made to give substance to a naturalistic and materialist theory of the mind, notably the functionalism of a Jerry Fodor and anomalous monism, Pascal Engel comments, "This dual concern with the reduction of mental concepts to concepts acceptable from the point of view of a scientific psychology and with support for the autonomy of such concepts well illustrates the permanent dilemma of a materialist theory of mind. Indeed, the more successful the reduction (which is to say, the more one manages to 'explain' mental concepts in 'physicalist' or 'naturalist' terms), the less our usual mental concepts (those of common-sense psychology and of our pretheoretical conception of the mind) seem correct---and the more one is tempted to 'eliminate' [mental concepts] in favor of [physical concepts], to hold that there simply are no such things as beliefs, desires, sensations, and so on. In other words, materialism ceaselessly oscillates between its 'eliminativist' and 'non-reductionist' versions. The project of a 'naturalized' philosophy of mind similarly oscillates between these two tendencies."<sup>4</sup>

MT is resolutely non reductionist, as we shall once again verify in the next section of this paper. To what extent it can afford being eliminativist, that is to say, non mentalist, is still an open question. What can be said for sure is that MT falsifies a basic assumption of the desire-belief model, namely that

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<sup>4</sup> Pascal Engel, *Introduction à la théorie de l'esprit*, Paris, La Découverte, 1994, p. 10.

beliefs and desires, if we decide to maintain this terminology, pre-exist the action.

This could be shown in many ways. I will limit myself to two basic mimetic patterns: double mediation and pseudo-narcissism.

Double mediation obtains when the model imitates in the other the desire the other first found in him. This is all the more likely in a world in which there are few effective cultural barriers to rivalry and in which each denies that he models himself on anyone else.

René Girard writes, "In the world of internal mediation, the contagion is so widespread that everyone can become his neighbor's mediator without ever understanding the role he is playing. This person who is a mediator without realizing it may himself be incapable of spontaneous desire. Thus he will be tempted to copy the copy of his own desire. What was for him in the beginning only a whim is now transformed into a violent passion. We all know that every desire redoubles when it is seen to be shared. Two identical but opposite triangles are thus superimposed on each other. Desire circulates between the two rivals more and more quickly, and with every cycle it increases in intensity.<sup>5</sup>" [*Deceit, Desire, and the Novel*, p. 99.]

The mechanism is the following. A and B imitate each other reciprocally. A is anxious about B's desire, which alone can designate a target for his own desire. Some ephemeral and random sign makes him believe that B has designs on object O. Rushing to get there first, he thereby signals to his alter ego the stakes of the rivalry. When B in turn imitates A's desire, the starting illusion becomes reality. The first to imagine the other's desire thus seems not to have been imagining at all: he now has the proof! This is a particularly interesting case of a self-fulfilling prophecy. Any object could have emerged from the mechanism. It all depends on how one enters into it. Now, the starting point of the process of the emergence of the object possesses an apparently contradictory twofold property: it is nothing or almost nothing, a *je-ne-sais-quoi*, a caprice, a chance occurrence; and yet, it plays a crucial role, since everything takes place as if it were the thing that "determined" the object, the "objective" reality that is to emerge. There is a

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<sup>5</sup> René Girard, *Deceit, Desire, and the Novel*, Baltimore, The Johns Hopkins University Press, 1966, p. 99.

beginning, but that beginning is evanescent; there is determinism, but the determining factor is in the final instance ... beyond grasp.

Mimetic rivalry and the object of conflicting desires determine each other; neither pre-exists the other. The actions that reveal the converging desires cause them to emerge and intensify. Desire does not pre-exist action. There is a feedback loop of action onto desire.

To introduce pseudo-narcissism no better guide than the famous passage in which Girard scathingly and humorously critiques Freud's theory of narcissism:

"The coquette knows a lot more about desire than Freud does. She knows very well that desire attracts desire. So, in order [to] be desired, one must convince others that one desires oneself ... If the narcissistic woman excites desire, this is because, when she pretends to desire herself and suggests to Freud a kind of circular desire that never gets outside itself, she offers an irresistible temptation to the mimetic desire of others. Freud misinterprets as an objective description the trap into which he has fallen. What he calls the self-sufficiency of the coquette, her blessed psychological state and her impregnable libidinal position, is in effect the metaphysical transformation of the condition of the model and rival.

[...] The coquette seeks to be desired because she needs masculine desires, directed at her, to feed her coquetry and enable her to play her role as a coquette. She has no more self-sufficiency than the man who desires her, but the success of her strategy allows her to keep up the appearance of it, since it offers her a form of desire she can copy ... To sum up: in just the same way as the admirer caught up in the trap of coquetry imitates the desire that he really believes to be narcissistic, so the flame of coquetry can only burn on the combustible material provided by the desires of others."

We are dealing here with a variant of double mediation: the coquette's desire for herself is mediated by those she attracts, while their desire for her is mediated by what they believe is her purely independent self-desire. Here, it is the *belief* that the other is self-sufficient that is generated by what it causes, namely the revelation through some action that one desires her.

Belief does not pre-exist action. There is a feedback loop of action onto beliefs.

Those descriptions still preserve the mentalist terminology of folk-psychology. MT has not yet crossed the line, which would consist in jettisoning it altogether. Its roots in the analysis of literature probably stop it from doing so. Is it prepared to take that step, if that is the price to pay in order to become amenable to naturalization? What follows can help think through this crucial issue.

## **2.2. Away from mentalism, closer to mechanism**

What is remarkable is that within cognitive science itself a trend has always been present, which tends to deconstruct what a Heideggerian would call the “metaphysics of subjectivity”. Cybernetics played an essential role here, by showing that the fastest route to naturalizing the mind was to mechanize it<sup>6</sup>.

I will take a detour through the social sciences to illustrate this point. Methodological individualism in the social sciences has one golden rule: never treat aggregates as subjects. To do so would be to commit a category error. It is an error that we are tempted to commit constantly. Consider voting in elections, which today is the democratic procedure par excellence. Whether it is a matter of electing a president through universal suffrage, or of a referendum requiring the voter to answer yes or no to a certain question, it frequently happens that the distribution of votes is nearly equal: the winner prevails by very little. This state of affairs occurs so frequently, in fact, that a vote massively in favor of one of the options proposed inevitably arouses the suspicion that there was something irregular about the voting procedure. Since the time of Montesquieu, democratic theory has multiplied the number of attempts to account for this observation. For an information theorist, however, an even vote is one that maximizes entropy, which is to say disorder. In formal terms the procedure is equivalent to a lottery.

This interpretation may seem surprising, but it acquires still more force if one is aware of what rational choice theorists call the “voting paradox.” Except in the extremely improbable case where ballots are equally divided between two options, the conclusion is unavoidable from an individualist

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<sup>6</sup> That’s what I have set out to show in my *The Mechanization of the Mind*, op. cit.

perspective that no single ballot cast by any of the electors has any effect whatsoever: the effect of any individual vote upon the outcome is, strictly speaking, nil. The individual voter is forced to accept that the answer to the question "Would the final result have been altered had I voted otherwise than I did?" is no. But what do we observe in practice? We observe that the outcome of a vote is often interpreted as the manifestation of the carefully considered choice of a collective subject: the "people," the "electorate," and so on. In the case of a referendum that goes in favor of the "yes" by an extremely narrow margin, the usual interpretation is something like the following: "The electorate, in its wisdom, has answered yes to the question put before it, but it has also wished to issue a warning to all those who seek to move too fast..." It is as though one had made a subject out of chance---a collective subject in what might be called a position of exteriority to itself, since obviously the electorate is supposed to transcend each citizen taken individually. In the life of the innumerable committees and commissions to which modern societies confide responsibility for administering public affairs, the resort to anonymous voting is very frequently only a disguised means of delegating to chance a decision that presumptively rational debate has shown itself incapable of reaching. But these forms of randomly generated consensus are considered legitimate and meaningful to exactly the extent that they produce an external or transcendent point of view, and so can be taken as the decisions of a collective subject. Those are cases of generation of *transcendence from immanence*.

This interpretive attitude---what cognitive philosopher Daniel Dennett calls the "intentional stance"<sup>7</sup>---is an inevitable fact of the human condition. We ceaselessly attribute to others "mental states" (intentions, desires, beliefs, and so on), no matter whether the other is a human being, an animal, a machine---or a human collectivity. As a practical matter, this stance tends to weaken methodological individualism (or, as I would rather say, to make it more complex) since the individual subject no longer has a monopoly upon certain attributes of subjectivity. It becomes necessary to admit, in addition to the existence of these individual subjects, the existence of quasi-subjects, which is to say collective entities capable of exhibiting at least some of the attributes that one had thought were restricted to "real" subjects---individuals---and, in particular, the existence of mental states. One thus does not hesitate to say of an organization, or more generally of a collective entity, not only that it is capable of learning, but also that it is capable of

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<sup>7</sup> Daniel Dennett, *The Intentional Stance*, Cambridge, Mass., The MIT Press, 1987.

knowing, remembering, analyzing a situation, making experiments, forming concepts, taking decisions, and acting.

Now a whole tradition in cognitive science, from the time of its cybernetic origins up through the present day, has presented a picture of the individual subject itself as a quasi-subject, that is as a collective entity manifesting the properties of subjectivity. When I think, remember, desire, believe, decide, and so on, the subject of these predicates is not a ghost in the cerebral machine, a concealed homunculus as it were---it is the machine itself, in the form, for example, of a network of neurons. On this view there is, as Dennett insists, no ghost in the machine, no center of subjectivity. The attributes of subjectivity are emergent effects produced by the spontaneous, self-organized functioning of a complex organization in the form of a network. Cognitive scientists who defend this thesis, or a variant of it, resort sometimes to curious expressions: Francisco Varela speaks of "selfless selves," Daniel Dennett of non-selfy selves, Marvin Minsky of a "society of mind." But the idea is clear enough.

All of this is to say that the weakening, indeed the "deconstruction" of the metaphysical (i.e., Cartesian and Leibnizian) concept of subjectivity took place at the intersection of the social and cognitive sciences on both a "macro" and a "micro" level. On the "macro" level, the attributes of subjectivity are not the monopoly of individual subjects: collective entities can exhibit them as well. On the "micro" level, the attributes of subjectivity are not attributes of individual subjects: they are emergent effects produced by the functioning of *subject-less* processes. In both cases the tool used to deconstruct the subject is the same: the realization that a complex network of interactions among simple entities---formal neurons in the case of the individual quasi-subject, schematic individuals in the case of the collective subject---can exhibit remarkable properties. For someone like Dennett, it is neither more nor less justified to attribute a mental state, such as an intention, to a human being than to a collectivity.

If one reads contemporary cognitive philosophy on consciousness and the self, one cannot help but be struck by its constant references to social and political metaphors, even electoral ones. The emergence of a self at a given moment, in the course of one of those processes that constitutes the life of the mind, is likened to the transition from being in a crowd---a crowd of mental events, of neuronal configurations---to being in an organized political community, created by the election not of a center of control but of

a representative: the "head of mind," as the individual "subject" might be called, playing the same role as the head of state. In this scenario, mimetic crises occasionally arise: several potential representatives emerge as rivals for power, and so on. *Mental mechanisms and social mechanisms are placed on the same level, precisely to the extent they are mechanisms.*

Therefore, social theory and cognitive science, in their recent developments, converge, or, rather, grope towards two fundamental conclusions. Firstly, the autonomy of the human subject posited by classical modern philosophy, from Descartes to Leibniz, is just an illusion ("Descartes' error", to quote from Antonio Damasio.) Secondly, no center of control is responsible for the transition from disorder to order in the case of human collectivities.

Those findings receive an incredibly strong and novel light from MT. The human subject is radically incomplete, insufficient, for being radically mimetic. The scapegoating mechanism is responsible for the transition from violent disorder to a form of order that is always fragile and bound to collapse; and the victim is surely not in a position to control that process. The important word here, a talisman that can help bring MT and parts of the dominant paradigm closer to one another and to a position from which they can engage in a fruitful dialogue, is: "mechanism". We are now going to confirm this intuition by confronting MT with Evolutionary Theory [ET].

### **3. MIMESIS AS MORPHOGENETIC PRINCIPLE**

#### **3.1. Mimetic Theory and Evolutionary Theory**

MT includes a theory of hominization and of cultural evolution, which presupposes a certain theory of biological evolution. The latter is yet to be conceptualized, another daunting task for MT. Most neo-Darwinian theories which set themselves the task of accounting for the passage from animal to man characterize the latter in mentalist terms. This is not what MT as evolutionary theory is interested in doing, for the reasons just adduced. How then can the conversation between MT and ET be engaged?

ET plays an essential, structuring role in what we have called the dominant paradigm. It itself has had to avoid many pitfalls in its conquering enterprise, the most glaring one being what goes by the name of "social Darwinism" – that is, the careless application of "Darwin's dangerous

ideas”, such as “struggle for life” or “survival of the fittest”, to the social domain. The thinker who has best understood the absurdity for neo-Darwinian evolutionary anthropologists or psychologists to brutally apply to social phenomena what they think is the case in the biological realm, was social philosopher and Nobel prize laureate in economics, Friedrich Hayek. In a text that has become a classic of the epistemological literature on evolutionary thinking, he brought out

the erroneous belief that it is a conception which the social sciences have borrowed from biology. It was in fact the other way round, and if Charles Darwin was able successfully to apply to biology a concept which he had largely learned from the social sciences, this does not make it less important in the field in which it originated. It was in the discussion of such social formations as language and morals, law and money, that in the eighteenth century *the twin conceptions of evolution and the spontaneous formation of an order* were at last clearly formulated, and provided the intellectual tools which Darwin and his contemporaries were able to apply to biological evolution. Those eighteenth-century moral philosophers and the historical schools of law and language might well be described ... as *Darwinians before Darwin*<sup>8</sup>.

Hayek cruelly added,

A nineteenth-century social theorist who needed Darwin to teach him the idea of evolution was not worth his salt. Unfortunately some did, and produced views which under the name of “Social Darwinism” have since been responsible for the distrust with which the concept of evolution has been regarded by social scientists<sup>9</sup>.

Among the Darwinians before Darwin whose thought had a powerful influence on the author of *On the Origin of Species*, Hayek singled out the Scottish Enlightenment in general and Adam Smith in particular. It was not the economist or the fledging discipline called political economy that had the major impact on Darwin’s thinking. The book that interested him most

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<sup>8</sup> F. A. Hayek, *Law, Legislation and Liberty*. Volume I, *Rules and Order*, Routledge & Kegan Paul, London, 1973, p. 22-23.

<sup>9</sup> *Ibid.*, p. 23.

was the treatise in moral philosophy that Adam Smith published in 1759, i.e. exactly one hundred years before *On the Origin of Species*. This book was titled *The Theory of Moral Sentiments* (TMS) and it preceded by 17 years the publication by the same author of the first work of modern economics, *An Inquiry into the Nature and Causes of the Wealth of Nations* (WN). It must be added that Smith always considered the former, TMS, a much superior work, where the key to the latter could be found.

What did Darwin find so essential in TMS? He found something absolutely stunning, a remarkable discovery equal to the most fabulous accomplishments of the human mind. He found that it was possible to conceive of a complex order, of its genesis and evolution, without any recourse to the postulation of a designer, God or Man. Another member of the Scottish Enlightenment, Adam Ferguson, had used a memorable formula: “Social order is the result of human action but not of human design.” Darwin saw there how he could conceive of a natural order, capable of complexifying itself ever more, without having to posit that a demiurge, a grand clockmaker or a grand architect planned or designed it according to His will. That discovery was overwhelming and had nothing to do with the economic frivolities that go today by the name of social Darwinism and are the result of the brutal application of biological ideas to society: the market is the place where the weakest are eliminated and only the fittest survive, capitalism is synonymous with struggle for life, and the like.

Smith’s account was a brilliant precursor of what would be called, in the second half of the twentieth century, theories of complex, self-organizing systems, autopoietic systems, or, in Hayek’s terminology, spontaneous orders. It turns out that MT itself is a theory of self-organizing, complex systems, no less than Darwinism and ET. The mechanisms that it analyzes are *morphogenetic*: they are capable of generating new forms. They are simple but their simplicity brings about complexity. My methodological advice is then the following: let us set up the dialogue between MT and ET at the level of *the formal models* that structure the one and the other. We will avoid the many pitfalls that await those who carelessly smuggle biological notions into the social and cultural realms and vice versa, and we will focus on the interesting questions: it is likely that biological self-organization as seen by ET, and social and cultural self-organization as seen by MT, share fundamental traits and differ in their material implementations. Let’s explore systematically what they are. In what

follows, I will present a brief illustration of what this research program might look like.

### **3.2. Chance and Necessity: Two Principles of Evolution**

Both MT and ET have isolated *morphogenetic* principles of organization, which are neither biological nor economic or social per se, but reside at a higher level of abstraction.

I will start from MT. I would like to explore the reason that makes mimesis a morphogenetic principle of such power as to generate self-organizing systems whose evolution is endogenously determined. We know that evolution is a mix of chance and necessity. This characterization is too general, though, and a fundamental distinction must be drawn between two principles of evolution: the first one is dubbed “*order from noise*” and the second “*complexity from noise*”<sup>10</sup>. To illustrate their difference at a formal level I will present two very simple mathematical thought experiments.

The first experiment has been carried out at the Palais de la Découverte, Paris’ science museum, ever since its foundation in 1937. All visitors are invited to participate. They are requested to cast a needle onto a grid of equidistant lines. The length of the needle is half the distance between two neighboring lines. Either the needle intersects one of the lines or it does not. The setting is electrified, which permits a counter to compute the frequency of the cases in which there is an intersection. Over time, tens of millions of visitors have cast their needle, and the proportion of intersection cases has oscillated around and converged towards a value that is now determined with thousands of decimals: the beginning is 0. 318309886183791... It turns out that this value is the inverse of pi [pi being the ratio of any circle's circumference to its diameter]. It is thus that the value of pi can be *experimentally* determined with a precision that is, if we wait a sufficiently long time, as high as one wishes. The same experiment is being reproduced in many other science museums of the planet, for instance at the San Francisco Exploratorium. Everywhere the process converges towards the same value.

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<sup>10</sup> Those phrases have been coined by the neo-cybernetician tradition, from Heinz von Foerster to Francisco Varela to Henri Atlan. A history of those concepts can be found in my *On the Origins of Cognitive Science*, op. cit.

This experiment, known as “*Buffon’s needle*”, as spectacular as it may seem, is just an illustration of the so-called “law of large numbers”, one of the pillars of the probability calculus: the frequency of a random event tends over time towards its a priori probability. The French naturalist Buffon<sup>11</sup>, who was also an eminent mathematician, could demonstrate in a highly elegant way that the a priori probability of an intersection in the experiment at hand is the inverse of pi. Chance, here, is the instrument through which a pre-existing necessity realizes itself. This is a case of “order from noise”.

The second thought experiment illustrates the incredible morphogenetic power of imitation. Dubbed the *Polya’s urn scheme*, after the name of Hungarian-born Stanford professor of mathematics George Polya<sup>12</sup>, it has become the matrix of a wide variety of scientific models. An urn contains one white ball and one black ball; one ball is drawn randomly from the urn and its color observed; it is then placed back in the urn together with another ball of the same color. Hence the number of balls in the urn increases by one every time. The question is, how does the proportion of white balls, say, evolve over time? It is very easy to simulate this evolution with a simple calculator coupled with a generator of random numbers. We realize the experiment and observe with surprise that the system seems to have the same kind of dynamics as the Buffon’s needle case: a series of oscillations dampen out and converge towards a certain value. A second surprise is that this value is not 0.5 (in which case half the balls in the urn would be white). Why is it a surprise? : because the setting is perfectly symmetrical. The observed *breach of symmetry* seems to come from nowhere. No rational explanation seems capable of accounting for it.

Note what makes this model the simplest formalization of a mimetic dynamic. Every random event (here, the draw of a ball of a certain color) changes the conditions for the next draw by reinforcing the odds of the color in question. This self-reinforcing process is very much akin to the mimetic pattern which Girard calls “double mediation”: imitating a desire that is itself imitated on one’s own desire, as we have seen above. There is no original desire and the object on which rival desires *converge* is the

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<sup>11</sup> One hundred years before Darwin, Buffon, in his *Histoire Naturelle*, postulated the existence of a common ancestry of man and apes.

<sup>12</sup> George Polya, who died in 1985 in Palo Alto, California, at the age of 98, was the professor of the mathematician John von Neumann, he, too, of Hungarian origin, and to whom we owe the concept of complexity.

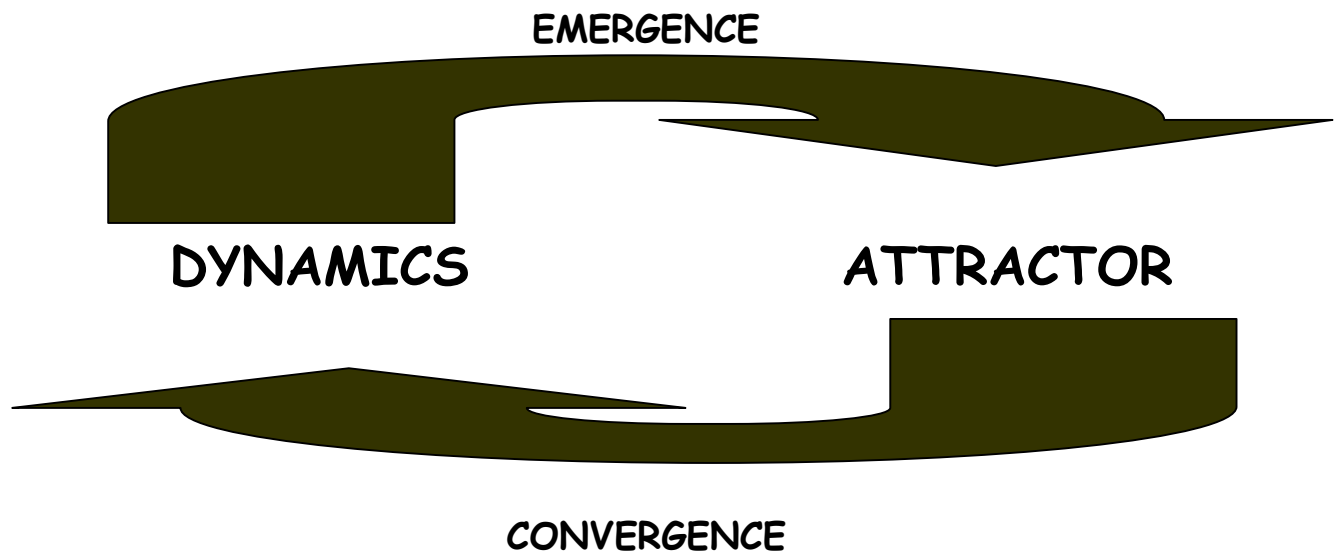
*emerging* production of the mechanism itself. [Think of two absent-minded professors going together to attend the same event. Neither of them knows the venue; each one believes the other knows. A trajectory emerges, endowed with some stability, from the fact that each partner follows in the other's footsteps<sup>13</sup>.]

Let's return to the Polya's urn scheme. There is a fundamental difference with the Buffon's needle case. Every time the experiment is carried out again, the same phenomenology obtains, but the value towards the dynamics converges is different. It is entirely contingent on the experiment in question. The dynamics seems to be converging towards a pre-existing value, but the value is generated by the very dynamics. From within, it is impossible to realize that a pre-existing end does not guide the evolution. From without – that is, if we are able to pull ourselves up by our own bootstraps and contemplate from there the set of all possible trajectories –, our specific world appears in all its contingent singularity to be one among a manifold of possibilities. It is a case of “complexity from noise”. Chance here brings about a form of necessity that appears as such only retrospectively.

The relationship between the dynamics and its asymptotic behavior (called, in the jargon of the mathematical theory of dynamical system, an *attractor*), takes on the form of a loop that is the signature feature of a self-organizing system – that is a loop between an emerging level (the attractor) and its conditions of production (the dynamics):

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<sup>13</sup> An Argentinian ad for a business magazine illustrates this mechanism in a brilliantly humorous fashion. Two blind men are about to cross a street. The dialogue between them goes like this: “Cruza?” “Si”. [that is: “Are you crossing the street?” “Yes”]. And the two set out to cross the street, each one giving his arm to the other, in the middle of a heavy traffic that almost runs them over. Neither of them understands that the other is blind. The first one is really asking: “You see that I am blind. Would you help me cross the street?” The second is answering yes to a different question: “I see that you are blind: do you want me to help you cross the street?” The lesson of the ad: it is better not to be informed than to wrongly believe that one is. The recent financial crisis was driven in part by mechanisms of this kind.



**Complexity from noise:** the dynamics converges towards an attractor that is generated by itself. The evolution is said to be *path-dependent*.

Over the years, I have shown that all the mimetic and sacrificial figures that MT has put forward or brought out (double mediation, pseudo-narcissism, pseudo-masochism, the pattern of the “Stranger”, the scapegoating mechanism), are particular instances of this bootstrapping scheme.

This scheme is consonant with an impressive series of scientific and mathematical discoveries made during the second half of the twentieth century, which has completely changed the way in which we conceive the trajectory of a material system subject to purely causal physical laws. It is well known today that *complex systems*, made up of many elements interacting in nonlinear ways, possess remarkable properties—so-called emergent properties—that justify their description in terms that one should have thought had been forever banished from science in the wake of the Galilean-Newtonian revolution. Thus it is said of these systems that they are endowed with "autonomy," that they are "self-organizing," that their paths "tend" toward "attractors," that they are “path-dependent”, that they have "intentionality" and "directionality"—as if their paths were guided by an end that gives meaning and direction to them even though it has not yet been reached; as if, to borrow Aristotelian categories, purely efficient causes were capable of producing effects that mimic the effects of a final cause.

In a sense, we are not far here from Kant's conception of nature in the second part of his third Critique, the *Kritik der Urteilkraft*, entitled "Critique of Teleological Judgment". Only explanations that ultimately appeal to causal mechanisms are considered adequate. Nonetheless, faced with the most surprising manifestations of complexity in nature (life for Kant), recourse to another "maxim of judgment"—teleological judgment—becomes inevitable. Concepts such as "internal finality" are indispensable, and perfectly legitimate, so long as one keeps in mind that they have only heuristic and descriptive relevance. Teleological judgment consists in treating them as though—the Kantian *als ob*—they have objective value.

An essential feature of MT, which, unfortunately, is overlooked or misunderstood by many who are exposed to it, is that all the accounts it provides are entirely causalist, as befits a scientific theory. And nevertheless, they are capable of explaining why human history, in spite of its fury and apparent madness, is not a tale told by an idiot, but displays features that evoke intentionality and directionality. The genesis of the scapegoating mechanism – to take up the figure that is at the core of Girard's anthropology of violence and the sacred, but also one about which radical misunderstandings abound – was not invented by humankind *in order to* keep its violence in check. It constitutes one possible *attractor* of the dynamics of violence.

### **3.3. Mimesis and Cultural Evolution**

The Polya's urn model is the simplest model capable of generating "complexity from noise", in contradistinction with "order from noise". Much work has been carried out in recent years to enrich it in various ways. It is remarkable that a good many of the models that have thus been developed can be subsumed under the category of "cultural evolution". It is no less outstanding that all of them place the logic of imitation (under various guises) centre stage.

A very active branch of formal economics is today exploring the role of what it calls "interpersonal influences" in economic activity, a euphemism for mimesis. Economists are progressively realizing with surprise and reluctance how far removed this mimetic universe is from the ideal market. Contrary to what they thought, generalized imitation produces something rather than nothing – a statement that constitutes the *ba* of MT!. It

creates self-reinforcing dynamics that converge so resolutely on their target that it is difficult to believe that this convergence is not the manifestation of an underlying necessity, in the manner of a mechanical or thermodynamic system returning invariably to its equilibrium state after straying from it under the effect of some perturbation. Yet one sees that the concept of equilibrium, which the theory of the market imported from rational mechanics, is absolutely unsuited to characterize the "attractors" of mimetic dynamics. Far from expressing an implicit order, they spring from the amplification of an initial fluctuation, and their appearance of pre-established harmony is a mere effect of unanimous polarization. They are condensations of order and disorder. The mimetic dynamic seems to be guided by an end that pre-exists it--and that is how it is experienced from the inside--but it is in reality the dynamic itself that brings forth its own end. Perfectly arbitrary and indeterminate a priori, it acquires a quality of self-evidence as the vise of collective opinion tightens. If there is a social process that illustrates to the highest degree the notion, so important today in social and political philosophy, of "pure procedure, it is the mimetic dynamic. There is no other way to determine its result than to let it proceed to its conclusion. It is a random procedure that takes on an aura of necessity.

In coming to an equilibrium, the economists' ideal market is supposed to reflect an external reality. The prices express objective, "fundamental" values that synthesize information as diverse as the availability of techniques, the scarcity of resources or the preferences of consumers. The mimetic dynamic for its part is completely closed upon itself. The attractors that it generates are not in any relationship of correspondence with an external reality, they simply reflect a condition of internal consistency: the correspondence between a priori beliefs and a posteriori results. The mimetic attractors are self-realizing representations.

Generalized imitation has the power to create worlds that are perfectly disconnected from reality: at once orderly, stable, and totally illusory. It is this "*mythopoetic*" capacity that makes it so fascinating. If there are hidden truths somewhere to be discovered, one must not count on mimetic dynamics to disclose them. If it is real-world efficiency one is looking for, it is again better not to have to depend on them. Efficiency and the capacity to reveal hidden information: those are two properties that economists readily attribute to the ideal market. The distance between the latter and the mimetic process seems insuperable.

The clinical picture of the imitative logic is in its essentials already present at the stage of a very simple model in which the mimetic connections between agents are given and remain fixed throughout the whole process: the probability that a given agent imitates another given agent is a constant, possibly null.<sup>14</sup> Phenomenologically, we know that this hypothesis is too restrictive and that the mimetic dynamic has the ability to modify the structure of its own connections: one subject has all the more chances of being imitated by another given subject if he is already imitated by many other subjects. An opinion's power of attraction increases with the number of individuals who share it. One can see that if this is the case, the effects of mimetic polarization are accentuated accordingly. It may seem, however, that such hypotheses depend too much on the irrationality of crowd phenomena. In fact, research in recent years has shown that they correspond to forms of behavior that are individually rational. For instance, there are cases where the personal advantage that an individual derives from joining the mass grows *objectively* with the size of the latter.

This hypothesis is today precisely a commonplace in the literature that deals with a very important dimension of cultural evolution in modern societies, the *choice of techniques*.<sup>15</sup> As a technique spreads, more is learned about it and it develops and improves; the more users there are, the richer and more diversified the selection of products becomes; production costs diminish, and so does the risk of failure. In these conditions the competition between rival techniques displays features which distinguish it markedly from the "perfect competition" of economists. The first is the multiplicity of attractors. The "*selection*" of one among them cannot be determined by deduction from the formal structure of the problem; it is the actual history of events, with its contingencies, fluctuations, and random turns, especially those affecting the system's first steps, which are responsible. The concept of "*path-dependency*", which the Polya's urn scheme illustrates so simply and cogently, plays a crucial role here. Fundamentally, it expresses the same idea as that of "pure procedure." We are poles away from Le Chatelier's

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<sup>14</sup> See the model presented by André Orléan in "Money and Mimetic Speculation," in P. Dumouchel (ed.), *Violence and Truth*, Stanford University Press, 1988. Under certain conditions, it is demonstrated that the imitative dynamic converges toward unanimity of the group. These conditions reflect the fact that there is an effective interdependence among all the agents; in other words, very few probabilities  $p_{ij}$  are null,  $p_{ij}$  being the probability that the agent  $i$  imitates the agent  $j$ .

<sup>15</sup> Cf. W.B. Arthur, "Competing Technologies: An Overview," in R. Dosi et al. (ed.), *Technical Change and Economic Theory*, London, Pinter Publishers.

principle, a thermodynamic reference still popular with theorists of the market who want to laud the latter's capacity to neutralize perturbations which affect it. The evolution of such a dynamic is highly unpredictable. There is obviously no reason for the selection that it accomplishes to be the most efficient one. If a certain technique is favored by chance at the outset, it will benefit from a "selective advantage" that it will maintain and amplify as the number of users grows. It may end up dominating the market even though another technique would have shown itself to be more advantageous for everyone if only chance had selected it from the start. Technological evolution thus has a strong propensity to get *locked into* undesirable paths from which it is harder and harder to remove it. Chance, selection, "order through fluctuation," self-organizing process: all of these terms used today by historians of technology define a theory of evolution that has only the remotest kinship with neo-Darwinism, but owes all of its most stunning characteristics to the logic of imitation.

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Any theory of evolution, in biology or elsewhere, that is structured by the "order from noise" model suffers from a fatal flaw: it is unable to account for the diversity of the world. The dynamics of the latter are bound to converge towards pre-existing states. ET, in biology or, worse, in the social sciences, when it refers to a principle of selection, such as the "survival of the fittest", falls under that fundamental critique. Darwin himself saw the danger. He didn't think that selection, the sacred cow of ET, was the only factor of evolution. Today, one could even say that it is not even the most important one. In the first edition of *On the Origin of species*, Darwin wrote: "I am convinced that selection has been the main, *but not the exclusive*, means of modification." In the 6<sup>th</sup> edition, he added: Ever since the first edition, I have repeated this claim again and again. "This has been of no avail. Great is the power of misrepresentation."

In order to escape that fate, mechanisms capable of generating "complexity from noise" are required. Mimesis is the ground from which they stem<sup>16</sup>. That is why MT gives the impression that it can account for everything, from quantum to neuron to the eschaton. This impression is not unwarranted.

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<sup>16</sup> I venture the following conjecture, although I am quite unable at the moment to justify it: Mimesis, in a form or another, is not only sufficient, but also necessary for the generation of complexity from noise.