

Some Observations on the Role of Singularity in the Exact, Mathematical, and Social Sciences

*Jacques Hamel*¹

At first glance singularity would seem to be necessarily opposed to the physical sciences, indeed to any kind of science. As the hallowed saying goes: "Science deals only in universals." According to this view, the aim of any true scientific endeavor must be the discovery of universals or, in other words, the value of such an endeavor is based on its ability to explain phenomena in terms of universals. The status of singularity in science is a direct result of this approach. Singularity is associated with the presence, either in a person or an object, of an unusual or exceptional quality, or of an individual trait. Singularity so conceived must therefore be seen as inherently compromising the aims of any scientific endeavor, since the purpose of that endeavor is universality as defined above. In this sense, the basis of scientific explication is the ability to determine a feature common to a collection of objects, thus allowing them to be explained by deductive reasoning. This common feature can therefore not be individual, if individual is understood as unusual or exceptional.

This is the conception of singularity accepted not only in the exact and experimental sciences but also in the social sciences, especially in sociology. This should come as no surprise, given sociology's object of study: society. This object, by definition, implies a vast array of relations and social behaviors whose analysis hinges on the ability of the researcher to bring to light various common features. The problem, however, is that this object cannot be conceived in its totality within the framework of the very activity that determines the way in which it explains things. Sociology cannot, and will never be able to, examine its object of study in its totality.

This object must therefore be reduced, and sociological methodology has found an effective way to counter this inherent obstacle to explanation. As is known, the essence of this method consists in defining the object on the basis of a hypothetical configuration derived, for the most part, from statistical frequency. Society is thus reduced to an object defined in terms of a configuration of dominant characteristics whose representativeness is based on the frequency of appearance of these characteristics amidst the flux of relations and social behaviors that constitute the society in question. "From this," writes Claude Javeau, "comes the idea that sociology can only treat a large number of actors . . . [whose relations and actions] are synchronous, in order to find there . . . [traits] sufficiently prevalent so that they can be defined as logically causal."²

This approach, which carries the force of law in sociological methodology, seems in fact to conform to the scientific method defined narrowly. By the way in which it constitutes its object, sociology is constrained to take into account a large number of individual cases in order to note those common features capable of accounting for the object in terms of the logical relations of causality.

This approach not only requires statistical representation for the constitution of its object, but also suggests that these dominant features can be perceived neither on the individual level nor, consequently, through a study of the individual consciousness of the social agent who underlies this object. To grasp these traits requires that an objective approach be coupled with a statistical representation. The hypothetical-deductive path that characterizes this experimental method in the sciences harmonizes, from the start, with just such a conception of the object; and, what's more, with the methodological approach apt to explain it. This approach, it would seem, is the sole one capable of attaining this goal. Although this approach has been called into question at various times in the history of sociology, it nevertheless remains – with its basis in objectivity and typicality – the dominant one in the field.

Singularity can thus have no place within sociology; and this includes the methodological approach that defines singularity itself. Although the return to the use of qualitative methods in sociology, such as the use of life stories and the method of case studies,³ has certainly contributed to increased interest in singularity, most of the methodological debates have centered around the question of exactly how many life stories are necessary in order to ground a sociological analysis.

Nevertheless, these debates point up the fact that the rigor with which an object is constituted and analyzed in sociology has in some ways gone beyond that of the experimental method prevailing in the other sciences (and yet the effectiveness of this method for the sciences leaves no room for doubt). Pierre Bourdieu, in a conversation with Loïc Wacquant, has pointed out that “Galileo did not have to repeat endlessly his experiment with an inclined plane in order to construct his model of how bodies fall. A single case, when well conceived, ceases to be a particular case.”⁴ Newton’s apple can be seen in a similar light, in the sense that the explanatory value of the fall of this particular object attained universality due to the fact that the experiment was “well conceived” (to use Bourdieu’s term); and this holds true equally for a methodical or, more generally, a methodological approach.

Although it cannot be doubted that statistical methods can help us to constitute a “well conceived” object of sociological inquiry, it is equally true that the experimental approach we have just described – on the basis of the experiments of Galileo and Newton – proves that the statistical method is not the only one. In this sense, then, sociology might derive real benefit from a reflection upon the epistemological value of singularity in scientific inquiry.

I. The Status of Singularity in the Sciences and Mathematics

The epistemologist Georges Canguilhem has characterized the role of singularity in the sciences, particularly in biology, in an article entitled “Du singulier à la singularité en épistémologie biologique” (“From Singular to Singularity in the Epistemology of Biology”). His remarks on the subject are worth repeating.

In its initial guise, singularity is defined as one particular characteristic of anything that, lacking a satisfactory explanation, is relegated to the sphere of the unknown. Loadstone, for example, was once viewed as such a singular thing, since at first glance no single explanation seemed capable of accounting for the apparently contradictory properties of the substance. In this case, singularity was conceived of as being part of the order of things themselves. Nevertheless, even if such a trait is empirical and characterizes a thing as such, it can also, at the same time, serve to clarify other things or other objects – animate or inanimate, depending on the case – and in fact allows us to put them into some kind of perspec-

tive. In connection with this, Canguilhem restates the observation of the naturalist Blumenbach:

There are numerous examples of how aberrant manifestations in nature often shed more light on obscure areas of research than nature's normal and regular course does.⁵

The perception of a singular trait as being an aberration peculiar to one particular animal or natural species casts a revealing light that immediately helps us better understand the totality of other species. The singular trait of a particular species does not necessarily indicate a demarcation or exclusion, as long as this trait is neither aberrant nor unknown. If such were the case, singularity "would in some sense be based on the acknowledged futility of seeking any relation."⁶ Singularity is, however, on the contrary, partitive and contains an epistemological function. As a result of this definition, a singular trait is henceforth considered to be part of a totality that it helps to clarify in the sense that singularity allows us better to grasp the overall totality.

The recognized epistemological function that naturalists invest singularity with is based on "the access to instruments and dissection procedures that allow for the examination of internal organic structures."⁷ Singularity therefore has both a theoretical and methodological status; strictly speaking, it is not part of the empirical order. Its foundation is a "theory" of things and animal species, one of whose tenets is a presumed relation between these things and animal species. Thanks to these theoretical terms we can now distinguish between singularity, as it is henceforth to be understood, and the extraordinary, which is based on a narrowly defined "empirical" point of view, that is, on initial perceptions:

Experiences are accounted singular in relation to concepts describing types or laws of nature; experiences are accounted extraordinary in relation to habits of perception.⁸

Singularity is therefore not part of the empirical order and, as a result, cannot be reduced to the category of exceptions or the extraordinary. Its theoretical status, to follow Canguilhem's formulation, is related to an epistemological, even heuristic function, in the sense that it calls into question recognized generalities:

The singular plays its epistemological role not by offering itself as a generalization, but rather by compelling a comparison, on the part of critical inquiry, between this singularity and the generality anterior to it.⁹

Contemporary mathematics has itself played a leading role in developing striking new ideas concerning the epistemological role of singularity. "Catastrophe theory," for example, which was proposed by the mathematician René Thom, challenges the idea that singularity can be made part of an adaptive analytical approach to totality. According to it, a total view can be achieved on the basis of singular traits, to the extent that they are "well conceived," to repeat the particularly expressive formulation of Bourdieu.

The initial foundation of Thom's catastrophe theory is a narrow analysis of geometrical forms and their morphological transformations. A "catastrophe," from this perspective, proves to be a border, either spatial or temporal, separating one state from another; moreover, it is characterized by a sudden leap, or an accident, in the manifestation of the form. The example he uses is that of a conical point, which is the summit and singular point of a revolving cone, conceived of as originating in a revolving cylinder by a continual application that "concentrates the meridian circle in its source."¹⁰ A sudden leap in the manifestations of a phenomenon, which causes differences to appear, creates a form that "surges out of a continuous background."¹¹ In such a case it is a matter of "concentrating a non-local manifestation within a local structure." This vivid formulation is the basis for what the theory of catastrophes calls singularity.

A singularity can always be considered as originating in a regular space *E*, if it is assumed that there lies buried in this space a figure, in one concentrated point, of universal (*global*) applicability.¹³

This essential aspect of singularity thus entails a neutralization of characteristic differences while at the same time maintaining the mark of this difference and in some sense acting as its vanishing point. Thus, essentially, one form is distinguished from another by its singularities. In this sense, singularity is a fundamental concept for the description and understanding of the morphological transformations that catastrophe theory attempts to encompass.

[Singularity is] a crucial concept to the extent that it is one of the two available instruments, acting in diametrically opposed senses, that the mathematician can use in order to progress from the particular (*local*) to the universal (*global*): a progression that any form of deduction requires. The first of these instruments, which progresses from the particular to the universal, is the prolonging of analytic procedures; it can be said that all the existing methods of quantitative prediction ultimately depend on this approach.

The second instrument, which progresses from the universal to the particular, is precisely that of singularities: in fact, in a singularity there is a concentration, within a single point, of a universal form that can be reconstituted either by deployment or desingularization. To make a situation intelligible thus means, in several senses, defining the totality of singularities that engender, either by their combination or reciprocal distribution, a stable universal configuration.¹⁴

Thom also defines singularity more simply as “the skeleton of a phenomenon”¹⁵ of universal form, which can thus be reconstituted on the basis of this skeleton or, more precisely, on the basis of the *generic* points that in fact – according to this theory of forms – constitute these singularities. Thus these singularities are seen as the characteristics of a form that embodies generic properties capable of accounting for the origin, configuration, and stability of the form, so that “the theory of catastrophes introduces the revolutionary idea that we can in part ‘follow’ observed morphologies back to the unknown dynamics that gave rise to them.”¹⁶

In this sense, catastrophe theory offers a qualitative methodology that goes well beyond the theory of geometrical forms, since, as the author himself states, it can not only be used to consider problems of a philosophical and sociological nature, but also, with the help of methods derived from the fields of topology and differential geometry, to consider problems relating to embryology. While we cannot pretend to give a detailed description of catastrophe theory, which makes singularity the basis for its concept of the development of forms (for one thing, the technical details of this process go beyond the mathematical competence of the present author), we can at least schematize those aspects of this theory of forms that can help to enrich a sociological approach that would strive to be a science of “well conceived” singularities.

The description of borders between nations is one example, among others,¹⁷ of the application of catastrophe theory to an area closely connected with sociology. According to this theory, the particular points that make up the outline of a border, represented on a geographical map in the form of lines, are in fact the marks of a catastrophe (i.e., of a “sudden leap” or accident on the continuous form of regular space that defines any given territory) and allude to a passage from an unstable to a stable situation. These points, conceived of by topology and differential geometry in terms of their singularity, allow us to create a geometrical form containing an aspect of invariance. In effect, if each capital is represented by a

point, the borders can then be treated like segments of the median between the points, thereby decomposing the space into polygons. For almost any choice of capital city, we find that its borders intersect the territory at three points and that this singularity is characteristic of a stable solution in which there is harmony among the states affected. Any other configuration – four points, for example – is unstable. This topological description, which uses points to designate capitals, allows us to see that the origin of borders between states can be found in the pragmatic action of serfs who often sought a sovereign in the closest capital city. Without discussing the value of the description itself, it is nevertheless true that this description results in an approach to the meaning of pragmatic action that excludes arbitrariness because of the constraints imposed on the topological and geometrical models by catastrophe theory itself. As Thom has written:

No matter what empirical morphology one discusses, it is necessary, in order to have a good model, to eliminate, as much as possible, all arbitrary parameters: this is the problem of “the reduction of arbitrariness” in description, a task that catastrophe theory, thanks to the interpretation [geometrical] that it provides, can effectively fulfill. In order to describe, one must understand . . .¹⁸

If understanding is indeed a necessary condition for description, then catastrophe theory requires, for understanding, a reduction in the arbitrary character of this description; and, because of the mathematical constraints imposed on it by our chosen models of topology and differential geometry, this arbitrariness can be reduced to the vanishing point.

The intermediary stage of geometrization required by catastrophe theory is essential: it is here that semantic intuition, with its immediately subjective character, is replaced by geometric intuition. As a result, the object is spatialized and distanced from the thinking subject.¹⁹

The distance created by this recourse to geometry and topology in no way excludes intuition and even imagination, which can both be used in description; however, their “meaning” is now exactly defined and clarified among the potentialities disentangled by the mediation of this model. The constraining quality of the experimental method in the sciences, which is fundamentally due to the technique of hypothesis and deduction that underpins it, can thereby be made more supple by the application of catastrophe theory, and without any lessening of its acknowledged rigor.²⁰

Moreover, thanks to the models that this theory inspires, sociology can reduce, to a bare minimum, the arbitrary character of its description and understanding of action by neutralizing the pragmatic meaning with which action is usually invested. We can do this because the geometrical intuition responsible for these models effectively allows us to define sociology as a theory of action clearly demarcated from its pragmatic meaning.

While the essential aim of action is to resolve particular problems, understanding [manifested by science] aims at the universal, that is, the global. By a seeming paradox, particular problems demand non-particular means in order to be solved; intelligibility, on the other hand, requires the reduction of a global phenomenon to typical particular situations, whose pregnant character makes them immediately intelligible.²¹

The paradox is equally apparent when Thom identifies this twofold progression in science itself; i.e., on the one hand, there is quantitative knowledge, and, on the other, qualitative knowledge, of which the social sciences, and in particular sociology, constitute the perfect example. Here "the reduction of a universal phenomenon to typical particular situations," or to singular ones, is reached; and catastrophe theory eliminates any arbitrary character.

With the help of this theory, there is hope that the arbitrary aspect of the "social sciences," and in particular sociology, can once and for all be eliminated. This can be achieved through an analogical use of the geometrical models. And catastrophe theory can be seen as but the first systematization of this analogy. By using it we can hope to remedy the lack of rigor that afflicts the social sciences, including sociology, and that in fact afflicts all qualitative knowledge.²² Thus it is now clear that this method is a true *qualitative methodology*: indeed it may be *the* qualitative methodology that the originator of the theory hoped for.

The methodological advances claimed by catastrophe theory have nonetheless raised some questions. The aim of the theory, as has been seen, is to redefine science and remedy the defects of the experimental model (defects that René Thom has bluntly identified) by substituting models of differential geometry and topology for the experimental method. According to Thom, the prevailing experimental method in science can be summarized as follows; it is a set of rigid rules, of serial procedures and predictable operations, that produces predetermined results. Although this method naturally allows for experimental controls, it simultaneously undermines the scientific imagination. While catastrophe theory, through

its introduction of geometrical intuition, furnishes this imagination with rigor, it does not, on the other hand, admit of any experimental control, if we understand experimental control to be confirmation by experiment.²³ Thom sees this drawback as the price that must be paid, given that the goal is to “understand well” the empirical morphology we are describing; and this holds true, moreover, for any kind of qualitative knowledge. The value of this knowledge is not “its agreement with experience but, on the contrary, its ontological reach,”²⁴ that is, the attainment of universal validity, which is a result, according to Thom, of the geometrical intuition that propels the scientific imagination without requiring the latter to be in agreement or immediate contact with the pragmatic meaning of the experience under consideration. Catastrophe theory assumes and in fact demands that this imagination be tied to criteria – themselves based on an abstract geometrical intuition – that are capable of passing from the particular to the universal in the morphological study of singularities, whether they be of a mathematical, philosophical, or sociological character.

II. The Singularity and Epistemology of Qualitative Knowledge

The epistemology of qualitative knowledge, the study of which is identified here with the famous inquiry of Gilles-Gaston Granger, has cast into doubt the constraint imposed by geometrical intuition (and which, according to René Thom, is the best hope for the scientific imagination) on any quest for qualitative knowledge. Although this geometric intuition has proven to be quite fecund, it cannot by itself, Granger says, replace the epistemological aspect, which is at the heart of the very progress of qualitative knowledge. The explicit elaboration of the passage from the particular to the universal is what is needed, and this can be well established without requiring that the study of the “morphological qualities” of singularities be conceived of within the narrow framework of geometrical intuition.

In order to describe, one must understand, Thom writes. More importantly, we would add, such a description aims at an explanation. By the word “explanation” we have in mind the relation of the particular to the universal, a relation that the mathematician [Thom] has so correctly insisted upon. We have already seen that he characterizes singularity as the “concentration” of the universal in the particular. However, he more generally suggests that the theoretical approach is opposed to the prag-

matic in the same way as the identification of universal problems, which are to be solved by their reduction to locally typical situations, is opposed to the identification of particular problems, which are to be resolved by universal means. . . . He identifies this twofold progression in scientific activity itself. But the perception of forms – the aim of which, as he understands it, is to grasp the source of the generation of the forms – would in essence employ the very movement that we have called qualitative knowledge and which is based on singularities in order to disclose and redeploy the universal.²⁵

Granger's epistemology of qualitative knowledge immediately leads to the conclusion that any event or experience is immediately given in the form of qualities. Without taking up the philosophical problems raised by the assertion of a perception of qualities, we can in any case analyze this perception from two different points of view. Quality, in the first instance, is a lived experience, absolute and unique, that natural language allows us to transmit and that the various arts attempt to recreate. Quality is later experienced as *form*, understood simultaneously as contrast and continuity,²⁶ and it is precisely this lived experience that science attempts to transform into concepts in order to account for experience. According to Granger's epistemological model, the conceptualization of form is based on three distinct modes of presentation of the forms, which can be summarized by three key words: describe, understand, explain.

Description initially consists of "picking out" the "dimensions" of a form that correspond to empirical data, itself originally "shapeless" except for our ability to slice it up into distinct and "namable" elements. "Form will be described on the basis of discerned elements."²⁷ The second way in which form is presented is by means of the understanding rather than by simple description. Understanding is in fact not simply description, since the understanding of a form is equivalent to the "the understanding of the invariant element of a group of transformations."

It is now that the secret source of all objective thought is uncovered; this is its tendency to count upon both the reciprocal movement that constitutes the object and the functioning of the operating system of which it is simultaneously a support and a product. In this way, form no longer appears as brute data, and the analysis of this reciprocity is one of the most common characteristics of the activity we call understanding.²⁸

The comprehension of form is therefore based on our ability to grasp the way in which the discerned elements, reduced to an

invariant form within a system of transformations, function. Moreover, it must be done in such a way that the elements can ultimately be reconstituted into an operating system that allows for articulation between the concepts. Finally, form can be characterized by its singularities. Although this third mode of presentation of form can lead to the conclusion that the universal definition of a form is, so to speak, abandoned here, in favor of its particular "accidents," Granger writes that "in many cases, both for the description and the analysis of phenomena, it is the accidents that count: so true it is that in the grasping of a form the intuition of continuity is inseparable from the encounter with rupture."²⁹ The universalist point of view on form is therefore acknowledged as being possible along the very lines imagined by René Thom in his famous catastrophe theory.

In the case where the form of a phenomenon itself depends on a linkage among a small number of parameters, the mutations of the form of the phenomenon correspond to the singularities of this linkage in the space of its parameters. The distribution of these parameters engenders typical figures that are characteristic of the *changes of organization of the phenomenon*.

A model thus conceived contains, so to speak, two superimposed stages; the first describes the actions of strategic variables, the second the other "dynamic" variables that regulate the evolution of the phenomenon within the limits set by a certain field of stability.³⁰

From a standpoint that strives to define form, explication consists of: 1) identifying a phenomenon in its totality and dissociating its parts, that is, describing it; 2) establishing the relations and constraints that link the parts, that is, to understand, in the sense outlined above; and 3) integrating this system into a larger system on which the smaller one's genesis, stability, and decline depend. In brief, explication consists of identifying the relations of empirical morphologies within a phenomenon, including the passage from the particular to the universal. In this sense, it cannot afford not to consider the forms.

III. The Case Method as a Study in Singularity

The experimental method used by the sciences conceives of the forms of phenomena in ideal terms (that is, if we can indeed acknowledge for it a less constraining character than the one defined by René Thom, and whose concrete qualities are outlined

in the preceding remarks by Granger). Indeed, for example, this method tends to reduce the study of natural phenomena to an activity of determining the experimental prototype whose theoretical and methodological assumptions allow for the reconstitution and simulation of their singularities; moreover, it is this method that makes possible the explanation of these phenomena in terms of their universal (*global*) form. In this case, the essential basis for the explication is the progression from the particular to the universal. This progression itself is guaranteed by the experimental prototype, to the extent that it takes up the singularities of phenomena and facilitates their description and an understanding of their form by means of an explicit articulation of the theoretical imagination and the methodology that determined its orientation.

The counterpart of the experimental method in the social sciences, and more particularly in sociology, is without doubt the case method or monographic approach. Strangely, although the value of the experimental method in the hard sciences is rarely called into question (notwithstanding the critical attitude that Thom exhibits toward it), sociology, and the social sciences in general, regards the case study method with undisguised skepticism. The definition applied to it in the majority of specialized studies and in dictionaries bears witness to this skepticism.

The case study method, because of its particularity, can only attain scientific status if it is integrated into an approach of universal reach, in which the role of theory is not distorted. . . . As a general rule, a single case presents questions, offers suppositions that it then refutes; it illustrates a theory but can never itself give rise to one.³¹

The case method here is immediately restricted to the study of singularity taken in an extremely narrow sense. In fact, singularity here refers only to the immediate character of a phenomenon, in this case its particular traits, adroitly limited to the pragmatic meaning of the action that constitutes it. Consequently, social phenomena cannot be grasped in their universal form by the case method; at best, the case method has an explorative value that can lead to a more exhaustive investigation. Such a study will be more exhaustive only to the extent that more than one case is studied; it cannot be the result of a single "well conceived" case. Only a large number of cases can in fact assure the level of "representativeness" of a phenomenon necessary to grasp the universality of its form. Moreover, this ability, thanks to a large number of cases, to grasp the universality of a social form allows us to escape the pragmatic

meaning with which any social act is invested. From this point of view, the case method, understood as constituting a mere study of "singularities," of particular traits, would seem to be of little interest. The objections to this method, which were based on the constraints of typicality and objectivity that are incumbent upon sociology, quickly cast doubt on the overall value of the case study method.

However, beyond the question of the legitimacy of these objections, it must be pointed out that they were raised somewhat crudely and without any inquiry into the aims and methodological rules underpinning the case study method. These are questions that we will now take up.

A. The Lack of Representativity in the Case Study Method

The monographic approach, which marked the beginnings of anthropology and sociology, is, without doubt, the purest embodiment of the case study method. Indeed it is, by definition, "as complete an analysis as possible of a human group, an institution or a particular social fact."³² Therefore, a monographic study of a tribe or village, considered to be a classic anthropological approach, aims at grasping a social fact, a culture, or the social life characterizing a society, on a local level. The methodological qualities, so to speak, contained in a village or a tribe, are perfectly summarized by the French anthropologist Marcel Maquet.

The village is a preferred locus of study for monographic inquiry. Because of its small size, a village will not surpass the ability of a single researcher to absorb his material; and even in the case of a specialized study, the researcher can maintain a synoptic and individualizing view on the group. The weak cultural differentiation in such a setting allows for a full grasp of the totality of meanings that have current value.³³

Because of its limited size and relative homogeneity, the village therefore offers an exceptional environment in which to grasp a given culture or society in its universality. In this sense, the village is not an object of study *in itself*. Rather, it is a particular case or *center* through which the researcher is able to gain access to the characteristics of a village or culture, that is, to its singularities. The village, observed under such ideal conditions, can therefore be conceived of as being a miniature prototype of the entire culture or society.

This last point has not been sufficiently taken into account by anthropologists. Consequently, the concept of the monograph is usually limited to its role as a study of particular villages, and is

seen as unsuited for grasping the general characteristics of a culture or society. Perhaps the reason for this is related to the kinds of societies that anthropology has made the focus of its inquiries. For the most part, these have been "insulated and demographically small societies, in which the individuals that compose it, finding themselves in direct contact with one another, constitute a relatively closed and geographically isolated group, and whose contacts with other groups are consequently limited and episodic in nature."³⁴ In such conditions, where cultural and social life are relatively homogenous and little differentiated (a condition that holds true on the overall societal scale as well), the same observations can be made about any village. Thus the village can be viewed as a "condensed" version of the entire society and, therefore, as *immediately* representative. In this context, the monographic approach to village life could be applied by the methodological principle of the "Russian doll," a principle that Edmund Leach describes in the following terms:

It is assumed here that a social system exists inside a geographic area that is more or less arbitrarily defined; that the population living under its social system shares an identical culture; that the social system itself is uniform. Thus the anthropologist can choose a locality "whose size he finds agreeable," and can then study what happens there in detail; on the basis of this study he hopes to draw conclusions about the principles that regulate the social organization of this particular locality. On the basis of these conclusions, he formulates generalizations regarding the organization of the society now considered as a "whole."³⁵

The intrusion of modernity destroys the characteristic cultural and social homogeneity and uniformity in these areas, replacing these qualities with what is called on the geographical level "unequal development."³⁶ The various localities that make up the society in question are now differentiated from each other in such a way that it becomes difficult to assume that any single one of them "summarizes" the society as a whole. Thus the result of modernity is that these societies have ceased to exist in a homogeneous form and have taken on instead a contradictory one.³⁷ According to the formulation of the French-Canadian sociologist Fernand Dumont, modern societies "exist only as problems."³⁸ In order to investigate one of these societies in a monographic form, the current approach assumes that they must be analyzed on the basis of the problems and contradictions marking a society that has undergone the differentiation caused by the intrusion of modernity. Consequently,

this approach demands an *a priori* definition of the *object of study*, which the monographic approach itself will be based on. This object of study is therefore relative to the contradictions that can be conceived of – according to the terms used by Thom – as being the “accidents” or singular “sudden leaps” in a social form whose morphological study makes possible the description, understanding, and explication of the form in its universality.

Sociological monographs, particularly those carried out in the tradition of the world famous Chicago School, have achieved several undeniable successes in this regard. If the city of Chicago has become the central locus for studies devoted to social phenomena such as juvenile delinquency and violence, it is because the city has been conceived of as being a “social laboratory,”³⁹ and, as a result, offers ideal conditions for such studies. The broader import of the study of the local problem of juvenile delinquency in Chicago is directly tied to the degree to which this city “condenses” problems whose source is the generally frantic pace of industrialization throughout America; and it is the conflicts that arose as a result of this process, affecting the entire character of American social life, that make up the subject of study.

The constitution of the “problem” that is at the root of the object of monographic study will therefore largely determine the strategic choice of the precise “local case” that will appear to be the ideal point of observation from which to grasp it. This choice, however, is no longer immediately apparent, as it was when the preferred areas of study for anthropology were societies of a relatively homogenous nature: the choice is based now on an *object of study* chosen according to a *strategy* whose articulation determines how *representative* it is. And this process is buttressed not only by the very way in which this object of study is analyzed, but by the “well conceived” prototype that is at the heart of the experimental method. In effect, the local case here fills the role of prototype, while the analysis it makes possible determines the case’s representative value, depending on how “well conceived” are its theoretical and methodological concepts.

B. The Objectivity of the Case Study Approach

This strategy, and the analysis that results from it, manifests from the start a “sociological intuition” whose arbitrary aspect can only be reduced with the help of the kind of geometrization proposed

by René Thom in his catastrophe theory. The explicit elaboration of this strategy, as well as the actual activity of analysis, leads to this reduction and to the kind of ideal conditions that call for the utilization of the scientific imagination. As the anthropologist Françoise Zonabend has strikingly expressed it: "The strictest objectivity necessarily requires a stage of the boldest subjectivity."⁴⁰ She adds that this is true only so long as this boldness is clearly articulated in all its strategic, methodological, and theoretical aspects. The rigor that this articulation requires can in fact be achieved without the application of geometric models, provided that the functions vested in these models – that is, as catastrophe theory puts it, their ability "to reduce arbitrariness" – are maintained in the description, comprehension, and explication of forms as conceived by Gilles-Gaston Granger. If we maintain the idea – which arises with the introduction of geometrization – that these forms can be explicitly and unequivocally defined and regulated, then language can assume this function as long as it is stripped of its pragmatic meaning or, better still, "brackets" this pragmatic meaning.

As the epistemology of science demonstrates, the application of these kinds of constraints on language is perfectly admissible: science itself was largely built on a constant sharpening of linguistic procedures, that is, by constant modifications of the "natural language" that makes pragmatic action possible. The same surely holds true for the "social sciences," although these sciences must from the start confront the pragmatic meaning with which any action is invested or, to put it more correctly, of which this meaning is the immediate form. The lack of rigor in these sciences is a result of the introduction of arbitrariness in description, understanding, and ultimately in the articulation of forms; in this case, social forms. This frequent arbitrariness arises when these sciences identify their subject with the pragmatic meaning with which action is endowed.

Can the social sciences, and in particular sociology, overcome this defect? In other words, if the task of sociology is to produce a theoretical explication of action – based, as has been shown, on a "well conceived," qualitative knowledge of social forms – can it do so without reproducing the pragmatic meaning of action in the theory?

Without being either overly optimistic or stupidly arrogant, it seems possible to answer this question affirmatively. If the explicit

articulation of qualitative knowledge is acknowledged as being possible through the application of linguistic constraints,⁴¹ these constraints should then arise simultaneously with the exact definition of the *object of study*. The definition itself will express, to the best of its ability, both the aims of sociology and the necessary strategy (based on our theoretical knowledge) to account for pragmatic action. Conceived of in this way, the object of study signals, as a result of the constraints imposed on it by its definition, a first distancing from the pragmatic meaning of action, which is action's *immediate* form. The description of the object of study within the framework of this form gives rise, among other things, to a second distancing, without it implying a *rupture* with the inherently pragmatic meaning of action. Nevertheless, this description allows us to distinguish the theoretical – in this case, sociological – meaning of the object of study from the pragmatic, the understanding of which is now determined by the activity of describing the form; that is, by the steps and rules that it contains and whose articulation is guaranteed by its language, combining the constraints of rigor and unequivocalness.

The description of a form therefore reveals, from the start, its "understanding," and in this sense René Thomas is correct when he writes that "in order to describe, one must understand." To this, it could be added that to understand well one must articulate, and that this articulation does not necessarily require geometrization or geometric intuition. However, description and comprehension are not equivalent to articulation, although they do lead to it, provided that the relationship between the universal and the particular is clearly and firmly established; and it was this insight, which Thom so correctly insisted upon in his study of singularities as they relate to any empirical morphology, that gave rise to "the revolutionary idea that one can 'follow' the observed morphologies backs to the dynamics that gave rise to them."⁴²

*

To conclude this article we will take up an example of the qualitative approach to knowledge in which the relationship, even progression, from the particular to the universal is both clearly grounded and based on the description and comprehension of a specific form of social life. We are speaking of the anthropologist Maurice Godelier's extremely insightful epistemological analysis of Marx's concept of capitalist production, particularly as regards its methodology.⁴³ According to this analysis, Marx's definition of a

particular form of social life is "the *specificity* of social relations that tie individuals and groups to the process of production, that is, broadly speaking, to their material conditions of existence."⁴⁴ The analysis of capitalist societies – that is, the analysis of the prevailing social form under which the conditions of existence are produced – is tied to the ability to determine the specificity or, in other words, the singularity of the social relations that constitute the process of the production of existent conditions in these societies.

Although Marx, in order to carry out this analysis, did rely to some extent on the initial investigations that the classical economists made into the nature of work and profit, Marx's own discovery of the specific characteristics of capitalist relations of production was ultimately based on the direct observation and detailed description of the capitalist mode of production as embodied in the English manufacturing system, which itself was a veritable prototype of the industrial revolution. For example, although the theories of Smith and Ricardo surely accounted for the specific characteristics of the capitalist mode of production,⁴⁵ the actual discovery of their singularity could only be made on the basis of an empirical description of the manufacturing process. This description was based, in large part, on written accounts by the workers themselves, and ranged from books compiling workers' complaints to individual articles on working – and workers' – conditions published in the press.⁴⁶ Such a detailed and exhaustive description of the manufacturing process⁴⁷ allowed Marx to grasp the overall characteristics "of the capitalist form of production, no longer conceived of as being a primordial mode of production, but as a specific social form of production that arose at a specific moment of historical development."⁴⁸ Marx's description and understanding of manufacturing, although based on a specific (*local*) object of study, nevertheless brings to light the characteristic traits of the capitalist mode of production, namely: 1) it is the most advanced form of commercial production; 2) it is a form of commercial production based on the private ownership of the means of production and of money; 3) it is a system in which the means of production exist in the form of capital, that is, exist in order to create and ultimately extract capital in the form of surplus value, which is the aim and ultimate engine of this entire form of production; and 4) this creation of value in the form of capital is achieved through the exploitation of salaried workers who are free as individuals but, lacking the means of production and of subsistence, are conse-

quently constrained to sell their labor power to the owner of the means of production.

The description and understanding of English manufacturing, which serves as both a particular instance and a classic expression of the industrial revolution as such, permits Marx to bring to light the characteristic traits of the capitalist mode of production as a social form, that is, as the specificity of social relations that makes up this mode of production. However, its explanatory validity ultimately depends on its ability to pass from the particular to the universal. An outline of this progression can be glimpsed by following the approach advocated by Marx, an approach that Maurice Godelier, in his epistemological exegesis, calls the "regressive-progressive approach." The regressive approach "begins by identifying [on the basis of a description of manufacturing] the form of relations of contemporary capitalist production and then traces them back toward the historical conditions of their genesis."⁴⁹ Generally speaking, this approach is a kind of reverse genealogy. Its aim is to grasp and highlight the relations and constraints that characterize the relations of capitalist production. The path traced by this regressive method is guided, to some extent, by the "theory in action" that the very description and comprehension of the form produces; and, at least at this stage of the analysis, it is not necessary that the *historical* genealogy of the relations of capitalist production be known. Marx writes:

Our method not only shows the direction that historical investigation ought to take but also indicates those aspects of bourgeois economy, understood as a simple historical form of production, that point beyond themselves to modes of production that historically antedate the bourgeois economy itself.

In order to elaborate the laws of bourgeois economy, it is not necessary to write the actual history of these relations of production. Rather, the correct observation and deduction of these laws points to the past that lies behind the system. This information, complemented by an accurate understanding of the present, offers the key to the understanding of the past, which is a labor that we ourselves hope one day to undertake.⁵⁰

The regressive approach, which uses the characteristic traits of the object of study – in this case, English manufacturing – as its starting point (traits that are revealed in the process of their description and comprehension), therefore consists of determining the concrete conditions under which the transformation into a new

form of relations of production took place. If, for example, the spread of salaried labor is assumed to be an inherent characteristic of the relations of capitalist production, then it is necessary to determine exactly the conditions under which this form of labor, which was in fact indigenous to feudal society, came into more general use. By the same token, the use of money in its role as capital requires a painstaking analysis of the conditions and constraints that, arising in feudal society, allowed for the injection of capital, itself accumulated either in finance or commerce, into co-operative guilds and into agriculture, ultimately determining both their organization and management.

The regressive method, however, falls short when it comes to determining the relationship between the particular and the universal; and this relation must be established if we are to explain the relations of capitalist production on the basis of its most obvious expression, manufacturing. Indeed, the regressive method cannot account for the diversity of historical forms and development, since in essence it is guided by the characteristic traits brought to light in the very process of the description and comprehension of the perfect prototype of relations of capitalist production, that is, English manufacturing. The regressive approach

only finds in history that which leads directly to the present. This approach must therefore be complemented by another, one that progresses from the past to the present and can reproduce the totality of historical developments capable of clarifying the simultaneous or successive appearance of several different forms of production, all based on an identical form that formerly dominated; that is, on its ability to account for the existence of several possible evolutionary paths, one of which carried the day.⁵¹

The progressive method therefore consists of tracing, in conjunction with the regressive method, the ideal path (in the theoretical sense of the term) of the history of established societies in order to account for the relations of capitalist production; then comparing this ideal history with all the exceptions, all the "particular accidents" of history and thereby gauge the accuracy and universal validity of the characteristics traits identified in the course of study of a single, specific object.

In this way, Marx's regressive-progressive method furnishes us with a first example of the modes of presentation of any social form that Gilles-Gaston Granger had summarized, in three words –

to wit: describe, understand, explain – in the course of his epistemological investigation of quantitative knowledge, which itself drew on catastrophe theory in mathematics. There can be no doubt about the relevance and value of Granger's definition of singularity to the kind of knowledge to which sociology, like any other science, social or not, aspires. This kind of singularity, which is constituted by the relations of the particular to the universal, and defined – in light of the way Marx uses the example of English manufacturing – by the characteristic traits of social relations that determine the object of study, has enormous strategic value since it allows for the determination of similar relations, and even more importantly, for the securing of the passage from the particular to the universal. Singularity, in this sense, can no longer be relegated to the category of the merely particular or to an accident of a purely singular significance, incapable of attaining a more general or, even more desirably, a universal significance.

Translated from the French by Thomas Epstein.

Notes

1. This article is a result of my research in the field of qualitative methodology. The research was underwritten by a grant from le Conseil de recherches en sciences humaines du Canada and la Fondation F.C.A.R. I also wish to thank my two young colleagues, Stéphane Dufour and Dominic Fortin, for their timely and penetrating comments and criticisms. The same thanks go to Dominique Boucher of the philosophy department at the University of Montreal.

2. Javeau, Claude, "Singularity et sociologie," *Société*, 6, Autumn 1989, p. 229.

3. On this point, see Charlotte Heinritz and Angela Rammstedt, "L'approche biographique en France," *Cahiers internationaux de sociologie*, vol. XCI, 1991, p. 1 and pp. 331–370; Jacques Hamel (ed.), *The Case Study Method in Sociology*, *Current Sociology*, vol. 40, 1, Spring 1992.

4. Bourdieu, Pierre and Wacquant, Loïc, *Réponses*, Paris, Seuil, 1992, p. 57.

5. Canguilhem, Georges, "Du singulier à la singularité en épistémologie biologique," *Études d'histoire et de philosophie des sciences*, Paris, Vrin, 1968, p. 213.

6. *Ibid.*, p. 214.

7. *Ibid.*

8. *Ibid.*

9. *Ibid.*, p. 218.

10. Thom, René, *Modèles mathématiques de la morphogenèse*, Paris, Bourgois, 1980, p. 116.

11. *Ibid.*, p. 87.

12. The translator has decided, in this case and in several others farther on in the text, to indicate the presence of the French word *global*. It is the opposite of the word *local*. However, unlike in English, the distinction in French between "local" and "global" also carries an abstract meaning. Thus *local/global* can sometimes refer to

the distinction between particularity and universality, or between the micro and macro levels of phenomena. I have kept "global" here both to highlight the distinction with the use of the word "local" above it and to enrich the meaning of the term "universal" with which I translate it in this case. This distinction runs throughout the essay. (translator's note)

13. *Ibid.*, p. 216.

14. Thom, René, *Paraboles et catastrophes*, Paris, Flammarion, 1983, p. 91.

15. Petitot, Jean, "Entretien avec René Thom," *Mathématiques et sciences humaines*, 59, 1977, p. 4.

16. Petitot, Jean, "Catastrophes (théories des)," *Encyclopaedia Universalis, Universalis 1978*, Paris, Encyclopaedia Universalis France 1978, p. 198. On this point, see Jean Petitot (ed.), *Logos et théorie des catastrophes*, Geneva, Patino, 1988. This concept raises the question of determinism; on this point, see Krzysztof Pomian (ed.), *La querelle du déterminisme*, Paris, Gallimard, 1990.

17. The development of "catastrophe models" in the social sciences is in large measure a result of the work of E.C. Zeeman and his followers at Warwick University. His ideas are adroitly presented in *Catastrophe Theory*, Reading (Mass.), Addison-Wesley, 1978. The development of this model provoked a controversy that René Thom discusses in chapter seven ("La Controverse") of his book, *Modèles mathématiques de la morphogénèse*.

18. Thom, René, *Modèles mathématiques de la morphogénèse*, *op. cit.*, p. 109.

19. *Ibid.*, p. 123.

20. On the question of the experimental method see René Thom's article "La méthode expérimentale: un mythe des épistémologues (et des savants?)," in Jean Hamburger (ed.), *La Philosophie des sciences aujourd'hui*, Paris, Gauthier-Villars 1986, pp. 7-20.

21. Thom, René, *Modèles mathématiques de la morphogénèse*, *op. cit.*, p. 115.

22. Thom, René, *Paraboles et catastrophes*, *op. cit.*, p. 135.

23. On this subject, see René Thom, *Paraboles et catastrophes*, *op. cit.*, pp. 59-60; and *Modèles mathématiques de la morphogénèse*, *op. cit.*, p. 109.

24. *Ibid.*, p. 108.

25. Granger, Gilles-Gaston, *Pour la connaissance philosophique*, Paris, Odile Jacob, 1988, pp. 116-117.

26. Granger's position on the philosophical debate concerning continuity and discontinuity - that is, on whether the former is anterior to the latter, or vice versa - is that no rupture exists at all between the continuous and discontinuous: there is unity.

27. *Ibid.*, p. 109.

28. Granger, Gilles-Gaston, *Pour la connaissance philosophique*, *op. cit.* p. 112.

29. Granger, Gilles-Gaston, "Modèles qualitatifs, modèles quantitatifs dans la connaissance scientifique," *Sociologie et sociétés*, vol. XIV, 1, April 1982, p. 10.

30. *Ibid.*, pp. 10-11.

31. De Bruyne, Paul, et al., *Dynamique de la recherche en sciences sociales*, Paris, P.U.F., 1974, p. 212.

32. Bromberger, Christian, "Monographie," in Pierre Bonte and Michel Izard (eds.), *Dictionnaire de l'ethnologie et de l'anthropologie*, Paris, P.U.F., 1991, p. 484.

33. Maget, Marcel, *Guide d'étude directe des comportements culturels*, Paris, C.N.R.S., 1953, p. 57.

34. Champagne, Patrick, "Statistique, monographie et groupes sociaux," *Études dédiées à Madeleine Grawitz*, Genève, Dalloz, 1982, p. 8.

35. Leach, Edmund, *Les Systèmes politiques des hautes terres de Birmanie*, Paris, Maspero, 1972, p. 87.

36. See Samir Amin on this subject, *Le Développement inégal*, Paris, Éditions de Minuit, 1973.

37. See Georges Charbonnier, *Entretiens avec Claude Lévi-Strauss*, Paris, Plon-Julliard, 1961.

Observations on the Role of Singularity

38. Dumont, Fernand, *L'Anthropologie en l'absence de l'homme*, Paris, P.U.F., 1981, p. 69.

39. Grafmeyer, Yves, and Joseph, Isaac, *L'École de Chicago*, Paris, Aubier 1984, pp. 6–52.

40. Zonabend, Françoise, "Du texte au prétexte. La monographie dans le domaine européen," *Études rurales*, 97–98, 1985, p. 37.

41. See Gilles-Gaston Granger, *Langages et épistémologie*, Paris, Klincksieck, 1979.

42. Petitot, Jean, "Catastrophes (théories des)," in *Encyclopaedia Universalis*, *op. cit.*, p. 198.

43. This methodological analysis by Godelier figures most prominently in the following articles: "D'un mode de production à l'autre: théorie de la transition," *Recherches sociologiques*, vol. XII, 2, 1981, pp. 161–193; "La théorie de la transition chez Marx," *Sociologie et sociétés*, vol. XXII, 1, April 1990 pp. 53–81; "L'objet et les enjeux," in M. Godelier (ed.), *Transitions et subordinations au capitalisme*, Paris, Éditions de la Maison des sciences de l'Homme, 1991, pp. 7–56. These texts are based on his epistemological study of Marx that began with *Rationalité et irrationalité en économie*, Paris, François Maspero, 1974, two volumes.

44. Godelier, Maurice, "D'un mode de production à l'autre: théorie de la transition," *Recherches sociologiques*, *op. cit.*, pp. 173–174.

45. On the genealogy of the idea of work and the tradition passed on to Marx by the classical economists, see Maurice Godelier, "L'anthropologie économique," in *L'anthropologie en France, situation actuelle et avenir*, Paris, Éditions du C.N.R.S., 1979, pp. 47–62.

46. On the subject of just how these empirical data influenced Marx's elaboration of his theory, see the absolutely fascinating biography of Marx's two daughters, written by Yvonne Kapp, *Eleanor Marx. Chronique Familiale des Marx*, Paris, Éditions sociales, 1980. It is in large measure thanks to their labors that the documentary authenticity and accuracy on the manufacturing process, as well as on the lives and working conditions of workers, and on other subjects, is achieved, although Marx himself gave them little credit for their contribution to his work.

47. That is, the process understood as a medium of production and exchange. "In order to grasp the specific nature of a social mode of production, attention must be paid exclusively to its forms of production and of exchange" (Karl Marx, *Théories sur la plus-value*, Paris, Éditions sociales, 1974, p. 338).

48. Godelier, Maurice, "D'un mode de production à l'autre," *Recherches sociologiques*, *op. cit.*, p. 174.

49. Godelier, Maurice, "La théorie de la transition chez Marx," *Sociologie et sociétés*, *op. cit.*, p. 58.

50. Marx, Karl, *Fondements de l'économie politique*, Paris, Anthropos, 1973, p. 424. Quoted by Maurice Godelier in "La théorie de la transition chez Marx," in *Sociologie et sociétés*, *op. cit.*, pp. 58–59.

51. *Ibid.*, p. 59.