

Chapter 2 Mini-Communities and Granulated Society

§ 1. Weaver's Models and Social-chemistry

The individual human being regarded as *homo noumenon* is the fundamental social atom in all social-natural sciences. For this reason all social-natural scientific disciplines must begin with the nature of the individual person as this human nature is explained by the science of mental physics [Wells (2009)]. The social-natural scientist can no more ignore the mental physics of the nature of being-a-human-being than a physicist can ignore the *Existenz* of dead-matter atoms. Social-natural sciences as proper natural sciences were not possible to achieve with objective validity prior to the development of mental physics, an event that did not occur until 2006.

It is obviously not practical to present a full treatise on mental physics in this volume devoted to the topic of a social-natural science of education. I am for this reason compelled to present the topic of mental physics at a higher and, in a manner of speaking, pre-digested form here. A deep understanding of results deduced from mental physics requires of the reader that he undertake the study mental physics itself. A deep understanding of social-natural education likewise requires an understanding of the Critical Social Contract theory presented in Wells (2012). I have, however, endeavored to present the pertinent findings of mental physics and Social Contract theory in these pages with sufficient clarity so that you can grasp their basic principles at a level of understanding sufficient to follow the theory presented here. No doubt some of the principles you are about to be encountering here will seem to run counter to many suppositions and speculations of current social science theories. It is important to bear in mind that the social sciences as they currently exist are not natural sciences and have perforce had to adopt numerous speculations and propositions that lack objectively valid grounding in Critical metaphysics and, therefore, lack objective validity in explaining the nature of being-a-human-being. A social science lacking this grounding cannot be a *natural* science. Let this be my apology to you for asking you to suspend judgment for now on those mental physics findings that run contrary to what you might have been taught previously. Once you have grasped their significance for social-natural education, you are then at liberty to examine the grounds of those findings in Social Contract theory and in mental physics to whatever level of detail you require to satisfy yourself as to their objective validity. Here in this chapter, the investigation begins with figure 2.1, the Weaver's model.

One of the most pertinent mental physics findings is the fact that every human being builds for himself his own personal and very privately determined society. This basic fact is fundamental to

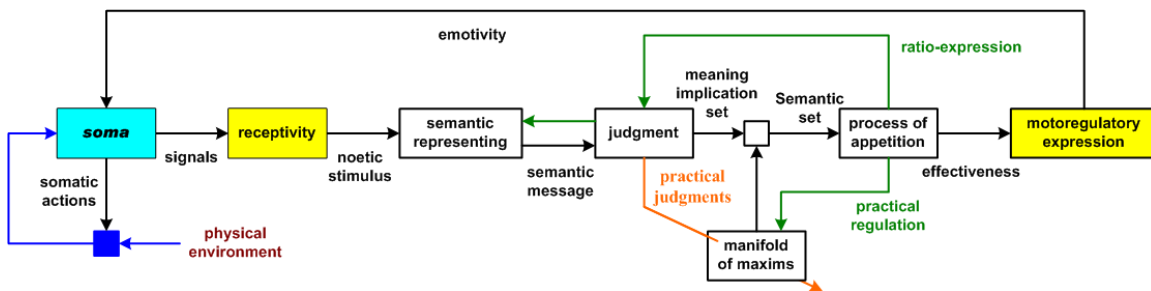


Figure 2.1: The one-person Weaver's model illustrating the functional processes by which a person determines his understanding of his environment, his manifold of practical rules and his action expressions.

The person's determination of his understanding of meanings is called semantic representing. He assigns meanings to the external stimuli he receives through the logical division of *soma* (his physical body). The meaning he represents objectively and affectively is called the semantic message. Color key: light blue = logical division of *soma* (phenomena of body); yellow = logical division of *psyche* (animating principles of mind-body reciprocity); uncolored = logical division of *nous* (phenomena of mind).

and understands all our other objectively valid ideas concerning Societies in general. A Society is an abstraction – a mathematical Object – we employ to integrate and unify those group behavioral phenomena that are conventionally labeled a "society" in the traditional (dictionary) sense of that word. If you are not a professional sociologist, you might find it a bit startling to learn sociology has no generally accepted technical definition for the term "society." Abercrombie *et al.* (2006) call "society" a "commonsense category" – a convenient label that allows one to declare "society" to be whatever he wishes it to be. This will not do for a natural science. Critical Social Contract theory grounded in mental physics finds a *society* to be *a mathematical object of a mathematical concept formed by an individual such that the concept: (1) is suitable for one or more of his practical purposes; (2) contains mathematical principal quantities representing appearances of individuals; (3) has no ontological significance whatsoever; and (4) in its logical essence is a concept of relationships and associations.* A Critical *Society* is *the Object understood as a higher concept of divers individual concepts of society retaining what is contained in common among these divers concepts.* It is described by mathematical field constructs.

These are, of course, deeply technical explanations. If you are not very well acquainted with mathematics theory they are likely to seem rather opaque right now. If so, you need not feel embarrassed about it because you have a lot of company. Even professional mathematicians, who in general understand detailed *formal* mathematics theory better than I do but do not understand objectively valid *Critical* mathematics at all, are likely to find these ideas hard to grasp. Let me boil them down a bit. First, neither a society nor a Society is an ontological *thing*. The individual person self-defines them according to whatever semantic implications he comes to assign to his collected concepts of phenomenal social appearances. He unites those concepts under these ideas. He formulates these ideas by means of his capacities for making judgments. Therefore society and Society are *epistemologically significant* but not *ontologically significant*. All ontological significance *associated* with these ideas is found only in actions and behaviors he *expresses* as a consequence of meaning implications he has made. These provide his concepts with *personal and practical real significance*. All meanings, at their roots, are *practical*. This is a theorem of mental physics and one that is liable to empirical testing. Empirical tests of this have been carried out by Piaget and Garcia and their findings confirm the expectations of the theory. The interested reader can consult Piaget & Garcia (1987) for the details of this testing.

A Weaver's model (figures 2.1 and 2.2) is a high-level mathematical model of the mental physics processes governing the assignment of meaning implications to mental representations. The process of making a mental *parástase* significant is a process by which the *parástase* is linked to practical actions. This is called *semantic representing* in figure 2.1. Weaver's models are bound by epistemological laws of mental physics that govern *all* objectively valid constructs of Critical mathematics [Wells (2006), chap. 23; Wells (2009), chap. 1]. Information theorist Warren Weaver first proposed the idea for this semantics model in 1949 [Shannon and Weaver (1949), pp. 1-28] but development of Weaver's idea had to await the discovery and development of mental physics [Wells (2011a)].

The products of semantic representing undergo additional mental acts of judgment to specify particular meaning implications and a Semantic set (i.e., determined motoregulatory expressions capable of being transformed to practical appetites and behaviorally exhibited by the person). The individual person is the sole agent determining his own actions, and he does so based on his semantic representations under the executive control of a single and fundamental law of pure practical Reason. These mental determinations are affected by the individual's prior experience and determinations, and so it is rigorously correct to say all motoregulatory expressions beyond those of innate sensorimotor reflexes are *learned* expressions. Under the principle of thoroughgoing mind-body reciprocity, required by Critical epistemology, these acts of mental representation are mirrored by physical signals in *soma* called the *somatic code* [Wells (2011b)].

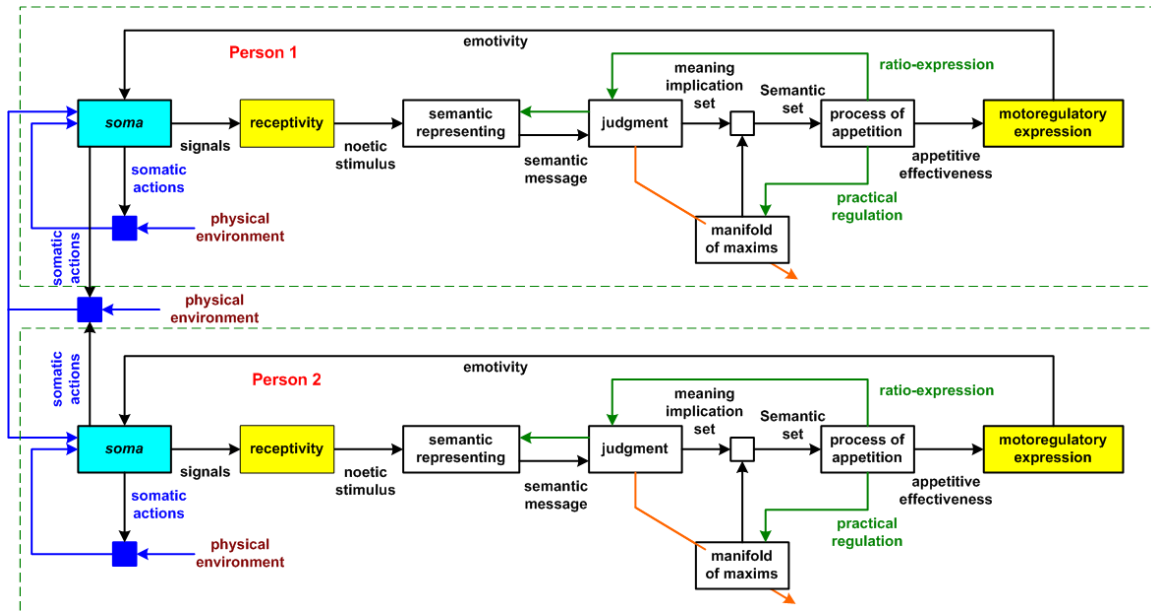


Figure 2.2: A two-person interaction Weaver's model. Each person is depicted by an individual Weaver's model. For each person the other person makes up a part of his social environment. Each individual makes his own noetic determinations interpreting the meanings he assigns to noetic stimuli he receives via the process of receptivity. He determines his own action responses on the basis of his semantic interpretations. Neither individual can "read the other's mind" and each bases his interpretations strictly on his judgments of taste, judgments of understanding, and practical action determinations of appetition that are governed by practical judgments of practical rules he has himself constructed in his manifold of practical maxims.

The contexts of a society or a Society require a minimum of two people who interact with each other. Figure 2.2 illustrates a two-person Weaver's model of interacting individuals. What each thinks about the other consists of what he observes and experiences from the appearances of their interactions as well as what he infers from other signs or sources and learns about the other person from other individuals. At the level of detail depicted in figure 2.2, the mental processes and structures of each person are mathematically the same. However, at a deeper level of detail involving each person's manifold of concepts and manifold of rules the two individuals are very different from each other because each will have different experience. These differences cause differences in each person's acts of thinking and judgmentation.

The two interacting persons communicate with each other in a variety of ways, many of them non-verbal. Some psychologists call this interpersonal communication an exchange of *command messages*; others, primarily those of the Freudian school, call it *transference-countertransference*; H.S. Sullivan called it *parataxic distortion*. Psychologists attempt to classify different categories of impact messages using what is called an impact message inventory (IMI). These ideas are ideas contained in various empirical hypotheses of personality theories. Two central ideas found in these theories are those of *evoking messages* and *impact messages*. Kiesler *et al.* explain these in the following way:

A central proposition . . . was that a relationship is the momentary and cumulative result of the reciprocal *command messages*, primarily nonverbal, exchanged between two interactants. One half of the relationship is the encoder to decoder (ED) *evoking message*, by which an encoder imposes a condition of emotional, cognitive, and imaginal engagement on the decoder. As a result of the ED-evoking message the decoder is "pulled" to counter-communicate or respond as the encoder wishes without the decoder's being clearly aware of his or her compliance [to the implicit commands of the person acting as encoder].

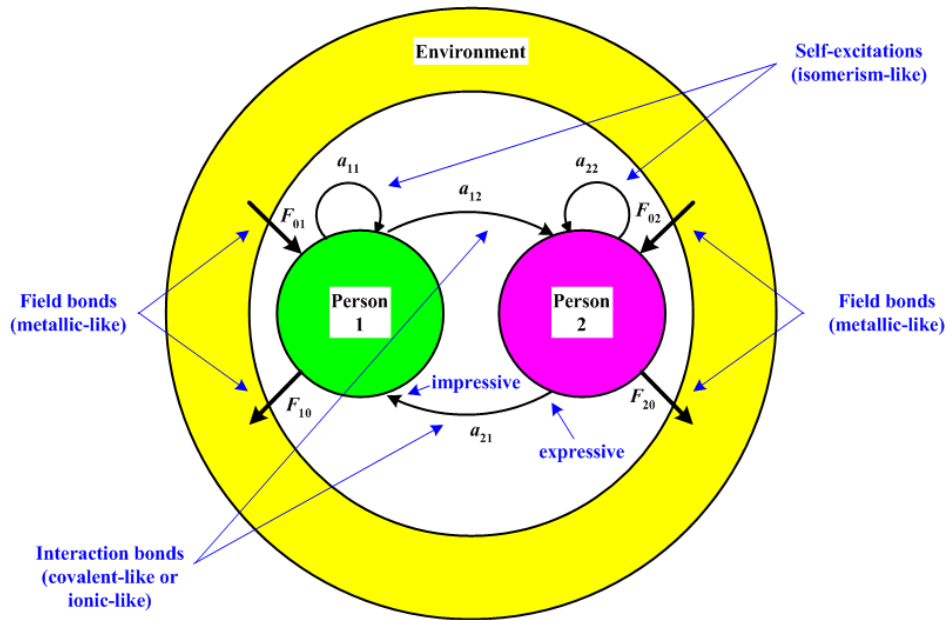


Figure 2.3: Two-person social chemistry model of interpersonal interactions.

The second half of the relationship consists of decoder to encoder (DE) messages registered covertly by the decoder in response to the ED messages. These emotional, cognitive, behavioral, and fantasy covert responses of the decoder were named the *DE-impact message*. The decoder's reciprocal covert responses represent the receiving end of relationship communication. They comprise the impacts or pulls-to-respond that are the direct result of the encoder's evoking messages. [Kiesler et al. (1997)]

Here the "encoder" is the person who is behaviorally expressing himself (by motoregulatory expression of emotivity). The term "encoding" refers to the manner by which he expresses himself. How he expresses this is said to constitute his "operationalized" evoking message. The "decoder" is the other person who is observing and experiencing the appearances of the encoder's operationalizations. How he objectively interprets and subjectively judges his perceptions of these appearances is said to constitute the semantic representing of the impact message. One pair of evoking-impact message pairs constitutes what we can term an interpersonal communication event. When the decoder responds and operationalizes his own reaction, he becomes the encoder and initiates a second communication event. A communication event involves a change in the overall mental state of the decoder-person, usually produces an accommodation of the concept structure in his manifold of concepts, and sometimes might lead to the production of an accommodation in the structure of his manifold of practical rules as well.

I think it almost goes without saying that the decoder-person changes himself in some way as a result of an interpersonal communication event. This phenomenon of Self-determined mental self-change is called an *isomerization*. It is perhaps fairly obvious that our social atom is much more complicated in its nature than is the physicist's dead-matter atom. A Weaver's model occupies an intermediate rung on a ladder of scientific-reduction/model-order-reduction structure in the general and interdisciplinary practice of science. Below it on the ladder (in the direction of scientific reduction) is found the detailed model of the structure of the Organized Being in mental physics and Critical metaphysics. Above it we find a reduced-order model, illustrated by figure 2.3, that I have named a **social chemistry** model of interpersonal interactions. I introduced the idea of social chemistry in Wells (2012) as a mathematical method for practically dealing with the explosion in complexity that characterizes the nature of social-natural science questions.

The model depicted in figure 2.3 is a reduced-order (higher level) model of the same thing represented by the Weaver's model of two-person interaction. Reciprocally, the Weaver's model of figure 2.2 is a scientific-reduction (lower level) model of the social chemistry model. Different rungs on the ladder of science are a crucially necessary tactic for making the findings of science useful in practice. A scientific theory that cannot be put into practice is rightly said to be a *useless* theory. The rungs, however, cannot be permitted to float or levitate themselves above one another. They must be held in place by railings in the ladder, i.e., fixed in their interrelationships with one another by precise scientific rules that generally go by the name of *describing functions*. These rails are themselves subject to disciplinary scientific treatment and this discipline goes by the name *general systems theory*.

An example will help clarify these ideas. All sensible phenomenal objects in the physical world are made of the dead-matter atoms physicists study. A bridge that crosses a river is such an object, and bridges are made of atoms. However, physicists do not design or build bridges – and, quite frankly, I would not care to pay for the cost of a bridge designed by a physicist, much less walk or drive across it. Civil engineers design bridges and supervise their construction. However, when a civil engineer designs a bridge he does not think about it in terms of atoms. If he did he would find the mathematical complexity of the problem so overwhelming that it could not be solved. Fortunately, though, he does not have to think about atoms. Between the discipline of bridge design and the discipline of atomic physics there is an enormous gulf that is filled in by means of intermediate scientific models, techniques and methods all held together in such a way that our collective scientific knowledge at the lower rungs is connected step-by-step as we ascend the ladder from atoms to bridge design. The intervening levels include chemistry, the mechanics of strengths of materials, soil science, and other additional disciplinary levels. Without scientific ladder-work, knowledge of atomic physics would be utterly useless because it could nowhere be applied to *do* anything of any practical use. Without the lower rungs on the ladder, bridge design engineering would not be a natural science at all but, rather, an exercise in craftsmanship on a par with the craftsmanship of sword-making prior to the invention of metallurgy. It would be at most a natural history rather than a natural science¹.

The social chemistry model of figure 2.3 is an example of a mathematical graph and, more specifically, the type of mathematical graph called a *network*. The circles representing the two persons are called *vertices* or *nodes* of the graph. They are modeled by a set of differential equations, deduced by model order reduction from a Weaver's model level, that are called *state equations*. The arcs a_{ij} shown in the figure depict mathematical functionals² modeling the effects that operationalizations (behaviors) at vertex i have on the state of vertex j . These functionals are called *output equations*. The functionals are divisible into two classes. The functionals a_{ii} , where the acting and the reacting vertices are one and the same vertex, are called *isomerization functionals*. The functionals a_{ij} , $i \neq j$, are called *interaction bonds*. These in turn are divisible into functionals of *bonding relationships* and those of *antibonding relationships*. The former are conducive to civic interactions and cooperation between the two persons, the latter to antagonistic interactions and competition between the two persons. The mathematical methodology for working with models of this kind was discovered and developed by Stephen Grossberg of Boston

¹ A splendid example of civil-engineering-as-natural-history is provided by Egypt's famous bent pyramid. The bent pyramid starts off at its base at a relatively large angle relative to the plane of the ground. Then, part way up, the slope of the pyramid suddenly decreases drastically. Archeologists are more or less in agreement that part way through its construction the builders discovered that the supporting stones were starting to crack from the weight of the load they were bearing. The design of the pyramid was therefore changed, it is hypothesized, to prevent the pyramid from collapsing under its own weight.

² a mathematical functional is a function having for its domain a set of functions and for its range another set of functions.

University over the period from 1968 to 1971 [Grossberg (1968), (1969), (1971)] and is called *embedding field theory*. The theory has been applied for several decades now to theoretical studies in neuroscience, psychology, and, more recently, by researchers working in the field of artificial intelligence theory, so-called autonomous ("smart") machines, and a few other branches of engineering. It has not yet been applied very much to problems of social-natural science – not too surprising when one considers that we have not had any such sciences – although it has seen some applications in the social science of economics. Grossberg has proved that it can be applied to precisely those sorts of questions of interest to social-natural science and has developed important mathematical theorems pertinent to social phenomena of cooperation and competition [Grossberg (1978), (1980)]. In short, the mathematical methodology already exists, has existed for a long time now, and what remains to be done is to actually put it to scientific use.

It seems reasonable for me to expect that the majority of people reading this treatise have not had very warm or nurturing experiences with mathematics, have not had the benefit of very much advanced mathematical training, and, more likely than not, do not harbor very friendly feelings toward the subject of mathematics. If you are one of these readers, I can offer two hopefully comforting reasons you shouldn't stop reading this treatise right now. First, while the sort of mathematical work I have just described is necessary for the development of social-natural sciences as proper scientific disciplines, that work belongs to the detailed labors of those fields and that is not the objective of this treatise. The objective of this treatise is to introduce and explain the principal metaphysical and *qualitative* aspects of a social-natural science of education, and for this it is not necessary to dive deeply into the details of quantitative mathematics.

Second, while I am not saying quantitative social-natural science is a trivial undertaking – it isn't and I suspect you already knew this – I can say that the main reason you might not have developed much of a liking for (or might even have developed a strong distaste for) mathematics does not really lie in mathematics itself. The primary fault lies in the appallingly bad pedagogy that has been in use for over a century now in *teaching* mathematics. Primary blame for this in the most recent seventy years can justly be laid at the feet of a bankrupt pseudo-philosophy of mathematics instruction we owe to a group of mathematicians from the 1940s and 1950s who are collectively known as the Bourbaki mathematicians. Basically, math just isn't as hard or obscure as teachers of mathematics at the college level have been making it look for a long time now. At its root math is all about finding schematic patterns in things. Did you know the root of the word "mathematics" comes from the Greek word *mathēma*, "what is learned"?

Despite the pseudo-philosophy of the mathematics community, mathematics is nothing more and nothing less than a *language* for saying something very precisely, saying it in a way that the meanings of the "words" you use do not drift and change over time until the meaning of what you said becomes equivocal, and saying it in such a way logical consequences that follow from what you said can be deduced. When Kant wanted to say something technical with a maximum of precision and in a way such that what he meant would not be altered by changes in the evolution of language, he said it in Latin (a dead language in his day). Modern quantitative scientists use mathematics for precisely the same practical reason that Kant used Latin. Isaac Newton wrote,

I have in this treatise cultivated mathematics so far as it regards philosophy. The ancients considered mechanics in a twofold respect; as rational, which proceeds accurately by demonstration; and practical. To practical mechanics all the manual arts belong, from which mechanics took its name. But as artificers do not work with perfect accuracy, it comes to pass that mechanics is so distinguished from geometry, that what is perfectly accurate is called geometrical; what is less so is called mechanical. But the errors are not in the art but in the artificers. He that works with less accuracy is an imperfect mechanic; and if any could work with perfect accuracy, he would be the most perfect mechanic of all; for the description of right lines and circles, upon which geometry is founded, belongs to

mechanics. Geometry does not teach us to draw these lines but requires them to be drawn; for it requires that the learner should first be taught to describe them accurately before he enters upon geometry; then it shows how by these operations problems may be solved. To describe right lines and circles are problems, but not geometrical problems. The solution of these problems is required by mechanics; and by geometry the use of them, when so solved, is shown; and it is the glory of geometry that from those few principles, brought from without, it is able to produce so many things. Therefore geometry is founded in mechanical practice and is nothing but part of universal mechanics which accurately proposes and demonstrates the art of measuring. [Newton (1726), pg 3]

Like Plato centuries earlier, the logicians and formalists of the nineteenth and twentieth centuries tried to reverse the relationship between mathematics and the technical arts in pursuit of a transcendent illusion divorced from the phenomenal world of real human experience. Eventually this pseudo-metaphysic led to the introduction of so-called "new math" in the United States in the mid-1960s, at which time mathematics education in the U.S. plunged into practical bankruptcy. Fix this and we fix a great many fundamental problems with science education. Fail to fix it and science education will eventually disintegrate utterly. Science makes a difference, the difference is important, and I don't know how to put it any plainer than to say *metaphysics matters and it makes a great deal of real difference in the real lives of real people*. Ultimately the practical real meaning of metaphysics is "the way one looks at the world," and if the way one looks at the world is based on transcendent illusion, inevitably the way one understands the world becomes illusional and mystic. It is important that mathematics education not work to obfuscate mathematics. It might not enhance the prestige of mathematicians if the rest of us understand that number theory ultimately reduces to patterns for counting with one's fingers, but what cost should all of us be willing to bear for the sake of anyone's peculiar brand of prestige?

In this spirit, I am not going to work to obfuscate social-natural science by committing in this treatise a too-premature plunge into the formal mathematics of social chemistry. Before anyone can construct a quantitative model of any scientific problem one must first develop a qualitative model of the problem, and that is the task undertaken in these pages. The whole job is not done until the quantitative is in hand, but we must have the first in order to obtain the second. What is important for now is to know that when we are ready to take the quantitative step, the tools for doing so already exist.

The chemistry metaphors of bonding, antibonding and non-bonding are useful in developing the qualitative understanding of the scientific tasks of social-natural sciences. The metaphors are just that – metaphors – and their correct employment crucially depends on developing a correct understanding of *the context of their application*. This is the understanding we must first seek out. It is part of the *homo noumenal* Nature of being-a-human-being that we first must understand the specific and concrete before we can understand the general and abstract. This is because the abstract concept is developed out of more concrete ones. This is a finding from mental physics. A child in the early teenage years is capable of developing a qualitative understanding of many principles of chemistry from non-quantitative metaphors. We adults, therefore, need not feel non-confident that the same is true with us for social chemistry. The chemistry metaphors of social bonding, antibonding and non-bonding are lively analogs, so let us put them to use.

§ 2. Habits of Reasoning and Science Development

The development of objectively valid social-natural sciences in general, and of a science of social-natural education in particular, requires that we re-think many old and now habitual ideas of man, community, and society. Howsoever much merit any of these ideas might have or might have had in a particular context or from a particular point of view – and often these merits are considerable – even a great idea is great no longer once thinking with it calcifies into dogma.

Dewey was correct when he wrote,

Profound differences in theory are never gratuitous or invented. They grow out of conflicting elements in a genuine problem – a problem which is genuine just because the elements, taken as they stand, are conflicting. Any significant problem involves conditions that for the moment contradict each other. Solution comes only by getting away from the meaning of terms that is already fixed upon and coming to see the conditions from another point of view, and hence in a fresh light. But this reconstruction means travail of thought. Easier than thinking with surrender of already formed ideas and detachment from facts already learned is just to stick by what is already said, looking about for something with which to buttress it against attack. [Dewey (1902), pg. 67]

When one is closed minded about new points of view and issues raised by facts of experience, and elects instead the satisficing action of conserving conventional ideas at whatever the cost, then what Dewey describes in the last sentence of the above quote can almost be called religious conviction and worship of what Bacon called idols of the market. The satisficing action is the first impulse of human judgmentation. It does not reflect any personal character flaw or weakness of mind because the process of practical Reason in *H. sapiens* is a cognitively dark and affectively cold process that seeks one end only, namely to bring about *Existenz* in a state of equilibrium. It does not "care" *how* this accomplished, just that it *be* accomplished. The process of human Reason knows no phenomenal objects and feels no feelings. Indeed, many of Freud's notions about the Superego are descriptive of the process of practical Reason.

Conservation of the *holistic* organized structure of learned practical rules in the manifold of rules (none of which can ever be perceptions) is a law of the process of practical judgment, but this law does not extend its absolute mandate to concepts in a person's manifold of concepts. Concepts serve Reason; Reason does not serve concepts. Nonetheless, accommodation of the structure of the manifold of concepts is often not the shortest route to the achievement of equilibrium and practical Reason is an impatient process. Therefore the satisficing behavior Dewey described is part of what one might with a degree of metaphorical license call "the first inclination of the nature of reasoning by *H. sapiens* generally." Within the structure of the manifold of practical rules, satisficing maxims giving rise to habits of thinking, such as those Bacon meant by his term "idols of the market," are quickly and easily developed. Many of these are learned in early childhood, succeed in achieving Reason's practical goal in numerous specific instances in experience at the time, and become increasingly inveterate through constant usage.

Bacon had a tendency to write in a more or less denunciatory style and with words that tend to convey to his readers the impression of a moralizing scold. The mental physicist recognizes this as a developed subjective preference of what Critical metaphysics calls the human faculty of taste. Indeed, expressions like Bacon used convey many valuable clues when one undertakes to study a specific human being to understand his rule and concept manifolds because judgments of taste orient reasoning. Let us then steel ourselves against reacting with either antagonism or enthusiasm to Bacon's style and learn the proper lesson from what he said about the effects of holding to idols of the market:

The idols of the market are the most troublesome of all, those namely which have entwined themselves round the understanding from the associations of words and names. For men imagine that their reason governs words, while, in fact, words react upon the understanding; and this has rendered philosophy and the sciences sophisticated and inactive. Words are generally formed in a popular sense, and define things by those broad lines which are most obvious to the vulgar mind; but when a more acute understanding or more diligent observation is anxious to vary those lines, and to adapt them more accurately to nature, words oppose it. Hence the great and solemn disputes of learned men often terminate in controversies about words and names, in regard to which it would be better . . .

to proceed more advisedly in the first instance, and to bring such disputes to a regular issue by definitions. Such definitions, however, cannot remedy the evil in natural and material objects because they consist themselves of words, and these words produce others; so that we must necessarily have recourse to particular instances and their regular series and arrangement . . .

The idols imposed upon the understanding by words are of two kinds. They are either the names of things which have no existence³ (for as some objects are from inattention left without a name, so names are formed by fanciful imaginations that are without an object), or they are the names of actual objects, but confused, badly defined, and hastily and irregularly abstracted from things. . . . [The first] species of idols is removed with greater facility, because it can be exterminated by the constant refutation or the desuetude of the theories themselves. The others, which are created by vicious and unskillful abstraction, are intricate and deeply rooted. [Bacon (1620), pp. 31-32]

Today philosophers and scientists alike have been trained to disdain Bacon and discount what he had to say on the excuse that he was not a physical scientist (which is true) and because he was a politician who came to suffer a tarnished reputation for dishonesty (also true but irrelevant). Institutionalized disdain has led to a practice of not teaching students what Bacon's ideas and theories were (other than, occasionally, as mere snippets and soundbites that are often colored by a presenter's bias). However, Bacon *was* a social-natural scientist whose principal topical concern was with the social nature of science. One of his books, *The New Atlantis*, inspired others to form the Royal Society, a respected association of scientists that still exists to this day. He was a Renaissance figure of major importance and, after Aristotle, probably the most important single person in history meriting some credit for setting science on the pathway to its current stage of development. I offer you the suggestion that ignoring and forgetting about Bacon is a blunder in science education as well as in the education of philosophers.

Every social-natural science must begin by taking the individual human being as its social atom. Yet social-natural science cannot stop at this point. It must go on to consider topics that span a much larger scope of phenomena. Here our present and past efforts have been dogged by a number of Baconian idols bearing such names as community, corporations, and society. These are what Bacon called the "vulgar" names of abstract and Platonic objects so vaguely conceived that their grounding notions are divorced from our social atom and people are relegated to secondary roles in the current social sciences. This will not do, and we must replace these idols of the market with properly grounded and objectively valid ideas. Doing so will likely seem a slow start to our journey, and this will not sit well with the impatient character of the process of practical Reason. Nonetheless, it is necessary if we are to accomplish more than to merely replace one set of Platonic idols with another. Mere idol replacement manifests something Dewey wrote:

Thus sects arise: schools of opinion. Each selects that set of conditions that appeals to it; and then erects them into a complete and independent truth, instead of treating them as a factor in a problem, needing adjustment. [Dewey (1902), pg. 67]

Let us start to solve the problem by identifying some of its factors, beginning with the scientist.

§ 3. The Society-Object and the Scientist

Every person defines (and redefines) his own society and it is private to the individual. This fact of *homo noumenal* human Nature must be our starting point for more general social ideas.

³ The correct Critical interpretation of Bacon's statement is that the idol is a Platonic *noumenon* divorced from all possibility of being immediately experienced. The idol *does* have existence in the connotation of *Dasein* and its *Existenz* is that of an object of fantasy. It turns out that fantasies *can* hurt you or others.

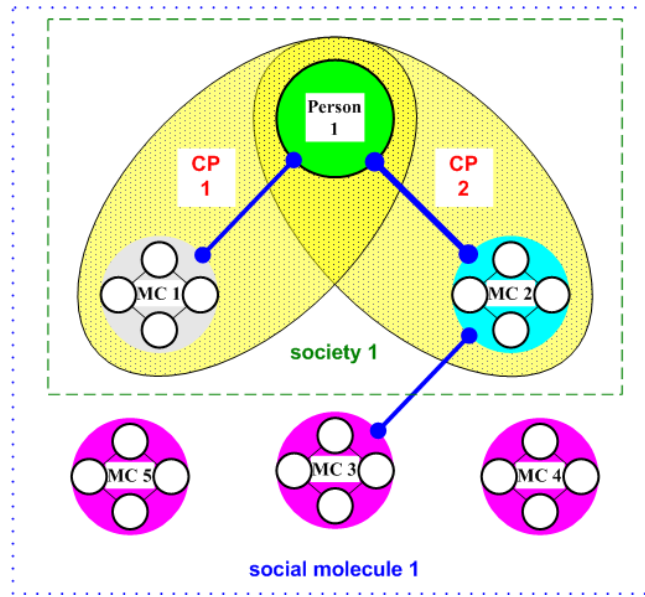


Figure 2.4: A specific example of the individual society of a Person 1 and his related social constructs of mini-Communities (MC), corporate persons (CP), and his social molecule. Solid blue lines denote social-chemistry interaction bond and field bond functionals. A number of functional connections are omitted from the picture for purposes of conceptual clarity in discussing the figure.

A *society* is the mathematical object of a mathematical concept formed by an individual such that the concept: (1) is suitable for one or more of his purposes; (2) contains mathematical principal quantities representing appearances of individuals; (3) has no ontological significance whatsoever; and (4) in its logical essence is a concept of relationships and associations. This is the real-explanation of "society" (its *Realerklärung*) and it differs from another Object that is traditionally confounded with it by homonymous usages of language, namely a Society. A *Society* is the Object understood as a higher concept of divers individual concepts of society retaining what is contained in common among these divers concepts. An individual's practical expressions that reflect his private idea of society are analyzable in terms of some important additional concepts. Figure 2.4 illustrates some of the most important of these concepts: mini-Communities, corporate persons, and the person's individual social molecule.

Person 1 in figure 2.4 is the starting point of the analysis. All the other constructs depicted in the figure – mini-Community (MC), corporate person (CP), society, and Person 1's social molecule – are constructs with real significance only to Person 1. Other people, looking on and observing Person 1, can only attempt to deduce these constructs by studying Person 1's actions and behaviors. The social-natural theory I am presenting to you in this treatise provides the objectively valid rational context for deductions of this sort. As scientists we are *observers* looking on at social phenomena and we have no microscope we can use to peer inside the head of an individual so that we might directly perceive his mental objects⁴. It is for this reason that we must be very careful to base our hypotheses and deductions upon solid grounds of Critical

⁴ In recent years there has been a great deal of hoopla about using brain imaging techniques as a way to directly observe mental objects. I must tell you that this is all science fiction. The supposition involves commission of a crucial *saltus* in reasoning that arises from an ontology-centered premise of current neuroscience utterly lacking objective validity. This premise is that "brain causes mind." If this were true, we would have to be able to make an objectively valid real division between mind and body. But to do so we must be able to call upon an assumption called the copy-of-reality-hypothesis. This hypothesis has testable consequences. They have been tested. The tests refute the hypothesis [Piaget (1947, 1970, 1974)].

epistemology and mental physics. General systems theorist Gerald Weinberg wrote,

What an observer does is make observations. These may be sensations on the sense organs of a biological organism, they may be readings taken by instruments, or they might be a combination of the two. An *observation* may be characterized as the act of *choosing an element from a set*, the set of all possible observations of that type for that observer. In other words, an observer may be characterized by the observations he can make. The notation of sets helps us to recognize that there are two aspects to an observer – the *kinds of observations* he can make and the *range of choices* he can make within each kind. . . . We may not speak of an observation as being correct or incorrect. Without some notion like "correctness," however, we shall find it difficult to say much about observers and their observations. [Weinberg (1975), pp. 69-72]

Weinberg's remark that "we may not speak of an observation as being correct or incorrect" is in most ways true, in one way false, and something a scientist is likely to feel very uncomfortable about because it seems to strike at the very possibility of science itself regarded as precise investigation of truths about nature. This discomfort originates from the peculiar reification given to the notion of "nature" as an ontological thing. It stems from a *learned human bias* that favors ontology-centered metaphysical realism. Even Weinberg succumbs to ontology-centered realism, and he undertakes a strenuous but ultimately Platonic effort to put the notions of "observation" and "observer" on a firm and purely objective footing.

Every human being begins life as a naive realist and the great majority of human beings remain semi-naive realists throughout their lives. Piaget was the first to conclusively document that we all begin life as naive realists [Piaget (1929)]. But because he did so by means of the very scientific method that implicitly presumes objective validity for observation and the observer, one can immediately demand to know why we should accept his findings if it is in fact true that "we may not speak of an observation as being correct or incorrect." This is, of course, the great conundrum of science in general and it can only be resolved through recourse to epistemology-centered metaphysics. The *practical* situation a scientist faces was well-stated by Claude Bernard:

Only within very narrow boundaries can man observe the phenomena which surround him; most of them naturally escape his senses, and mere observation is not enough. To extend his knowledge he has had to increase the power of his organs by means of special appliances . . . But man does not limit himself to seeing; he thinks and insists on learning the meaning of the phenomena whose existence has been revealed to him by observation. So he reasons, compares facts, tests one by another. This sort of control, by means of reasoning and facts, is what constitutes experiment, properly speaking; and it is the only process that we have for teaching ourselves about the nature of things outside us. [Bernard (1865), pg. 5]

We can learn – i.e., gain experience of our surroundings – in two ways: empirically and experimentally. First there is a sort of teaching or unconscious and empirical experience, which we get from dealing with separate objects. But the knowledge which we gain in this way is also accompanied necessarily by vague experimental reasoning which we carry on quite unawares, and in consequence of which we bring together facts to make a judgment about them. Experience, then, may be gained by empirical and unconscious reasoning; but the obscure and spontaneous movement of the mind has been raised by men of science into a clear and reasoned method . . . Such is the experimental method in the sciences by which experience is always gained by virtue of precise reasoning based on an idea born of observation and controlled by experiment. In all experimental knowledge, indeed, there are three phases: an observation is made, a comparison established and a judgment rendered. By the experimental method we simply make a judgment on the facts around us by help of another fact so arranged as to control the judgment and to afford experience. Taken in this sense, experience is the one source of human knowledge. . . .

Two things must, therefore, be considered in the experimental method: (1) the art of getting accurate facts by means of rigorous investigation; (2) the art of working them up by means of experimental reasoning, so as to deduce knowledge of the law of phenomena. We said that experimental reasoning always and necessarily deals with two facts at a time: observation, used as a starting point; experiment used as conclusion or control. In reasoning, however, we can distinguish between actual observation and experiment only, as it were, by logical abstraction and because of the position in which they stand.

But outside of experimental reasoning, observation and experiment no longer exist in this abstract sense; there are only concrete facts in each, to be got by precise and rigorous methods of investigation. We shall see . . . that the investigator himself must be analyzed into observer and experimenter; not according to whether he is active or passive in producing phenomena, but according to whether he acts on them or not, to make himself their master. [*ibid.*, pp. 12-13]

An experiment does not necessarily involve nor is it defined by examples such as are found in a chemistry laboratory or a physics laboratory, where the investigator deliberately sets up some situation so as to induce a desired outcome. You don't necessarily need a Bunsen burner to do an experiment. The essence of an experiment is a selection of a comparand fact of experience to use as a yardstick against another fact of experience in order to render a judgment on the latter. But the act of selection is itself an act self-determined by the scientist, thus is an outcome of his own process of judgmentation and cannot escape the scientist's own subjectivity in judgment – which Critical metaphysics calls a judgment of taste. *There is no real division* between observation and experiment, merely a logical division, and ultimately the practice of science is the practice of what Bernard above called "experimental reasoning." A **fact** is a *phenomenon for which its representation in the manifold of concepts is connected with an assertoric logical momentum of Modality*. But it is the human being himself who determines this Modality and, consequently, all facts of experience are empirically contingent in the sense that there is never a guarantee that no future phenomenal occurrence will ever gainsay the concept of the fact-object.

In Critical epistemology, *Nature per se* is the objective representation or "world model" of "all-that-exists" that the individual makes for himself. When the term "nature" is applied to an object, the nature of that object is the objective representation of all its characteristics and relationships with other objects. What science tries to accomplish is to erect a *structure* of concepts of objects such that their interrelationships with each other follow with logical necessity from specific conditioning concepts that tie them together. Science cannot and does not pursue either Absolute Truth or Absolute Certainty in a Hegelian context of these terms. Science, in its practical essence, pursues the perfection of total self-consistency in a *common* model of Nature. *H. sapiens* comes equipped with no built-in "copy of reality" mechanism and for every individual Nature and Reality are whatever he *thinks* they are. What scientists do, in effect, is challenge each other's world-models by calling attention to sensible phenomena of experience and demanding that scientific world-models converge to a single common world-model that the practice of science seeks to make ever more perfect (complete). That is all that any empirical science can do.

In the physical-natural sciences this is significantly easier to do than in any social-natural science. This is because the objects of physical-natural science are dead-matter objects that can be manipulated by scientists in a narrow and well-controlled way. Social-natural science, in contrast, must deal with live-matter that possesses the *Kraft* of acting as its own Self-determining causal agent. Dead-matter possesses no such *Kraft* and this makes social-natural science *different in kind* from physical-natural science.

The point I hope to convey to you by this seeming-digression into epistemology is *the scientific respectability of individual self-determinations of society*. Subjectivism is, quite rightly, rejected in the practices of physical-natural science because there the fundamental objects of

study are never self-determining. Thus, for example, vitalism in biology totally lacks objective validity. The pseudo-metaphysics of positivism in the 19th century biased the education of scientists into a comforting faith that so-called positive science would one day bring to mankind a Hegelian-like absolute certainty of Knowledge because scientific Knowledge would be purified and cleansed of all "merely" subjective contaminants; thereby the Truth about all things would be uncovered and hauled into the light of scientific rationality. When scientific experience in physics and in mathematics demolished this cherished goal in the early twentieth century and exposed the fundamental bankruptcy of positivism, it was a profound shock to the scientific community. Sir James Jeans, who was one of the world's most respected physicists when the scientific revolution of the early twentieth century took place, and who was never able to entirely let go of his own ontology-centered reification of "nature," wrote, with obvious reluctance, that

physics continued to believe that it was studying an objective nature which existed in its own right independently of the mind that perceived it, and had existed from all eternity whether it was perceived or not; this belief was the soil in which materialism had its roots. Physics would have gone on holding this belief today had the electron which the physicist observed behaved as, on this supposition, it ought to have done.

But it did not so behave, and the new quantum theory was brought into existence to make good the defects. It discovered what we believe to be the true pattern of events, with the wave-picture of matter as its pictorial representation. . . . We must remember that this picture is not a picture of reality, it is a picture we draw to help us imagine the course of events in reality. Thus we are not entitled to argue that reality is like the ingredients of the picture, although there is a certain presumption that the two are not wholly dissimilar in their natures; the pictorial representation does not take us into the mansion of reality, but does take us to its doorstep. . . . And now that we find that we can best understand the course of events in terms of waves of knowledge, there is a certain presumption – although certainly no proof – that reality and knowledge are similar in their natures, or, in other words, that reality is wholly mental.

Apart from arguments of this type, we can have no means of knowing the true nature of reality. The most we can say is that the cumulative evidence of various pieces of probable reasoning makes it seem more and more likely that reality is better described as mental than as material. [Jeans (1943), pp. 202-203]

One can, of course, overreact to Jeans' confession and swing either to the opposite extreme of opinion, namely a radical and Berkeley-like idealism, or to the hopeless skepticism of solipsism. Either would be just as great an error as the extreme position taken by the corpuscle materialists who founded physics' mechanistic model. Jeans is teetering at the edges of both in the last paragraph quoted above and his distaste for these positions is almost palpable in his book. The correct lesson to be learned from the scientific upheaval physics and mathematics went through in the first thirty years of the twentieth century is one so simple that a twelve-year-old understands it better than a dogma-trained college professor: There is no science without the scientists.

The social atoms of social-natural science are *all* self-determining agents, are all living beings who conceptualize and express actions from partly subjective grounds, and so subjectivity is inherent in their Nature. Social-natural science cannot disdain subjectivity. It is bound to treat it as one of its fundamental facts and examine *consequences* of subjectivity in all empirical social phenomena. It is for this reason that figure 2.4 is a required initial point of departure for any social-natural science. We cannot hope to understand Society with objective validity if we do not first understand the Nature of society, and every social-natural science must understand the Society in which the phenomena it studies occur. With this in mind, let us proceed to examine the social chemistry of society.

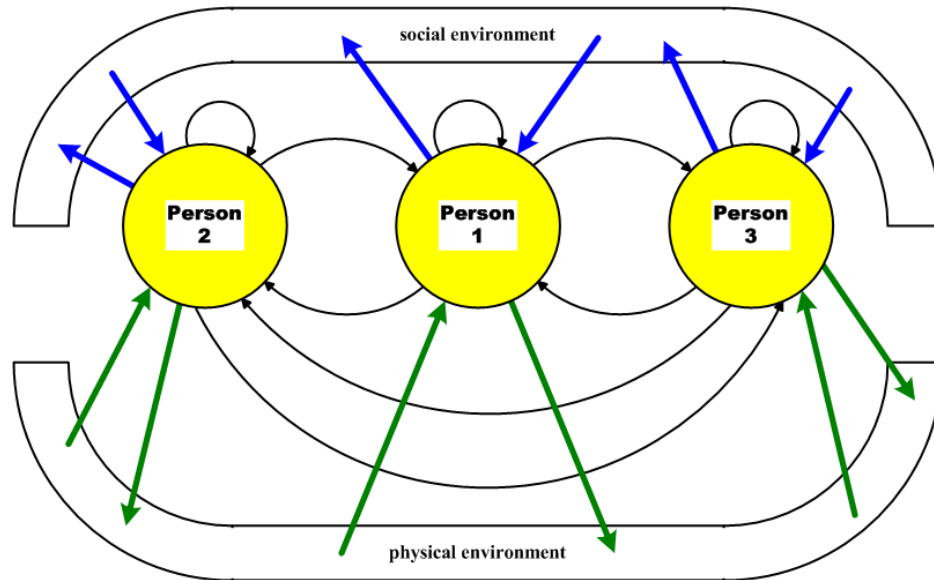


Figure 2.5: Social-molecule of Person 1 and its embedding social- and physical-environments.

§ 4. The Social-molecule of a Person

A **social-molecule** is the representation by embedding field network of the social environment of a single individual and his personal society. A social-molecule is a social chemistry model and is regarded from the point of view of a specific person whose molecule it is said to be. Figure 2.5 is a simple illustration of the social-molecule of the individual denoted Person 1. The other two persons depicted in the figure are said to be either bonded or anti-bonded to person 1 by direct social intercourse. In the figure, Person 2 and Person 3 are also depicted as being bonded (or anti-bonded) to each other. However, figure 2.5 is not a depiction of their social-molecules because a social-molecule is always uniquely associated with a specific person. This is distinct from another social chemistry construct I discuss later called a social Molecule. The social-molecule of figure 2.5 also includes other persons, not explicitly depicted, who make up Person 1's social environment.

A **social environment** is the entirety of all social situations and physical-natural conditions in which a particular human being is living at a given moment in time. The social environment of a person is said to affect that person through social chemical field bonds (see figure 2.3). Formally, a **field bond** is a functional describing the effect of an environment on a person or the effect a person has on his environment. Field bonds are divided into two types. A physical field bond is a field bond modeling the direct effect of the physical environment on the person's *soma* (phenomena of his physical body) or the direct effect a person's *soma* has on his physical environment. Field bond modeling falls under the empirical physical-natural sciences of physics, biology, chemistry and their subdisciplines. I will not further discuss physical field bonds here because they are properly dealt with by those sciences.

A **social field bond** is a field bond modeling the indirect effect of the social environment on the person through means other than immediate social interactions or the effect the expressed actions of the person have on the state of his social environment. A functional describing how the person's knowledge of the moral customs of the society in which he lives affects the person's Self-determinations and his self-determined actions is an example of a social field bond. As is also the case for interaction bonds (figure 2.3), social field bonds can represent either bonding or anti-bonding factors. All social chemical bonding and anti-bonding factors are psychological.

An **interaction bond** is a functional describing the effect the expressed actions during one person's social interaction with another person has on that other person. Interaction bonds are used to model both bonding and anti-bonding factors in direct person-to-person social interactions. An interaction bond is a specific mathematical model of the idea of interpersonal communication transactions that, as was described earlier, psychologists term impact messages. As such, an interaction bond is a psychological function describing the outcome of an act of semantic representing in a Weaver's model of the person designated by the sink node and, conjointly, the emotivity expression in a Weaver's model of the person designated by the source node. Interaction bonds and field bonds are representations of mathematical describing functions because they do not immediately represent the specific details of semantic representing or the process of appetition (figure 2.2) but only the outcomes of those mental processes in the Weaver's models of the two persons connected in the embedding field network by the network arc. Social chemistry network models represent higher level modeling than is modeled at the level of a Weaver's model. Thus, social chemistry network models stand as reduced-order models relative to the Weaver's model in the ladder of scientific-reduction/model-order-reduction. Conjointly, the Weaver's model representation is a scientific reduction model relative to the social chemistry model.

A **bonding factor** is any mathematical object having a meaning implication effect in semantic representing or the determination of appetition by a person that produces or expresses cooperation responses by a person in relationship to the other person or the social environment. An **anti-bonding factor** is any mathematical object having a meaning implication effect in semantic representing or the determination of appetition by a person that produces or expresses competition responses by a person in relationship to the other person or the social environment. A **describing function** is a phenomenological equation or set of coupled phenomenological equations used to transform the description of a set of mathematical input variables into a determined set of output variables. Describing functions have no ontological significance whatsoever and are merely used as mathematical tools for accomplishing model order reduction carried out on some complicated system to produce a higher-level model that has a lower order of practical cost-to-compute.

Describing functions are not deduced from scientific first principles but are instead defined and constructed with the goal of accurately mimicking interactions between two objects. The most widely used class of describing function is the class of statistical linear regression models but many other kinds of describing functions are employed in the quantitative study of nonlinear and distributed systems. They are extensively used in embedding field theory although it has not been a common practice to refer to them by this name in the technical literature. Common examples include the activation functions and the adaptation equations used in neural network theory. Other examples can be found in control system engineering, wireless transmission of signals in communication system engineering, reactor modeling in chemical engineering, lumped-element circuit modeling of Maxwell's equations in electromagnetic theory, lumped element modeling of partial differential equations for vibrating, thermodynamic and fluid mechanics systems in mechanical engineering, Hodgkin-Huxley modeling of neurons in neurobiology, micromagnetics (a modeling approach used in the applied physics of magnetic materials), and in solid state physics (exemplified by the "linear combination of atomic orbitals" or LCAO method and the "orthogonalized plane waves" or OPW method used to model crystalline solids).

A **social isomerism** is a Self-excitation functional (the a_{ii} loops in figure 2.3) that produces an accommodation in the person's manifold of concepts or manifold of rules as a consequence of an act of semantic representing. A social isomerism self-changes the person in the connotation that self-determined accommodations in a person's manifold of concepts or his manifold of rules alters his thinking, judgmentation and his self-determination of practical appetites.

In mathematically defining field, interaction and isomerism functionals three fundamental types of basic behaviors, called *compensation behaviors* ("compensations" for short), must be taken in account. These compensations are called types α , β , and γ , respectively. Compensation behaviors operate in both motoregulatory expression and ratio-expression and constitute schemes of ratio-expression in the person's motivational dynamic. Type α compensation consists of cancellation of a factor producing a disturbance by (1) ignoring perception of the disturbing factor (called *ignorance*) or (2) either physically removing a disturbing object or else fleeing from it. It also is constitutive for primitive forms of classifications in cognition.

Type β compensation acts to transform disturbances into mere variations by forming reciprocal relationships in the manifold of rules. It can also produce accommodations in the manifold of concepts. It leads to primitive forms of seriation (i.e. produces an order structure containing at least two contrary partial orders, e.g. $A < B$ and $B > A$). Type β compensation produces more durable rule and concept structures than type α compensation because there is always an actual adaptation effected during the motivational dynamic of the person's judgmentation. However, the adaptation it produces is not a very versatile form of adaptation because it merely assimilates a variation into an existing action scheme but does not reciprocally assimilate different action schemes to one another.

Type γ compensation always involves accommodation of both the manifold of rules and the manifold of concepts. In its case we say that the person reasons about Nature, which is to say the act of compensation produces a logico-mathematical ratiocination scheme. In order for it to be possible for this to take place, the existing manifolds must provide a sufficient support such that the adaptation can be carried through to a state of equilibrium. (Otherwise the adaptation cycle ruptures and the person switches to taking up some other action scheme). For this reason, type γ compensation behaviors appear later in the person's mental development than either of the other two compensation behaviors. Accommodation of the rule and concept manifolds carried out by means of this type of compensation produces greater versatility in how the person is able to react to stimuli.

A person's social molecule is constituted both by: (1) people he knows personally and has direct social intercourse with; and (2) people he does not know personally but of whose *Dasein* he is aware in such a way that his knowledge of their *Existenz* affects how he behaves through abstract concepts. The latter is a social field effect modeled by field bonds. For example, I am an American and I certainly do not personally know every other American. However, I know: that there are people I do not know who, like me, hold the title of citizen of the United States; that they and I share a particular common heritage; that by virtue of our common status as Americans there are particular political laws that apply to all of us governing how we conduct ourselves with each other; etc. These fellow-American strangers I know only in terms of particular *stereotypes* from which I construct particular concepts of my own Self-conduct and concepts of how they are *socially expected* to conduct themselves if we should happen to meet and interact. In this context, I hold that every living American citizen is a member of my personal social molecule merely by virtue of the common citizenship title we hold.

This does not, however, mean I make every living American citizen a member of my personal *society*, nor does it mean that a person must be an American in order for me to include him as a member of my personal society. For example, there are many foreign nationals who are currently students at the university where I work and these students I hold to be both members of my social molecule *and* members of my personal society simply by virtue of the fact that they are students at "my" university. On the other hand, I do not hold foreign students at other universities to be members of my personal society and they are members of my social molecule only by virtue of the fact that laws conventionally respected by members of my society are applied to them as well. A society and a social-molecule are *not* identical objects. The latter is an idea of wider scope than

the former and has a fundamentally practical basis. A society, by contrast, has for its fundamental basis *conceptual conventions* originating from subjective judgments of taste. For example, the current residents of the Idaho state prison are members of my social molecule – a part of the tax money the state of Idaho collects from me goes to guarding, warehousing and feeding them – but I hold them to not-be members of my personal society because *I* choose to exclude criminals from my society and hold our mutual relationship to be a relationship in the state-of-nature. Some other people who I do include as members of my society hold the opinion that the jailbirds of Idaho are "wayward members of our society" but I do not concur with their view on this point. My society is *my* society and *I* choose who does and does-not belong to it.

A Society, on the other hand, is an altogether different matter because a Society is a convention based upon a social contract. I don't get to choose who belongs to a Society I hold membership in; I only get to choose whether or not I will agree to belong to it. Again, as Objects a social-molecule, a society, and a Society are not the same Object. Figure 2.4 attempts to illustrate this distinctness in objective character. An individual always chooses who is or is-not a member of his society; he does not usually get to choose who is or is-not a member of his social-molecule.

§ 5. Mini-Communities, Mini-Society and Corporate Persons

A person's society is the object of a concept structure within his manifold of concepts that is conceptualized primarily from acts of judgmentation that reflect egocentrism and moral realism as these are explained in Wells (2012). A social-natural science must be concerned with concepts having a wider scope than this, and this brings us to the concepts of mini-Communities and corporate persons.

A **Community** is a *voluntary association of people who join together for some common purpose*. A Community can be either a civil Community or a non-civil Community. A **civil Community** is an *association of people sharing a civil convention (a civil association) having common civil rights and civil liberties with a common system of governance*. A **mini-Community** is a *civil Community constituted as a proper subset defined by the intersect of its members' societies*. Note that these epistemological real-explanations are de-centered from the viewpoints of individuals and are real-explanations grounded in the practical Standpoint of Critical metaphysics. Note too that the ideas of civil Community and mini-Community both contain an idea of a social contract of some kind established and in place among the members. A Community is an object that differs fundamentally from the object commonly called a community. A **community** is merely *a group of people living in the same district, geographical area, etc. under the same laws* and the word is commonly used as a non-technical term.

Figure 2.4 depicts five mini-Communities within the social molecule of Person 1. It also depicts Person 1 as belonging to only two of these five mini-Communities. Here we encounter a factor that is crucial for a proper scientific understanding of human social-nature. In almost all empirically occurring cases, *an individual person is simultaneously a member of more than one mini-Community*. His mini-Communities constitute his personal society. Other persons in his society might or might-not be members of more than one of these mini-Communities. Further, while each mini-Community has some system of common governance in place for that mini-Community, different mini-Communities might, and empirically usually do, have different systems of governance in place. The concept of governance is not identical with the concept of a government. Governance pertains to the leadership dynamics in play within the mini-Community, government to a formal system of institutions. The governance within a person's family is usually quite different from the governances found in, e.g., divers mini-Communities to which the person might belong at his workplace, and these differ again from, e.g., that of his athletic club.

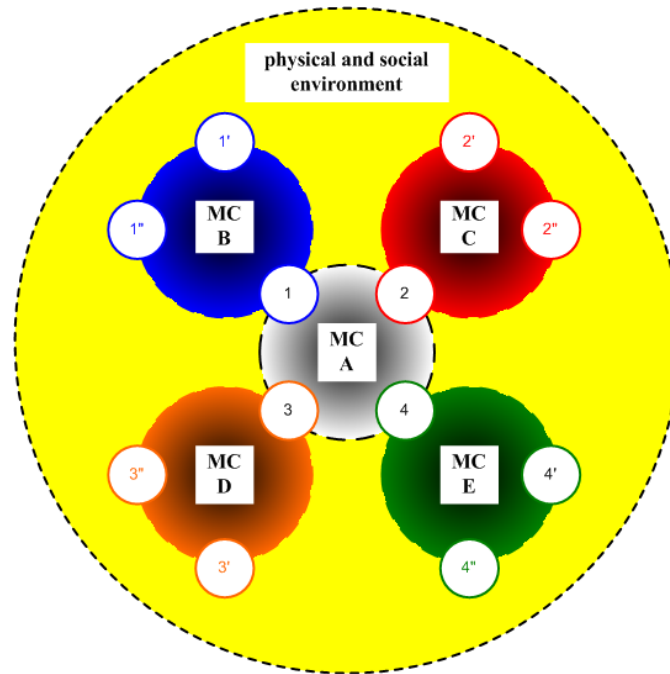


Figure 2.6: A social Molecule of granulated mini-Communities (MC) constituting a mini-Society.

All mini-Communities coalesce around some commonality of congruent purposes each of the members is attempting to realize (make actual) by means of the civil association. Furthermore, any mini-Community can become the nucleus of a mini-Society. A mini-Society is the object of a purely mathematical concept. Specifically, a **mini-Society** is *the mathematical object constituted as a mathematical set of people defined by the union of all people belonging to the divers mini-Communities of the members of a common mini-Community*. A mini-Society is always defined relative to some specified mini-Community. Furthermore, it is almost never the case that a mini-Society exists in isolation from some larger social environment of other people who are not members of that mini-Society (but do constitute a part of the mini-Society's *social Molecule*). Because a mini-Society is mathematically defined having people as the elements of its set, a mini-Society is a principal quantity of Critical mathematics and therefore its concept has real objective validity and a mini-Society is a proper Object of social-natural science. Figure 2.6 illustrates this concept of a mini-Society. In social chemistry terminology, a mini-Society is part of a social Molecule.

Although the following remark is somewhat (but not entirely) tangential to the topic of social-natural education, I think it is important enough to warrant making it here. Historically, the failure to recognize the *Dasein* of mini-Communities and mini-Societies has caused major problems for social-natural political science. This failure is no less troublesome for the present day non-natural social science discipline called political science. More specifically, the *Dasein* and *Existenz* of mini-Communities and mini-Societies present issues pertaining to workable and sustainable systems of representative government. These are so severe as to act as destabilizing national and international factors. Rousseau wrote,

The body politic, as well as the human body, begins to die as soon as it is born, and carries in itself the causes of its destruction. But both may have a constitution that is more or less robust and suited to preserve them a longer or a shorter time. The constitution of man is the work of nature; that of the State the work of art. It is not in men's power to prolong their own lives; but it is for them to prolong as much as possible the life of the

State by giving it the best possible constitution. The best constituted State will have an end; but it will end later than any other, unless some unforeseen accident brings about its untimely destruction. [Rousseau (1762), pg 93]

Rousseau's statement is historically accurate, and mirrors the gloomy conclusions of Toynbee, but the necessity he implies in his last sentence is an unjustified overgeneralization. It is true enough for the historically common forms of government, but Rousseau fails to recognize the real root cause of the fall of nations and entire civilizations. This real root is found in the phenomena of mini-Communities and granulated mini-Societies. Political science, both when it was a social-natural science and today when it is a mere social science, has not found the answer to the problem of, as Rousseau put it, "the death of the body politic"⁵ because political theories have not properly accounted for the human phenomenon of mini-Community. Mini-Communities cannot be abolished by legislation because their formation occurs from individuals' Duties-to-themselves and this formation is a primary fact of human social-nature. People can, of course, be coerced into keeping the *Dasein* and the *Existenz* of their mini-Communities secret – this is called "going underground" – but no government and no set of moral customs can prevent them from being formed.

In my opinion, social-natural political science faces no more-urgent challenge than to develop a sound and objectively valid theory of governance and government. In *The Idea of the Social Contract* I have proposed the idea of what I there called a system of Tocqueville governance as the probable best solution to the problem of civil governance and civil government. The issues of governance and government are pertinent to a social-natural science of education because the institutions of public education cannot exist in isolation from other institutions of governance.

Social chemistry bonding of mini-Communities to form a mini-Society occurs mediately and through the individuals who are members of the nucleating mini-Community. In figure 2.6 these are the persons depicted by the nodes labeled 1 through 4. Mini-Community A is the nucleating mini-Community for the mini-Society depicted in the figure. The bonding effect occurs because each of these individuals is himself a constituent of the entirety of all his mini-Communities regarded as corporate persons. A **corporate person** is the regulative Idea of the one-ness of the civil Community of a group of people regarded as a body-politic. The object of a corporate person is a civil Community (most commonly a mini-Community) in its entirety.

Viewed as an object, the corporate person is a mathematical abstraction. Its objective validity is entirely vested in the practical Standpoint of Critical metaphysics, which means that objectively valid explanations of the corporate person can only be explanations rooted in how this thing we call a corporate person is manifested by the activities of a group of people. Critical metaphysics requires that such explanations be grounded in basic transcendental principles, and for the case of the corporate person these must be animating principles of group actions. The term "animating principle" in this context refers to a principle by which independently-determined individual actions combine to produce a unification of co-determined group actions. The co-determination taking place in the mass actions of a corporate person does not necessarily mean that the individuals sit in council to jointly decide what to do, nor does it mean that the group forms a conscious conspiracy to act in some particular way. This might, of course, happen from time to time, but such instances are a relative rarity in empirical experience. Rather, the co-determination is the result of interactions among individuals who are each concerned with their own states of affairs within a field constraint of knowing successful accomplishments depend on the actions of other people as well as or even more so than on just their own.

⁵ A **body politic** is the regulative Idea of the totality of all members of a Community. Rousseau, and others, have provided examples of bodies politic but did not provide any objectively valid real-explanation of the Idea. Historically the Idea has been treated as if it were *Selbstverständlich* (self-evident), but it is not.

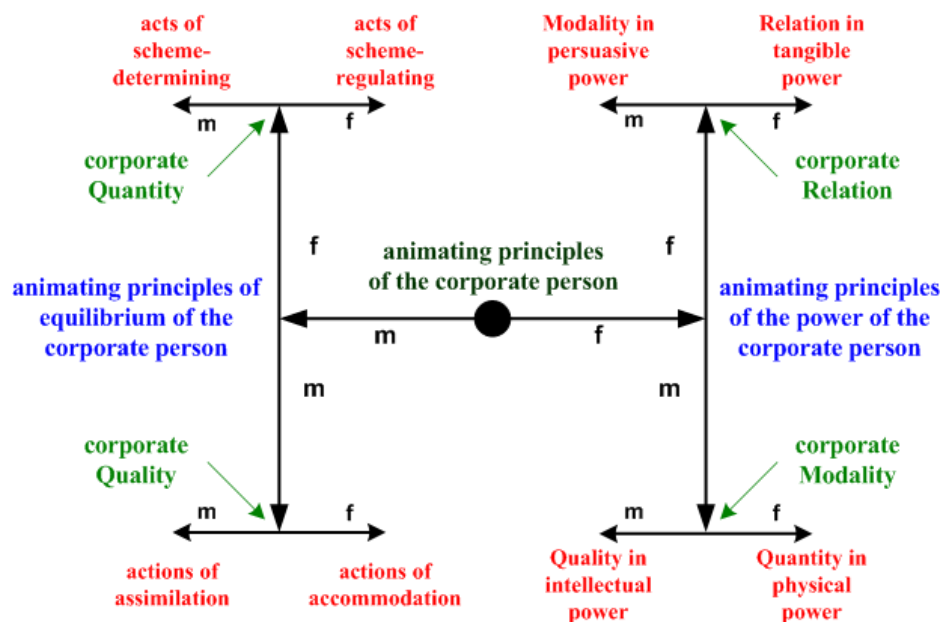


Figure 2.7: 3LAR structure of the system of animating principles of the corporate person.

A mere empirical accident whereby a group of people are thrown together in a situation that provokes social interaction is not a sufficient condition to guarantee the formation of a corporate person, although prolonged *Existenz* in such a social situation does empirically tend to exhibit the emergence of cooperative group behaviors in many circumstances. The animating principles of a corporate person are not principles of what any particular group of people *will* do in any given circumstance. Rather, they are principles explaining social conditions and factors that affect how and whether a group of people form a mini-Community and co-bind themselves to one another through self-commitments governing how they will live together in their common situation. These commitments are commitments to some type of mutual agreement, i.e. a social compact. It does not matter whether the terms of the social compact are explicit (as in a formal constitution) or whether the terms are merely tacit, as is the case with cultural moral customs. What matters is whether or not the ideas held by each individual involved, concerning what these compact terms require, are sufficiently congruent with those of the others that their civil cooperation is possible.

The animating principles of the corporate person were deduced in Wells (2012). There it was shown that the structural form of these principles is described by a third-level analytic representation (a 3LAR), giving rise to eight specific animating principles. Figure 2.7 illustrates the 3LAR structure of the animating principles. In summary, the principles are:

- **Principle of scheme-determination** – the action schemes of a corporate person are determined by a mathematical quantity called the competitive threshold;
- **Principle of scheme-regulation** – the action schemes of a corporate person are regulated by time variation of a mathematical quantity called the Community adaptation level; this adaptation level is sometimes called "a communal understanding";
- **Principle of assimilation in the corporate person** – the embedding field network structure describing the social interactions of the individuals conforms to the mathematical properties of smoothness, non-negativity, boundedness, and competition;
- **Principle of accommodation by the corporate person** – the embedding field network structure describing the social interactions of the individuals contains one or more mathematical functions called adaptation level functions;

- **Principle of the persuasive power of the corporate person** – corporate persuasive power is measured by the degree of generation/annihilation activity in bonding and anti-bonding leadership events in the embedding field network representation of the corporate person;
- **Principle of tangible power of the corporate person** – the group actions and adaptations taking place in the individuals' social interactions optimize social-economic utility for the group and each of its members;
- **Principle of intellectual power of the corporate person** – growth and sustainability of the mini-Community of the corporate person requires some institution of a means for the civic education of every member of the mini-Community;
- **Principle of physical power of the corporate person** – each person in the mini-Community must accept and attend to specific civic Duties, for the performance of which he can justly be held accountable by the Community-as-a-corporate-person.

The first four principles speak to the equilibrium of the body politic of the mini-Community. The principles are formal mathematical principles that were first discovered and proved by Grossberg [Grossberg (1978), (1980)]. They deal with the mathematics of action dynamics in an embedding field network. It is not particularly appropriate to discuss the formal mathematics of the principles in this treatise for two reasons. First, these details are quite adequately presented and explained in the Grossberg citations just given. Second, I expect that the majority of readers of this treatise have not yet acquired the necessary training in mathematics needed to understand an explanation in terms of the formal mathematics. As it happens, this mathematics is not very "deep" or esoteric at all and its formal background requires little more than basic calculus and a few ideas of ordinary differential equations. However, a good grasp of the mathematical theory is greatly enhanced by experience with working with embedding field graphs and by a grasp of certain important ideas of system theory. If I were pressed for a guess, I'd say that any person of average intelligence with a good public school preparation for college-level mathematics could acquire everything needed for this in under two years if he had access to qualified teachers who followed good (mental-physics-grounded) pedagogical practices. Of course, this is a big "if" and is not very well satisfied by present educational circumstances in the United States.

But if the formal mathematics of the principles goes beyond the scope of this treatise, the same is not true for the contextual and conceptual ideas that make up the matter of these principles. This matter is not very clearly presented in Grossberg's papers, although it is in them implicitly. I will now present them, but I must forewarn you I think it is likely you presently hold with some very popular ideas of human nature that are not true and constitute idols of the market.

I begin with one long-cherished and deeply embedded in traditional presuppositions, namely: Man has a social instinct. No. Not true. Mental physics teaches us that *H. sapiens* possesses no such instinct whatsoever. The transcendent notion of "man's social instinct" is nothing more than a supposition offered long ago as an explanation for the obvious fact that most people live in social situations and prefer these situations to life in asocial circumstances. The supposition that man has a social instinct is a kind of "social vitalism" analogous to the vitalism presuppositions of medical practitioners prior to the work of Bernard. Vitalism was the traditional useless habit of "explaining" everything biology, physiology and medicine could not then explain by attributing phenomena of medical and biological experience to an occult quality called "life." It was a form of institutionalized type α compensation behavior on the part of medical scientists. Bernard wrote

When an obscure or inexplicable phenomenon presents itself, instead of saying "I do not know," as every scientific man should do, physicians are in the habit of saying, "This is life"; apparently without the least idea that they are explaining darkness by still greater darkness. We must therefore get used to the idea that science implies merely determining the condition of phenomena; and we must always seek to exclude life entirely from our explanations of physiological phenomena as a whole. Life is nothing but a word which

means ignorance, and when we characterize a phenomenon as vital, it amounts to saying that we do not know its immediate cause or its conditions. Science should always explain obscurity and complexity by clearer and simpler ideas. Now since nothing is more obscure, life can never explain anything. [Bernard (1865), pg. 201]

So, too, it is with "social instinct." Think about it for a moment. If man had an innate social instinct, he would be born "social" *and the phenomenon we call socialization would not happen* because there would be nothing else left for "socialization" to accomplish. Yet it is empirically undeniable that not a few, not some, but *all* human beings undergo processes of socialization in childhood. The animating principles for equilibrium of the corporate person ban social vitalism. This is fully congruent with Critical epistemology and the doctrine of mental physics.

Next I turn to a somewhat Darwinian idol of the market that has attracted a following of quite a few rather stubborn idealists and romantics, namely: competition is antagonistic to consensus and cooperation. No. Not necessarily (as implied by the categorical form of the idol). Competitive behaviors *can* be antagonistic to consensus and cooperation. I think I hardly need to point out empirical examples where antagonism is prominently displayed. But competition *also* sometimes leads to the formation of, e.g., cartels. Consider this. There is probably no better example of extraordinarily hostile competition to be found than was displayed by the five major criminal "families" in New York City in the first decades of the twentieth century. Yet Lucky Luciano succeeded in getting the Five Families to form a cooperative cartel (called the Cosa Nostra) and thus was born organized crime in the United States. Cooperation did not mollify the murderous character of these people. There was a sixth "family," the "mob" led by gangster Dutch Schultz, who chose not to cooperate with Luciano's new cartel. They dealt with that problem by murdering Dutch Schultz and his top lieutenants. Mafia "commissioner" Albert Anastasia formed what we might call a "service organization" for the Cosa Nostra that became popularly known in the press as Murder Incorporated. Even so, the Cosa Nostra cartel did produce cooperation among New York's competing criminal organizations and greatly reduced (although it did not eliminate) the frequency of the internecine gang wars that had previously characterized the New York City underworld. The cartel soon became national and extended from coast to coast across the United States. The Cosa Nostra's "commission" acted as a body of poachers turned game wardens.

If you don't care for this example, here is another. It is rather naive to regard the Arab countries of the Middle East as constituting one big happy family. Not too many ideas could be further from the truth and centuries-old Bedouin traditions that predated the establishment of the Arab nations clearly were antagonistic in terms of relationships between different tribes. There is a relatively recent fiction that has taken hold in many parts of the United States that presents "the Arabs" as a great monolith of some sort. Any close examination of the Middle East exposes this idol for the fiction that it is. And still these intensely competitive nations chose to form OPEC (the Organization of Petroleum Exporting Countries), a cooperative price-fixing cartel that first exerted its economic muscle in a plainly visible manner during the 1973 Arab Oil Embargo.

Phenomena of cooperation among competitors stretches far back through the pages of history. Here is another example, this one also taken from the pages of social-natural economics:

We rarely hear, it has been said, of the combination of masters [business owners], though frequently of those of workmen. But whoever imagines, upon this account, that masters rarely combine, is as ignorant of the world as of the subject. Masters are always and everywhere in a sort of tacit but uniform and constant combination not to raise the wages of labor above their actual rate. To violate this combination is everywhere a most unpopular action, and a sort of reproach to a master among his neighbors and equals. We seldom, indeed, hear of this combination because it is usual and, one may say, the natural state of things, which nobody ever hears of. [Smith (1776), pg. 59]

I know many sincere people who tell me, "Well, that might have been true in England in Adam Smith's day, but things are different in this country. We have antitrust laws." The latter is true but irrelevant. In point of fact, every large corporation in America (and most smaller ones) make it a standard practice to base decisions about what to pay workers on something called "the market mean" for wages. Overt conspiracy is not required for this. Wage and salary statistics are compiled and published annually by trade organizations and by the U.S. government. They are available for anyone to look at; you just have to know where to look. The practice is not illegal and it is well-nigh universal in the United States even for intense economic competitors. I do it myself when I hire graduate research assistants even when I face competition from my colleagues in getting an especially bright and talented young person to come to work in my laboratory. I base the budgets for research funding proposals I submit to funding agencies on the "local market mean" for student salaries. So do my colleagues, and we all know it. We compete among ourselves to hire the best-and-brightest students but we do not wage-compete. Doing so would hurt the budget competitiveness of our research contract proposals at the funding agencies.

The animating principles of equilibrium for the corporate person are principles of conditions that must be satisfied *for robust cooperation to emerge out of competition*. One of these – one that is not too popular with my more idealistic friends and colleagues – is this: *competition is a necessary condition for the possibility of cooperation*. This doesn't always mean competition between two individuals who decide it is better to cooperate than compete. It just means that there has to be a factor of competition present somewhere within the social environment. Even so, it is empirically frequent that cooperation arises spontaneously out of immediate competition between people who choose to cooperate in some way. The logical essence of the character of competition can be simply stated: The accomplishment of the aims and objectives of one competitor thwarts the accomplishment of the aims and objectives of the other. Cooperation occurs when the people involved each judge and conclude that their personal Duties-to-themselves are better served by cooperation than by non-cooperation or competition. Without the factor of competition, individuals best service their Duties-to-themselves by acting independently of others – a situation that, if it actually existed, would be the most *antisocial* situation imaginable. This is not my opinion; it is a theorem of the mental physics of human *homo noumenal* nature.

This does not mean, as some neo-conservative zealots think, that competition in all and every form is some sort of "universal good" and that, therefore, competition should never come under any sort of civil restriction of any kind. Even Adam Smith did not advocate unrestricted uncivic competition – a fact more people would know if more people actually read and studied *The Wealth of Nations* instead of just taking other people's word for what Smith said.

The animating principles also say the neo-conservative proposition is untrue. This is implicit in the ideas of competitive threshold and adaptation level functions. Grossberg's theory merely describes formal conditions of competition whereby either cooperation emerges or else competition either: (1) leads to the disintegration of mini-Community and the rupture of the corporate person; or (2) prevents the formation of a stable mini-Community in the first place. It can go either way, and competition *per se* is neither "good" nor "bad." It does get credited or blamed by a lot of stupid but satisficing pseudo-theories that are untrue to human nature. The fundamental source of both competition and cooperation-arising-out-of-competition lies in the *homo noumenal* nature of judgments of taste in the motivational dynamic of *H. sapiens*. I discuss the mental physics of judgments of taste in chapters 12-13 of *The Idea of the Social Contract*.

The animating principles of Quantity and Quality in the power of the corporate person pertain to conditions for the formation and maintenance of a mini-Community. A corporate person is a "happening" (in the terminology of mental physics, an *Unsache*-thing) and these animating principles pertain to how independently determined human actions can come into coherence with each other to produce a mini-Community.

For the individual human being, *Personfähigkeit* or **power of a person** is the organization of his capacities for realizing (making actual) or attempting to realize the objects of his appetites. These capacities subsist in his physical power (Quantity), intellectual power (Quality), tangible power (Relation), and persuasive power (Modality) [Wells (2012), chap. 10]. Living in a state-of-nature social environment, his liberty to actualize his appetitive objects is limited. His discovery that he can increase his liberty to accomplish his aims by joining his capacities in alliance with those of other people, and thereby better serve his Duties-to-himself, is the foundation of all human Communities. Rousseau wrote,

I suppose men to have reached the point at which the obstacles in the way of their preservation in the state of nature show their power of resistance to be greater than the resources at the disposal of each individual for his maintenance in that state. That primitive condition can then subsist no longer; and the human race would perish unless it changed its manner of existence.

But, as men cannot engender new forces, but only unite and direct existing ones, they have no other means of preserving themselves than the formation, by aggregation, of a sum of forces great enough to overcome that resistance. These they have to bring into play by means of a single motive power, and cause to act in concert. [Rousseau (1762), pg. 13]

This "single motive power" is not some power of dead-matter Nature and has no *Existenz* as an ontological thing. It is, rather, a synergism of individual actions, and this synergism is that to which the term **corporate Personfähigkeit** refers. Its earliest and most paleolithic manifestation is reflected in what Santayana called the civilization of a *natural society*:

Natural society unites beings in time and space; it fixes affection on those creatures on which we depend and to which our action must be adapted. Natural society begins at home and radiates over the world, as more and more things become tributary to our personal being. In marriage and the family, in industry, government, and war, attention is riveted on temporal existences, on the fortunes of particular bodies, natural or corporate. There is then a primacy of nature over spirit in social life; and this primacy, in a certain sense, endures to the end, since all spirit must be the spirit of something, and reason could not exist or be conceived at all unless a material organism, personal or social, lay beneath to give thought an occasion and a point of view, and to give preference a direction. Things could not be near or far, better or worse, unless a definite life were taken as a standard, a life lodged somewhere in space and time. Reason is a principle of order appearing in a subject-matter which in its subsistence and quantity must be an irrational datum. Reason expresses purpose, purpose expresses impulse, and impulse expresses a natural body with self-equilibrating powers. [Santayana (1905), pp. 137-138]

Natural society, he goes on a bit later to note, cultivates relationships "which in the last analysis are experienced and material" [*ibid.*, pg. 146]. It is a bare step away from the state-of-nature and can be called civilization in childhood. If that civilization succeeds in growing and prospering, it will advance in stages from natural society to free society and finally to ideal society⁶. Free society, he tells us, "turns exclusively to unanimities in meanings, to collaborations in an ideal world" [*ibid.*]. Natural society is the society of comradeship, free society that of friendship:

Comradeship is a form of friendship still akin to general sociability and gregariousness. When men are "in the same boat together," when a common anxiety, occupation, or sport unites them, they feel their human kinship in an intensified form without any greater personal affinity subsisting between them. . . . For this reason comradeship lasts no longer

⁶ Natural society, free society and ideal society are terms Santayana introduced to describe the level of social progress and character of life in different stages of Society.

than the circumstances that bring it about. [*ibid.*, pg. 147]

Ideal society can be called the civilization of kinship. Ideal society, Santayana wrote, "is the society of symbols." He goes immediately on to say,

Symbols are presences, and they are those particularly congenial presences which we have inwardly evoked and cast in a form intelligible and familiar to human thinking. Their function is to give flat experience a rational perspective, translating the general flux into stable objects and making it representable in human discourse. They are therefore precious, not only for their representative or practical value, implying useful adjustments to the environing world, but even more, sometimes, for their immediate or aesthetic power, for their kinship to the spirit they enlighten and exercise. [*ibid.*, pp. 196-197]

As a person's society advances from natural to free to ideal, his *Personfähigkeit* ascends in its perfection and his civil liberty enjoys Progress and can be exercised with greater strength as the corporate *Personfähigkeit* of his society grows.

But this growth in personal society depends upon that of the Society of which it is a part. If that Society is arrested, so too is the individual's society. If that Society disintegrates, so too does the individual's society. The two animating principles of corporate physical power and corporate intellectual power are principles of those conditions that promote perfection and Progress in the power of the corporate person, without which the individual finds his liberty of action hindered or curtailed and his personal purposes thwarted by factors overpowering his *Personfähigkeit*.

The animating principle of corporate tangible power is the principle of the condition for the continued actual *Existenz* of the corporate person. An individual will maintain his membership in the corporate person only if doing so benefits his ability to satisfy those purposes he intended to satisfy by means of joining himself to the Community. The roots of all such purposes are planted in the soil of Duties-to-himself with respect to his own situation, and to serve these Duties he will alienate some of his natural liberties in exchange for civil liberties that empower him to better do so. But for his allegiance to the body politic he requires particular civil rights be granted him and that these civil rights be protected inviolate by the body politic as a whole. Its capacity to do so is the practical tangible power of the corporate person. The animating principle, social-economic utility optimization, is the principle for the *Existenz* of this tangible power.

The term **social-economic utility** means *the degree of value satisficing in a generalized system of social economy*. The term **generalized system of social economy** means *the system of self-regulating transformations contained in a corporate person actualized by means of social interactions employing the personal tangible powers of the interacting individuals*. These transformations are changes in the state of the corporate person effected by the actions of the people who compose it. They are self-regulating because the actions of one individual affect the value conditions of others, who in turn react to this affection because all human beings act to satisfy their Critical values⁷. **Social-economic utility optimization** means *minimization of the degree of uncivic social interactions as measured by the degree of global non-equilibrium in the cyclic dynamics occurring within the corporate person*. An **uncivic social interaction** is a *social transaction in which a person transgresses a civic Duty, to the fulfillment of which he is pledged by the terms of a social contract*. The preservation of the corporate person is dependent upon the *Existenz* of thorough-going civil relationships within it, and this general civil state is in turn dependent upon the actions of all its members being *civic* actions. However, for the principle to

⁷ A **value** is the form of an affective perception of a desire presented in aesthetical reflective judgment as a sense of interest and referenced to a person's appetitive power through the synthesis of desiration in teleological reflective judgment. Value judgment is always a subjective judgment of taste.

be applied scientifically, one or the other of either compliance *or* noncompliance with civic Duties must be *measurable*. This is only possible in the negative, i.e., only uncivic actions can be objectively experienced because whether a person's individual actions are intended to be civic or not depends on whether his action is grounded in tenets of civic Duty. This cannot be externally observed. Onora Nell correctly noted,

It was assumed that it could be discovered when an agent's maxim was inappropriate to his situation or to his act, or when the agent was acting on the basis of a mistaken means/ends judgment. But when we act we are not in that position. Once all reasonable care has been taken to avoid ignorance, bias, or self-deception, an agent can do nothing more to determine that his maxim does not match his situation. Once an agent has acted on his maxim attentively, he can do no more to ensure that his act lives up to his maxim. We cannot choose to succeed, but only to strive. Once he has taken due care to get his means/ends judgments right, he can do nothing further to ensure that they are right. Agents are not simultaneously their own spectators. In the context of action they cannot go behind their own maxims and beliefs. We can make right decisions, but not guarantee right acts.

Nor, of course, can every spectator go behind an agent's maxims and beliefs. Usually they will be far less informed about the agent's situations, beliefs, and acts than are agents themselves, for all their possible bias and mistakes. But when an agent is biased, mistaken, or self-deceiving, in spite of having taken all reasonable care to be none of these, it is not even possible that he should, at that time, realize the inappropriateness of his maxim to his situation, or the error of a means/ends judgment on which he bases the performance of some ethical duty of omission, or that he should foresee that his act will not be what he intends. If he did uncover his bias, mistake, or self-deception, he would either revise his maxim or have to find new grounds for retaining it. By contrast, a spectator may be able to see the inappropriateness of an agent's maxim to his situation . . .

On the other hand, in contexts of having acted agents are their own spectators. Like others they may be able to see a discrepancy between maxim and situation, an error in their previous means/ends judgments, or a discrepancy between maxim and act. They are no longer in a context of action, but in one of assessment.

So there is a distinction between contexts of action and contexts of assessment. In the former, if all care and attention have already been exercised, nothing more can be done to learn whether the maxim of action tested to discover an act's deontic status was one which incorporated the relevant composite act description and was not based on an erroneous means/ends judgment. In the latter context further steps can often be taken to see whether there is not some sort of hiatus between maxim and situation, between means/ends judgments and the probable causal sequences, or between maxim and act. [Nell (1975), pp. 127-128]

When a natural science deals with a mathematical object – and the corporate person is a mathematical object – the methodological discipline of that science must take great care to see that what it infers from experience to abstraction and vice versa is inferred from objectively valid foundations. The animating principle of tangible power of the corporate person is such a principle in the context that it is a principle for assessing the joint actions of individuals within a social body politic. It speaks to the scientific Relation of corporate accident to corporate *purposive* substance, to the dependency of corporate ends on the causality of corporate means, and to the notion of mutual reciprocities of causality and dependency of actions within the corporate person.

The last animating principle, corporate persuasive power, is similar in kind but addresses the matter of corporate *nexus* rather than, as corporate tangible power does, the form of this *nexus*. Whether or not the corporate person is actualizing a mini-Community, disintegrating it, or merely maintaining it in an arrested determination is objectively determinable through its bonding and non-bonding relationships among its members and, more specifically, by the generation or

annihilation of social bonds and the annihilation or generation of social anti-bonds in the course of its leadership dynamic. On this point it is crucial to understand that leadership is a social dynamic, not an attribute or quality of a person, and that every leadership event involves a *minimum* of two people in social interaction (a leader and a follower) [Wells (2010)]. Further, who is acting as a leader and who is acting as a follower is fluid and the roles change from moment to moment during social intercourse. **Leadership** is the reciprocal and dynamic relationship between two or more people by which the self-determination of actions by the follower(s) is stimulated by the actions of the leader(s). If the leader and the follower cooperate in their actions this is reflective of a bonding relationship between them. If they do not it reflects either non-bonding or, if the follower's action contradicts the leader's intention, anti-bonding.

The notion of a leadership event (the full cycle from leader's action to follower's response) is an objective indicator of the psychological idea of impact message transactions. "What's going on inside someone's head" is not an observable object of experience but congruence between the actions of two persons can be objectively assessed, and so the fourth animating principle is another principle of assessment – this time dealing with the matter of intercourse rather than its form. The principles of corporate tangible power and corporate persuasive power have this character of assessment because the idea of the corporate person has only epistemological, and not ontological, real significance.

§ 6. Granulated Society

Bonding, anti-bonding and non-bonding relationships among the mini-Communities to which a person belongs exert a non-negligible effect on the person and his social interactions with other people. The union of all the persons who comprise an individual's set of corporate persons is called the mini-society of that person. The person is a member of every corporate person in his personal society but this does not mean there is unified corporate personhood in his society.

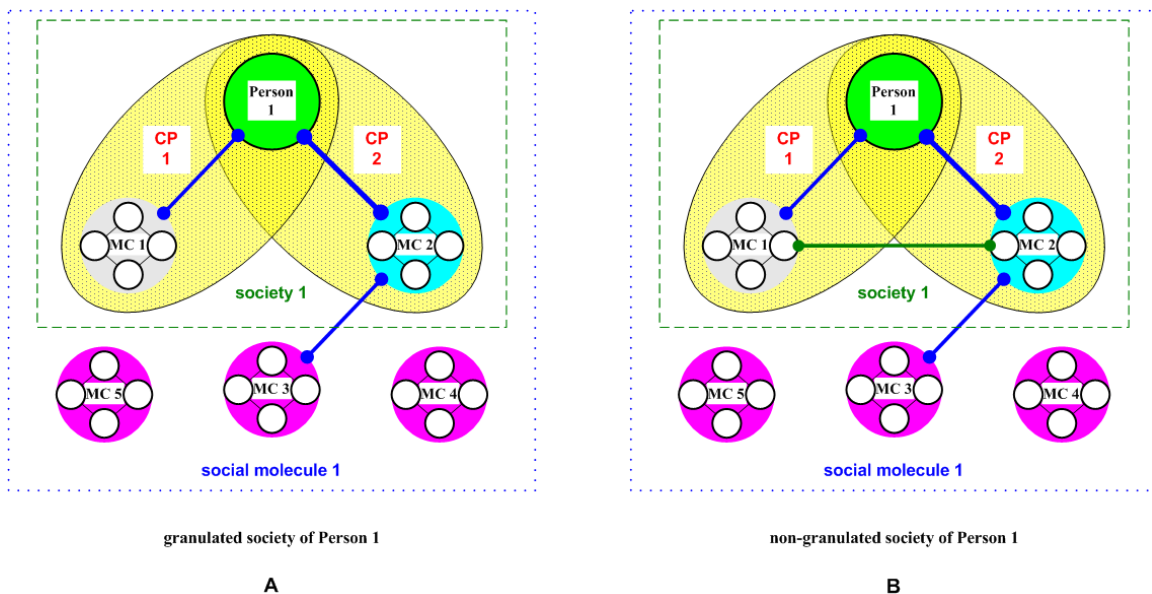


Figure 2.8: Granulated and non-granulated mini-society of Person 1. A: The mini-society is granulated because other persons in it belonging to mini-Communities 1 and 2 share no bonding relationships with each other except at Person 1. B: The mini-society is non-granulated because bonding relationships exist between other persons in mini-Communities 1 and 2 in addition to the bonding relationships with Person 1.

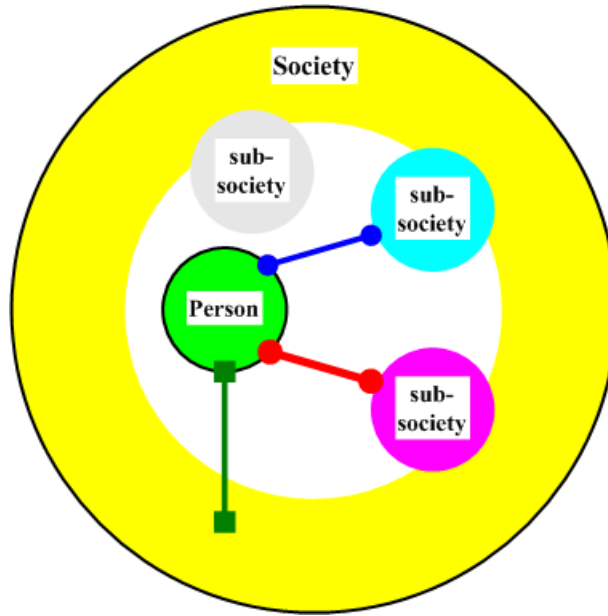


Figure 2.9: A granulated Society. The green connection denotes an abstract social bond between one person and the abstract (mathematical) entity said to be his Society. The blue connection denotes a bonding functional between the person and a sub-society within the Society. The red connection denotes an anti-bonding relationship between the person and a different sub-society within the Society. The person is *abstractly* united in association with all the sub-societies depicted because he and they are all regarded as common members of one and the same universal Society. However, within this Society there is granulated socialization and disunity among divers members.

Figures 2.8 illustrate two cases in point. In figure 2.8A mini-Communities 1 and 2 are connected with Person 1 through bonding relationships and, likewise, within each of these mini-Communities the local members are bonded with each other. However, between mini-Community 1 and mini-Community 2 there are no common bonds other than an indirect one through Person 1, who is the intersect of the sets of members of these mini-Communities. MC1 and MC2 both belong to the personal society of Person 1, but the two mini-Communities do not reciprocally form a single Community with respect to each other. It might even be possible that between the two mini-Communities there exist anti-bonding relationships among members of the two groups. Such a social situation, in which the two corporate persons (CP1 and CP2) are disjoint or anti-bonded except at Person 1, forms a *granulated mini-society* of Person 1. In contrast, figure 2.8B illustrates the case where bonding relationships also exist between MC1 and MC2 independently of Person 1 and in which the members of MC1 and MC2 regard their two groups as comprising a single corporate person. This case is a *non-granulated* or *united mini-society* because for all the people involved there is an identifiable corporate person in which they are all members. If this condition holds among all of the persons in Person 1's mini-society the population as a whole is said to comprise a Society. A **Society** is *the Object understood by a higher concept of the divers individual concepts of society held by an association of people that retains what is contained in common among their divers concepts of society*. Mathematically, the effect of a Society is manifested by a mathematical construct of field bonds.

A Society can be either granulated or non-granulated. Figure 2.9 depicts an example of a granulated Society. Here the depicted Person and every other person implied by the sub-societies and ring of general Society each regard themselves and all the other people as being in some way or another common members of the general Society. However, and however incongruent the idea might be with this general notion of a united Society, its divers members do not all have direct

bonding relationships with each other and, indeed, among some subpopulations there might even exist anti-bonding relationships. The absence of unity of corporate personhood in a Society usually hinders the achievement or maintenance of corporate equilibrium in the body-politic of the general association. This situation is called a **granulated Society**. In general, **granulated socialization** means *a complex social environment in which a person regards himself and all of his associates as being members of an abstract universal Society, but one which he further subdivides into logical sub-societies in which the other people are classified by the person as belonging to one or more of these sub-societies*. It is not necessary that every person understand the universal Society in terms of the same logical subdivisions. It is sufficient if identifiable logical divisions exist within the general Society.

Granulated socialization has effects on the behavior of and social transactions carried out by members of an association. Many of these effects are not due to direct social interactions between specific individuals but, rather, are due to indirect field effects as, e.g., personal interaction A:B later affects personal interaction B:C, which in turn later affects personal interaction C:D. A useful simile is to liken the indirect field effect of person A on person D by regarding A:B, B:C and C:D as "social gears" linking persons A and D such that remote actions taken by A lead to local actions that have an effect on D. Such indirect local effects due to non-local causes is the logical essence of the mathematical concept of a field. The general phenomenon can be called **social leverage** and, analogously to mechanical leverage, the effect can be one of "social-mechanical advantage" or "social-mechanical disadvantage." Figure 2.10 illustrates this analogy as a way to think about social field effects. It is mostly true that, as former U.S. Speaker of the House Tip O'Neil used to say, "All politics is local," but it is also true that "some politics is non-local." When it is, this is an example of a social field effect and the social leverage that local social interactions have on distant social interactions between entirely different people.

To bring this qualitative idea into somewhat sharper focus, let us add some context to figure 2.9 for specificity. Suppose the Person depicted in the figure works for a company (denoted by the yellow ring as the abstract universal Society) and is a member of a union (denoted by the blue sub-society). Let us further assume that the pink-colored sub-society denotes people who are "members of the management" of the company and that relationships between the union members and "management members" are hostile. Finally, suppose the gray-colored sub-society denotes non-union/non-management workers in the company who have maintained a "neutral" position concerning all contentions that might exist between the union and the management.

The company is a Society inasmuch as the people who work together under this common label regard the company as an entity to which they all "belong" and would defend it against, for example, a competitive threat by another company. But within this granulated Society there are factions, some of which stand in a mutual social relationship of sometimes-hostile competition. The specific social state between different factions can be very sensitive to field effects.

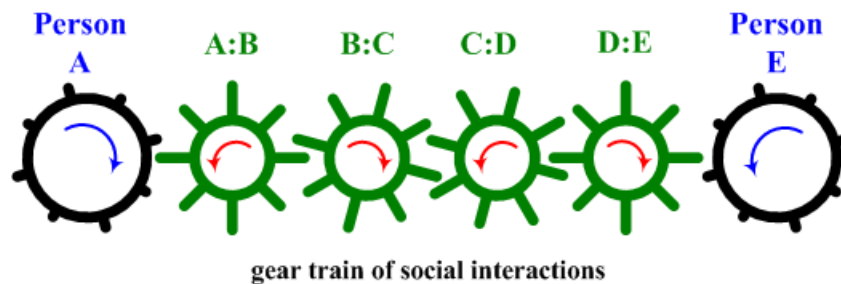


Figure 2.10: Socio-mechanical analogy of social field effects. Interaction between persons A and B exert a non-local field effect on the interaction between persons D and E. Remote person A affects local person E.

For instance, let us suppose that the individual denoted as the "person" in figure 2.9 comes to work in the morning in a generally contented and tranquil mood. He is satisfied – or, at least, not unsatisfied – with his external situation at the company and plans on spending "just another normal day at work." Now suppose that sometime that morning a near-violent argument happens between one of his union brothers and some particular shop floor manager. In an interval of time so short that the event can be breathtaking, the other union members "side" with their aggrieved union brother (and they have a Duty to do so because of the social compact of their union) and the other managers side with the aggrieved shop floor manager (and it is *their* Duty to do so because of their own social compact in place among the management staff). Before lunch time the entire company might be in a state of shutdown because a wildcat strike ensues. This is a somewhat extreme but not particularly uncommon example of a social field effect phenomenon that has been socially leveraged by field effect bonding and anti-bonding. Two *corporate* persons ("union" and "management") have been stimulated into action in a state-of-nature confrontation while a third corporate person (the "non-aligned" workers) stands to one side and tries not to become involved in the confrontation. Their chances of doing so, however, are poor because general and competitive social field effects are in play within the overall Society. Many of these will pressure the third corporate person to splinter itself as its members come under social pressure to give up their neutrality and take sides in the dispute. The Society overall comes under imminent threat of both disintegration and state-of-nature predation by outside competitors.

Almost all social field effect phenomena having significant consequences for a Society arise out of individuals' conceptual and practical understandings of their personal commitments to Duties under Obligations of various types. There are three general types of Duties that are or can be involved: Duties to oneself with regard to one's own person; Duties to oneself with regard to one's situation; and Duties to others with regard to one's own situation. The third class of Duties is the class underlying all social contracts, but all such Duties are themselves grounded in the first two types [Wells (2012)]. This means that all social situations such as illustrated in the example just given are situations in which tenets of individuals' private and personal deontological moral codes (in their individual manifolds of practical rules) have been provoked by circumstances into expression. Quite simply put, *all situations such as the example illustrates are exhibitions of moral conflicts* between the bodies-politic of corporate persons. In all such cases, no one corporate person or mini-Society can claim "the moral high ground" – that notion is an utter fiction completely lacking objective validity – because *no person or group of persons can impose an Obligation on another person*. This is a fundamental fact of the human nature of deontological morality, as I discussed at length in *The Idea of the Social Contract*.

§ 7. The Significance of Mini-Community and Granulated Society for Education

The phenomenon of granulated socialization is always at or very near the center of the root of internecine competitive conflicts that occur within a Society. Furthermore, the *Existenz* of granulated Societies is by far the most empirically frequent case for human social organization. The breeding ground of granulated socialization is the phenomenon of mini-Community in human social structures. For this reason, it is always a grave error of omission to ignore this factor in a social-natural science. It affects all social institutions, one of which is a Community's or nation's institution of education. It is, therefore, a recurring factor throughout the rest of this treatise.

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