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Metafantasia: The Possibilities of Science Fiction[1]

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Let us demonstrate three possible types of SF by way of three fictional examples. Our first example is a work about a system for preventing earthquakes. It has recently been discovered that spraying water under high pressure into geological strata that lie under immense tectonic stress induces a series of harmless, microseismic movements in the earth. As the water penetrates the fissures of the deep-lying strata, it acts like lubricating oil, and helps the soil layers to slide away from one another. This preventive spraying facilitates the gradual reduction of tectonic stress, so that the pent-up seismic energies need not be released in the tremendous, destructive earthquakes that accompany the fierce shifts of geological formations. On the basis of this hypothesis, already verified in reality, one might write an SF novel about the successful elimination of the catastrophes that threaten people living in earthquake-prone regions. This is a variation on the theme of "humanity's game with Nature"; our stance concerning it would be unequivocal, since we would not have to re-evaluate or reorient our cultural norms to conclude that the prevention of earthquakes is a good thing and a worthwhile goal to strive for.

Our second work might describe what happens when the use of a certain chemical that separates the sensations of pleasure from sex spreads throughout the Earth. One possible rational motive for the use of the drug might be the desire to check the population explosion. Or there might also be a hostile motive: the drug might be a secret weapon in a covert military operation. It is not difficult to imagine the consequences. Since no one wants to indulge in sex of her or his own free will any more—after all, it is simply hard physical labor, totally devoid of pleasure—humanity is threatened with extinction. To prevent this disastrous eventuality, governments are forced to experiment with strategies for saving the human race. First, they try propaganda. But quickly they are forced to realize that the very same drawings, photographs, and movies whose distribution they had been obliged to prohibit not so long before no longer interest anyone at all now; on the contrary, they produce general disgust, since they are no more arousing for either sex than a picture of a washtub is for a washerwoman, or a photo of an axe for an exhausted woodcutter.

These seductive devices fail for a very simple reason—once the act itself has lost its attraction, no amount of hinting, alluding, and suggesting can create a desire for it. Since the promotion of sex proves ineffective, governments resort to more pragmatic methods. They mobilize material incentives: rewards, premiums, decorations, extraordinary honors, social benefits, privileges, and magnificent titles with honorary diplomas. In the meantime, several industries go under: the cosmetics industry, part of the publishing industry (after all, who will read erotic literature when all it calls to mind is drudgery?), the film industry, as well as advertising—since they have been based on sex. The clothing and underwear industries are faced with a crisis greater than they have ever faced. Women's breasts now only remind people that humans are mammals; legs,

that people can walk; and a painted mouth seems as bizarre as if someone had decided to glue an artificial ear on his bald head.

Naturally, researchers work feverishly to find an antidote that will neutralize the catastrophic effect of the drug; but in vain. As the new state of affairs stabilizes, new models of beauty emerge, models that provide security against every kind of erotic danger (for it can happen that one resigns him- or herself to procreating to gain a medal or a title, only to find the potential partner repelled by the invitation; others may try to shirk their social responsibilities by making the illusion appear to be the reality, and thus supervisory committees are established to verify that everything is taking place as the social good demands; men declare that they deserve greater rewards because they have to put more work into it, while women protest that this is out of the question, and so forth). Under these conditions, perfect security lies in the companionship of someone visibly incapable of the sexual act (and so, not likely ever to suddenly demand it). Gray hair, potbellies, wheelchairs, and similar "anti-sexual" characteristics are accorded universal interest and respect as symbols of erotically disarmed paralysis.

A work of this sort would posit a certain anthropological hypothesis about the role of sexuality in the totality of human behavior.

The third example is of an entirely different order. It is a popular scientific book published in the mid-21st century detailing the history of cosmological views, including the most recent theories. The author, naturally, begins at the beginning: long, long ago, humans, basing their thought on their relationships to their own products, conceived of the universe as an intentional object, like a pot or a table; there was a Someone who had created it, intentionally, and by design. The battle of ideas went on for centuries, until science appeared to establish that natural phenomena are not intentional objects. Thus, the trees, stones, atoms, clouds, oceans, rivers, and beyond them the planets, the Sun, the stars, and the nebulae that constituted the objects of scientific inquiry were products of the natural processes of a heterogeneous evolution not conceived or designed by a personal being. Science discovered a series of objective regularities in these phenomena, and named them the fundamental laws of nature. Physics and astrophysics led the field, and the other branches of science queued up behind them.

But by the mid-20th century, theoretical views in the scientific world had come into grave conflict with one another. On the one hand, physics, planetology, astronomy, and evolutionary biology preached that the birth and development of life, which is crowned by the appearance of intelligent beings, is, in cosmic terms, normal, typical, average, and therefore a phenomenon belonging to the order of things. On the other hand, despite years of serious effort not a single trace had been discovered of any great, stellar-scale constructs that might have signalled the existence of a highly developed civilization, either in our own galaxy, or elsewhere. The persistence of this intolerable situation—produced by the contradiction between scientific expectations and the empirical data that had actually been gathered—swept the natural sciences, primarily biology and astronomy, into an ever-deepening crisis, until at last the inevitable ensued, and science resigned itself to the painful labor of restructuring its theoretical foundations.

Since we are here gathering in a nutshell something that itself amounts to a summary of an entire epoch's work (i.e., in our proposed popular scientific book) we cannot delve into the biographies of the learned people who set human thinking, including cosmogony and cosmology, on a completely new track. The

first tentative hypotheses proposed by certain pioneering scientists were given the worst possible reception by the community of inquirers. But when the evidence of the "negative facts" became incontestable (i.e., the total absence of signs of "astrotechnical" constructs or traces), an extraordinary reversal occurred. Through their common efforts, scientists shaped new approaches and new models of the cosmos one after another, and the broad outlines of a new image of the universe began to unfold as follows.

Astrophysicists already know today that our Sun and its planetary system belong to the so-called second stellar generation; the Solar System is approximately five billion years old, while our whole Galaxy is close to ten billion years old. Clearly then, the first generation of stars came into being before the formation of our Solar System, in the remote mists of the cosmic past. With them came the planets, and on these planets life emerged. This was the first stage in the history of cosmic civilizations. When they attained a sufficiently high degree of scientific development they applied astrotechnics in an ever wider sphere of activity. For creatures at lower levels of development, the laws of nature are immutable attributes of being, but for those who have reached the higher planes of cognition, the laws of nature are no longer absolutely binding. Certain changes can be affected on them; the constant of gravitation, for example, can be reshaped, as well as the constants of electrical charges, the constant of maximum velocity, and so on. Since enormous distances separate the most developed civilizations from one another—distances of several hundred million light years' magnitude, at the very least—they do not communicate with each other directly. They only infer the existence of their neighbors from certain observed facts: from certain gradual, noticeable changes in the laws of nature. Some of these transformations may benefit a given civilization, others may not. Therefore, each civilization approves and augments the former, and obstructs the latter, through its own astrotechnical activities. Thus begins the cosmogonic game played by the most developed civilizations of the universe.

This cosmogonic game is not military in nature, since the partners do not use weapons and do not aim to annihilate one another. Rather, it is a cooperation justified by considerations beyond ethics: the annihilation or conquest of the partners would benefit no one, while by cooperating the partners help to sustain the trend of cosmogonic transformation most beneficial to everyone. Nor is the game a form of interstellar dialogue. Civilizations so advanced have nothing to say to one another—the less so when we consider that a dialogue in which the reply is separated from the question by a billion years is utterly irrelevant. Intelligent discussions might be held about which natural laws should be transformed and in what manner, but the time spent waiting for an answer would be too long for any effective action. The situation might be described like this: a certain ship, battling a storm, is so large that the machinist and navigator cannot coordinate their actions through a dialogue, since they must act too quickly for orders or replies. Every message is thus hopelessly late in relation to the actions that have already been initiated; as they arrive, the messages always refer to something no longer relevant. Similarly, communication in the universe occurs on the level of action, not in articulated messages. The civilizations do not fight, since it would do them no good, nor do they converse, since that would be meaningless. Gradually, over millions of years, their cooperation has become harmonized and synchronized. In the beginning, surely, confusions did arise when they misunderstood one another's creative work; traces of this can still be observed by astronomers. But that time is long past. Now, the Exalted Partners

do their work wrapped in energetic silence, and realize their plans of cosmic stabilization or transformation so well that hardly any part of the primal universe that existed 7-8 billion years ago remains untouched. In the course of time, they transformed the entire universe in accordance with the strategy of the Exalted Civilizations, and everything within it—stars, dustclouds, galaxies, nebulae, as well as the laws directing them—originated in the game of this coalition. The evolution of matter is governed by Collective Reason, which is embodied in the multitude of the Highest Civilizations.

At first, this new cosmogony was roundly attacked, but it also gained adherents when it became clear that its hypotheses allow for deductions that agree with observed phenomena. For instance, the theory explains the expansion of the universe, since an expanding universe would be the most comfortable home for all the Leading Civilizations participating in the game at the same time. As soon as life appears on the planets of second-generation suns, followed by the flowering of intelligent societies, the psychozoic density (the frequency of the presence of intelligent beings) of the cosmos is altered as more and more civilizations occupy each unit of space. Should neighboring civilizations reach agreements, they might form coalitions whose activities could disturb the progress of cosmic processes. Therefore, in order to keep the psychozoic density of the cosmos constant, the Ancient Civilizations effected the continuous expansion of the universe. This at once explains why terrestrial astronomers have not been able to discover a single civilization near the Sun: the distances between civilizations *must* remain great. Pulsars, those great, pulsing founts of radiation, are instruments used to synchronize and keep in phase the activity of still more gigantic, but imperceptible, systems determining the measurable aspects of space. And quasars, each of which is a cosmic furnace so mighty that its capacity exceeds the total radiation capacity of the Milky Way, are devices for radiating energy into space; or rather, this is how they functioned several billions of years ago, since, due to their great distance from the Earth, we see them in their distant past, when the Exalted Partners had just begun their cooperation.

The new cosmology also explains the fact, known since the 1960s, that mathematics takes many forms, and the form in which it developed historically on Earth is only one of many possible varieties. The foundations of the universe were changed and reconstructed precisely through these different mathematics. The multitude of mathematical systems is an image of the multitude of possibilities of cosmogonic creation available at the dawn of cosmic history.

We will not dwell further on this new cosmogony of the 21st century, which considered the universe to be the result of intentional actions; nor will we describe at length the new philosophical syntheses based on its models. In brief, these posited a dialectical triad composed of a thesis: the universe created by God; its antithesis: the universe as a non-intentional object; and their synthesis: the empirical interrelation of the two previous models, which, developed further, does away with transcendence and replaces it will metagalactically plural Reason. Let us instead point out the relations between the three variations of SF we have cited above and the canons of literature.

The first work—on preventing earthquakes—might be best treated as an adventure novel or a technological "project" novel. What could be easier than to populate its setting with conventional literary characters. The second text—a hypothesis about human nature—might be written in a number of modes, from pseudo-realistic to extravagantly grotesque. But whatever mode the author chooses, the central protagonists, whose personal histories are the individual embodiments of general phenomena, will conform to the canons of literature.

The third theme, however, does not seem conducive to the same kind of literary treatment—at least if the traditional narrative structures are upheld, complete with the characterization of heroes bound to specific situations. The intellectual adventures of the new cosmogony's creators will not be contained by traditional naturalistic or realistic narrative structures. We need not know about these scientists' wives, children, and acquaintances any more than about Newton's or Planck's social and marital lives. Here we cannot simply present a social-cultural background against which purely personal events take place—the concept requires the chronicle of an idea, not of the vicissitudes of a few individuals. Of course, with sufficient obstinacy, we could apply the traditional solutions to this situation as well; but then all higher abstractions would be systematically detached from the minute human gestures, reactions, recognitions, personal conflicts, separations, etc., that make up the ordinary substance of the novel. Narrative structures of literature are incapable of synthesizing the "microscopic" elements of the cosmogonic scientists' everyday lives with the general hypotheses of their new cosmogony. To attempt such a synthesis would lead to a fractured work, with literary fragments, on the one hand, and discursive passages summarizing the new cosmogonic views, on the other. What is needed is an entirely new narrative structure, one that might be modelled on historiography, the biographies of scientists, or perhaps a collage of excerpts from scientific texts, press clippings, the addresses of Nobel laureates, or other facsimiles.

We are in no way suggesting that SF should renounce altogether its traditional structures of writing, in order to substitute as yet entirely unproven ones. Our example has a different purpose: it seeks to demonstrate that not all dramas and adventures of the human spirit in search of knowledge can be adequately represented through the traditional canons of the novel or epic narrative. In other words, the potential treasury of the narrative structures of SF has not yet been satisfactorily exploited.

In the course of writing this book, we suppressed the temptation to elaborate a metatheory of literary activity that would have dealt with the central structures of literature. Had we attempted it, we would have shattered the already too confining framework of this monograph. Our task here is not to elaborate a metatheory of SF, or even of literature in general, but to determine the extent of the field of paradigms, to define the boundaries that can contain the fruits of every possible creative production. Any metatheory of creative work must embrace every kind of cultural and intellectual effort that produces articulated and systematic products, such as music, novels, poems, buildings, sculptures, and philosophical systems. Such an inclusive theory cannot as yet be elaborated, but the time is approaching, when it may be fully articulated. Its portents are visible in many fields. The philosophy of science, for example, strives for a metaperspective on the structure of scientific theories. There are analogous attempts in mathematics to define all those structures which are invariant elements of every branch of pure mathematics. Similar researches are being pursued in other fields, such as linguistics and anthropology. It would be most desirable, therefore, to extrapolate the system of universal constants shared by all researches operating with the technical term "structure." But this term does not mean the same thing to the linguist, the mathematician, the anthropologist, and the literary scholar—indeed, the latter two cannot even define it unambiguously. Now that structuralism has become a fashionable movement, its practice is full of abuses. But these should not be permitted to blind us to the generalizations—even though distant and difficult—to which this method can lead us. For we suspect—although this has not yet been expressed as

a definite hypothesis—that every kind of creative activity whose goal is constructive and whose starting point is an ensemble of elements and the rules for their treatment has the characteristics of a process unfolding in a theoretically closed configurational space, and that the topological qualities of this space are determined equally by the multitude of potential objects to be constructed and the unsurpassable limits of the space.

Structuralism, as a word and a method, had hardly been born when, in 1945, G. Evelyn Hutchinson—reviewing the anthropologist A.L. Kroeber's book, *Configurations of Culture Growth*, in the third issue of *American Scientist*—proposed a hypothesis worth recalling. In his book, Kroeber compares the various periods of world history that were made memorable by extraordinary developments in philosophy, science, philology, sculpture, painting, drama, music, etc. In each of these cultural activities we can distinguish the embryonic and initial stages, when the parameters of all potentially realizable constructs that can be derived from the culturally accepted paradigms of artistic creation are already set—as yet, without anyone's being aware of it. (Where such newly accepted models originate is a different question altogether. But it is no more necessary for us to answer this question than for a biologist concerned with the evolution of organisms to answer the question: how did life originate on earth?)

In this early stage of the model, the whole stock of structures that can be derived from it is markedly indeterminate; in the course of their creative work, succeeding generations gradually determine the field of possible configurations, until it is completely delimited and exploited. The creative work of every historical period has developed within such limits or boundaries. Indirect evidence of this is provided by the following phenomena. Since the individuals more talented than the norm, whom we call geniuses, are the results of the rare intermingling of genotypes (the "winning numbers" in the "chromosome lottery"), and since these exceptional coincidences of genotypes are determined by the statistical regularities guiding population genetics, we might expect geniuses to be distributed uniformly along the axis of historical time. But in reality, this is not the case: the distribution of highly talented individuals is definitely not uniform and fortuitous. Hutchinson therefore constructs the following hypothesis based on Kroeber's insight: the chances of becoming an outstanding creator under different historical circumstances are not uniform, since an individual can only create within the field of paradigmatic structures that she or he finds prepared for him or her when she or he comes into the world. Those who are born in an early phase of the exploitation of a given "family of structures" face an enormously broad and difficult task, since the mass of virtual possibilities has not yet been defined. Those born in this state, writes Hutchinson, may perhaps gain the recognition of a small circle of enlightened cognoscenti, but they will not become as well known, or be able to found schools or movements quite as easily, as those who begin their work in the stage of *maximal* development of a given creative tradition. Thus, the sooner a genius is born within an artistic tradition, the more he or she can create; but if she or he arrives too early, he or she may go unnoticed, and, lacking "social reinforcement," may remain merely an unknown precursor. The person who arrives at the peak-stage of a particular tradition can create a great deal, backed by strong social reinforcement. The artist who appears when most of the possibilities have already been exploited can, at best, become an original representative of a decaying tradition. Thus, the ascents and declines in cultural production—which are evident only in retrospect—are actually movements first toward, then away from the maximum of a certain curve. As a whole, this curve—which expresses the rate at which original productions derived from the embryonic stage proliferate—is additive,

and is therefore only minimally dependent on individual successes. Thus, we do not consider 1616 the final date of Elizabethan drama as a whole, but as the year of Shakespeare's death.

Hutchinson attempts to formalize this process of slow growth, quickening, peaking, and decay, in a logistical curve used in the study of demographic dynamics. The curve resembles a letter S, the center of which is characterized by exponential inclines, its beginning and ending by slight inclines (the Verhulst-Pearl curve). I will not cite the math with which Hutchinson supports his hypothesis, since it is, in any case, far too simple to grasp the phenomenon—as Hutchinson is well aware. The introduction of only two parameters—the quantity of still exploitable "degrees of freedom" and the quantity of already exploited degrees at time T, when a certain creator X appears in the world—cannot be adequate. The mass statistical (stochastic) nature of the process would certainly require a greater number of variables. But the greatest problem with any attempt to quantify creative phenomena is that, in order to verify the effectiveness of the formal apparatus, the works of certain artistic periods must be enumerated as elemental facts, a process that would unequivocally classify them in terms of their originality, and coincidentally, in terms of their relative value—a hopeless task.

But we do have at our disposal a unique creative territory where the researcher is spared the problems caused by the subjective nature of any evaluation of cultural products, since, in this case, the evaluation has already been done for her or him, in an entirely unambiguous and incontestable way: this is the realm of natural development. For every emergent organism—such as the prototypes of "insect," "fish," "reptile," or "mammal"—is generated in a manner equivalent to those structural paradigms within which further evolutionary development "exploited every possible advantage for construction." In other words, the "insect" or "reptile" represents a certain stabilized "tradition" of creation within the field of variables determined by the given system's typology. The evolutionary process inexorably strives to exploit every possible organic combination inherent within the given prototype. (We need not puzzle over the quality of the various consecutive solutions that emerged in this way; evolution performs the evaluation of the product "in our stead," since only the "good" product survives.)

It is worth noting that not all of the prototypes mentioned above have developed an equal, or even a similar, number of variations in the course of their evolution. The structural paradigm of insects, for example, has proved to be an incredibly "fertile creative principle": at least as many species have developed from it as from all the other prototypes combined. Evolution also has its "creative stages," and its own "different schools and traditions." Its first triumphs were the creation of fishes, then it moved on to reptiles, while in our time it is primarily engaged in variations on the "theme" of mammals. Each type has, in its turn, gone through a slow initial stage of specialized differentiation, to arrive at a stage of the maximum richness of possible forms (consider but the variety of evolutionary reptile-modifications), and finally to end up in an "age of epigonism" or repetitive fulfillment. Such a correspondence of natural and cultural creativity can hardly be an accident. The hypothesis immediately offers itself, that there are, still unknown to us, higher regularities that determine the field of potential structures, regularities moreover that operate universally in the case of every type of material-information creation.

Recently, two English scientists, M.A. Ede and J.T. Law, used a computer to construct models of the embryonic formation process of certain organs, specifically the extremities. They fed the machine five series of data: four had to

do with the behavior of embryonic cells, the fifth provided a model of the gene-mechanism guiding their growth. In the course of its work, the computer produced only such models of extremity-structures as had actually come about in the evolution of the different species of vertebrates, from fish to human. A slightly retrograde modification of the gene-program resulted in the transformation of the structure of a leg into the structure of a fin. Neither machines nor programs exist for making models of complete organic systems; nonetheless, as the above example shows, we can already observe in experiments how the initial paradigm "determines" the field of possible constructions.

In order to continue the original creation, we must always introduce new elements into the paradigm's system. In literature (which is of greater interest to us here than evolution), there is a fairly universal intuition that every "great," "original" narrative model has already been discovered (and, moreover, quite long ago). But this is only a relative truth. While it is true, with respect to historically known conditions, that the narrative structures have been exhausted, it is equally true that civilization, by creating new problems, also provides new possibilities for literature. Our age, for example, is marked by the decline of conventional structures of ethical judgment all over the planet, since it is now within our power to instrumentally execute the Last Judgment. This fact is lost on the writer who would bring alien visitors to a destroyed Earth and have them deliberate among the ruins about "which side was right." One can speak of one's right, i.e., as representing the correct path, only as long as someone is left behind to evaluate what has happened. It is meaningless to discuss either side's right or wrong when total destruction has become possible; the only argument worth articulating on the verge of the ultimate catastrophe is that the catastrophe must be averted. At that point, truth, in the sense of "good" and "bad," is irrelevant as long as it is not bound up with the only program that has not lost its meaning, namely, the project of preserving humanity. The type of writer referred to above wishes to preserve the traditional standards of judgment of the pre-Atomic Age, but since he or she is writing in a pseudo-realistic style, she or he does not want to bring the Good Lord himself down to the ash-covered Earth—and so sends "aliens" instead, to continue the same argument that led to the cataclysm, on behalf of the no longer existing earthlings. This is a classic example of the helplessness of thought when it is shackled by inadequate narrative structures.

Every culture has codes that delineate the phenomena it considers "normal," and others that "deviate" from these and come into different degrees of conflict with the regulating norms. When phenomena that are predominantly associated with the stock of normal descriptive structures are depicted through discrepant structures, the result is often comic. Indeed, many humorous works owe their existence to this rule of displacement—they are intentionally "erroneous messages," cast in descriptive structures that are normally inappropriate to the phenomena described (for example, the description of a family quarrel in terms of natural phenomena, such as typhoons and volcanic eruptions; or, inversely, anthropomorphizing the volcano or storm). Generally, comic effects are generated when the use of alien descriptive structures does not quite amount to a fundamental transgression of the given culture's decrees and prohibitions. Still, the more the described phenomenon's structure is subject to codification (social ritualization), the stronger the effect—thus, a chase scene presented on speeded-up film is not as comic as a speeded-up funeral.

The simplest procedure, as we know, is simple inversion. What could be simpler than to achieve new effects by inverting the conventional structures petrified by tradition: this is the principle behind Mark Twain's "anti-stories." It would be easy to construct a theory of literature if only the descriptive language

did not damage the reality depicted in the work, but simply represented it in a different mode. The problem is that this is not the case at all. Language, the instrument of description, is also the creator of what it describes. (Language can describe itself, as well, thereby becoming an object, and not only in a linguistic sense; for the language that describes language has a different semantic function than the language it describes.)

As cultural prohibitions weaken, it becomes impossible for literature to confront them. An approach that a century ago would have been considered "blasphemous" or immoral now rises to the level of artistic innovation. To cite the most readily available example: dispassionate descriptions of things that customarily are not permitted to be presented "coldly." This is the principle behind Kafka's "In the Penal Colony," and this is how modern experimental prose often describes the sexual act. The result is a kind of cultural shock—characteristic of many works by Henry Miller (*Tropic of Cancer, Sexus, Nexus, Plexus*), in which the author describes his characters with great precision as though they were machines, naming their bodily parts by their functions, and intentionally ignoring all relevant social-erotic taboos. But in such situations we can at least distinguish between the structure of the description and the immanent structure of the object described. This becomes impossible when the reader has no knowledge whatsoever of the object and has none of the normative guidelines fixed in her or his memory for how the object "should be" described. These "wobbles" of perception cannot be enclosed within any strictly conceived semantic theory, because they are problems of practice, in which the receiver of the information is an inseparable part of the informational system. (For us, living in the present, the "Man on the Moon" can already be a specific person, or a specific historical event, whereas for people living only a few years in the past he was a purely fantastic creature, whose fictive nature deprived him of the solid objective qualities unique to intersubjectively demonstrable facts.)

The principle of "transposing and displacing" descriptive structures in relation to their objects can produce valuable results, both aesthetically and epistemologically. But when this "mixup" is the result of a writer's ineptness and ignorance, the narrative clings to any available structure like some fragile vine, and the effort can only end in failure. This sort of indifference usually reduces anthropological problems to stereotypical adventure novels, social phenomena to psychological and personal phenomena (e.g., the conflict of two cultures played out as if it were the conflict of two individuals), and the alternations of cultural codes and norms to primitive reorientations on the order of "Aha! so this is how it should be done!" By the same token, *escape* from realistic dilemmas into *illusory* solutions is the general rule (for example, the resolution of the conflict between socialism and capitalism through the arrival on Earth of "highly developed cosmic beings" who compel humans to live in peace, etc.).

The crisis of art in our age stems from the general disappearance of normative rules of action, which in turn results from the erosion of a view of culture as sacred and unquestionable because its commandments form a more ancient code than do civil laws. Whether one could break cultural rules if they became inconvenient was a question that one simply could not pose publicly in former times. It was empiricism that proved to be culture's Trojan Horse, since its principal criteria are those of utility, which naturally raise questions of comfort and convenience. For empiricism, the only inviolable barrier is the totality of the attributes of nature it calls the body of physical laws. Thus, observing the human world from an empirical standpoint necessarily leads to the complete relativization of cultural norms everywhere where they impose "unfounded" imperatives and restraints. Art can never be content with the basic

stock of prohibitions that empiricism respects—merely because it cannot transgress them—for that would reduce art to nothingness. If art were to confine itself to the goals of empirical knowledge, it would begin to resemble empiricism more and more, until it became a faint replica, a shadow of science.

Art—and specifically literature—had in its province structures inherited from a venerable past governed by the untouchable norms of religious doctrines and myths. Literature has all but completely exhausted these models, while it has not been enriched by new ones, for the sources of such structures have dried up. It is irrelevant whether they dried up when their creative power was naturally exhausted, or whether the invasion of technogenic pragmatism had dammed them before they could reach maximum potential. For even if such latent, historically untested meaning-structures might still be "inventable" in theory, they would be of no use for either humanity or art. A structure of significations that had never shone with the light of sacred solemnity, and had never been treated with the respect, fear, and love with which humans react to the presumed presence of the transcendental secret, would have no value for art.

The collapse of every kind of taboo created a freedom so vast that literature quickly began to feel acutely uncomfortable. From there on, its only forum of appeal is culture, in a necessarily non-sacred sense. Literature can still operate with the model-structures generated by this secular culture. But the sense that all the actual, synchronically functioning structures of the cultural field are unsatisfactory has led to hybridizing techniques, with combinations of extremely divergent structures and their superimposition over one another. For example: the deterministic structure of myth alloyed with the indeterminate structure of reality, as in Mann's *Doktor Faustus*, Joyce's *Ulysses*, or Frisch's *Homo Faber*. The principle of such works is allusion. The writer must arrange his ostensibly realistic material, drawn from the fund of common experiences, in such a way that its resemblances to the structure of some venerable myth (Faust, Odysseus, Oedipus) is evident to the reader. The reference to myth not only serves to give a lofty sanctification to things that would ordinarily be meaningless, however. Myth can also be parodized, treated iconoclastically, or even forcibly demolished. In *Lolita*, Nabokov discredits the myths of the innocence and angelic purity of adolescent girls, for in the novel it is the young girl who seduces the would-be ravisher, not he who defiles her. Elsewhere, as in Nabokov's most recent novel (*Ada, or Ardor*) the author exploits the cultural arsenal of prohibitions against incest in a "ludic" mode, by extending them to other relations parodistically superimposed over one another: between blood relations of a certain family, between the signs of the code invented by the incestuous lovers, between the "aristocracy" and the "plebeians." Even empirical truth contradicts the postulates of the incest-taboo, because, as it turns out, due to the sterility of incestuous relationship, "nothing would have come of it anyway."

The hallmark of such creative strategies is their authors' constant search for ever more emphatically expressed resistance. As far as creative motivation is concerned, this situation differs radically from previous historical situations, for the artist who believed in the uniqueness of the norms guiding and regulating his creative activity naturally did not consider it her or his primary responsibility to attack them. These norms were "programmed" into him or her, having been perfectly internalized intellectually and emotionally, and she or he obeyed them with grace. As a consequence, originality—the personal irreproducibility of the work—manifested itself above all in the form, since the lofty canons of religious-cultural faith did not prescribe down to the last atom what forms works of art were to take.

This "search for resistance"—the initially clandestine erosion of existing norms—developed gradually in art. Historically, it predates the advent of technical civilization, since *Don Quixote* already introduces the (otherwise quite ambivalent) collision of the "myth of chivalry" with a prosaic, non-mythic reality. But as more and more norms disappear from social praxis, literature faces ever-growing difficulties. Its predicament is beginning to resemble that of a child who has discovered that his incredibly understanding parents will let him break with impunity all his toys, indeed everything in the house. The artist cannot create specific prohibitions for himself or herself in order to attack them later in her or his work; the prohibitions must be real, and hence, independent of the writer's choices. And since the relativization of cultural norms has not so far been able to disturb the given characteristics of human biology, that is where writers today seek the still perceptible points of resistance—which is why literature is preoccupied with the theme of sex. But such tactics are short-lived, an accelerating escalation sets in, and the "law of diminishing returns" goes into effect. A cultural taboo is too fundamental to be a pliable barrier; once it has collapsed, it can no longer serve as a wall for wall-shattering rams to knock down, piece by piece. Thus the removal of the administrative, and not culturally generated, censorship barriers has produced such a lightning-fast "pansexualization" of literature that an amusing competition has begun in the description of the most obscene scenes.

Writers require the resistance of matter as they require air. In literature it is particularly meaningless to storm gates that are standing wide open. When the solid foundations of the cultural norms began to crack, then crumble, literature tried to establish for itself a special autarchy and self-sufficiency, but this could never be complete. Through its aesthetic means, its concrete works, literature attempts to prove what is both logically and empirically unprovable. This is the source of those polyvalent and ambiguous structures that are susceptible to divergent interpretations. Kafka's *The Castle*, for example, can be read as a caricature of transcendence, a Heaven maliciously dragged down to Earth and mocked, or in precisely the opposite way, as the only image of transcendence accessible to a fallen humanity. In the first instance, the revelation is compromised, in the second, its earthly interpretation. Works like this do not expose those main junctures that could reveal their unambiguous ontological meanings; and the constant uncertainty this produces is the structural equivalent of the existential secret. The secret is neither explained nor given a secondary meaning. It simply remains—not merely as an enigmatic reference, but vividly displayed as a tangible presence, created by the palpable, irreducible indeterminacy of the work's own structure. This "rock-solidity" of the secret produced by the cunning structuration of the work is one possible response to the destruction of cultural norms.

The other possibility is the approach mentioned earlier: superimposition of very different structures, some of which are harmoniously striving toward the same goal, whilst others are in dissonance and headed toward collision. The result is a peculiar feeling of *depth*, since it is not always possible to determine anew which structure is fundamental and which is relative, or rather, which is the "absolute system of relations," and which are the variables whose values must be interpreted with reference to the system's standards. In neither case is the guiding principle of the work arbitrary. Just as a breeder does not act blindly, fortuitously, or chaotically when she or he sets out to develop a superior strain from the original animal or plant prototypes, so a writer also does not act fortuitously when he or she cross-breeds and combines complex narrative structures in new ways. This does not mean that such a writer makes only pragmatic

"improvements." For, as a linguistic system, the literary work is often simultaneously homogeneous and disparate: it can be perfectly coherent on some levels, in certain constitutive structures, while on other levels it may even be internally contradictory. Moreover, it may keep some of its potential structures open—leaving, as it were, a way out for the work to transcend its own sphere, as is done in "The Monkey's Paw," for example. This short story proposes an "appended transaction": we must either accept the existence of the "ghosts," and thus the hypothesis of transcendence, which makes the story a coherent whole, or we discard the hypothesis, and the work dissolves into a series of fortuitous, coincidental events. The acceptance of transcendence is the price one must pay for the work to be coherent.

The approach of the French anti-novel has been a most interesting example of creative exploration. This exploration moved into extremely dangerous territory; for the novelists, instead of "cross-breeding" various kinds of order, reached a point where the paradigmatic forms of order and disorder collided. This is an altogether understandable approach when the author's guiding principle is the attempt to maximize the number of semantic levels in his or her work. For every message loses its clarity when it is damaged, either through collision and intermingling with another message, or because it is caught up in a flood of "pure noise." If we posit that the task of literature is not to ever give a definitive explanation of what it presents, and is therefore to affirm the autonomy of certain enigmas rather than to enter into explanations, then the most enigmatic of possible secrets is a purely random series. Every code that holds a hidden message has some key that will open it and decipher it, except pure chance, which is not a mask that can be ripped away, and thus will always resist every attempt at a definitive understanding. There is an unintentional trap in this situation, however. Every chance situation can be transformed into a nonrandom system if one employs adequate supplementary hypotheses. For instance, one can state that the Scandinavian peninsula resembles the outlines of a seal not because of chance geographical occurrences, but because of intentional actions (i.e., God himself willed it so when He created Heaven and Earth). In accordance with Occam's rule, one can designate any state to be intentional through such extraneous hypotheses, even when there is not a trace of intentionality in them.

The majority of the works of the French anti-novelists are the semantic equivalents of the story of the Emperor's new clothes, in that a certain kind of "semantic nudity"—a lack of intentionality induced by turning on the "noise generator"—is seen by its recipients as "new clothes," or as a new type of literary narrative that is, in its own way, intelligible.

The anti-novelists have employed this generator on many different levels of creative work. Nothing explains the superimposition of the following structure in *The Erasers*: (1) the myth of Oedipus; (2) "time loops"; (3) the detective story. If we must, we can deduce the detective story from the myth, or the time loops from the investigation. But we cannot explain *without contradiction* the meanings of the whole triadic structure, unless we invoke an elaborate edifice of additional tortuous and arbitrary interpretations. In *The Erasers*, the heterogeneous narrative structures were aligned by chance. In another of Robbe-Grillet's works, *La Maison de rendez-vous*, the principle of chance operates in the fragmentation and gradual recombination of the plot, and the method of fragmentation is also random. (Thus, in *The Erasers*, the chance generator operates on the fundamental level, the level of total structure, while in *La Maison de rendez-vous*, it operates on the subordinate ones.)

From the reader's point of view, Kafka's method (endowing the total structure of the work with a multidimensional "indeterminacy") and that of the anti-novelists (depriving the work of clarity of meaning through quasi-accidental interventions to produce obscurity) have similar semantic results. The reader, in the activity of reading, reconstructs the work in a way that explains it, and invests its partially random qualities with order. The only problem is that such works, like the ink-blots of a Rorschach test, have no "true" interpretations. This state of affairs favors the writer, since the broader a work's field of cultural references, the better it defends itself against devaluation. Any work that extends deep roots through its semantic references can serve to integrate the culture in which it originates. But the practical problem remains of convincing the reader to make the necessary interpretative effort, to integrate through hidden cultural references something that appears, at first sight, impossible to integrate, because it is a product of chance. Readers must be persuaded that there is a real need for their efforts, and the author is aided in this by zealous and resourceful critics who become the veritable co-authors of such emphatically indeterminate texts (which is probably why these texts hold such an attraction for many of them).

The difference between the works constituting multistructured sandwiches and the works that represent "noise-damaged" messages is the same as that between the information of an authoritative palimpsest and a pseudo-palimpsest in which the work of monks illustrating a manuscript is interlayered with that of houseflies making their own "corrections." It goes without saying that the use of the "noise generator" as a creative device is not a trick, since cultural consensus approves of chance in the creative process (this fact is self-evident in the fine arts, and can be seen in such extravagant methods as pitching fistfuls of paint at the canvas, or tracking shoe-soles dipped in paint across it, and so forth). It is another matter that these works are essentially mechanisms for the creation of semantic mirages, even when they give an impression of semantic richness; to search for their inherent significance is akin to searching for the objective correlation between the delusions and nightmares of the hallucinating mind. If the organizing principle of the work is chance, it cannot also be intentional at the same time. This means that intentionality is displaced onto another, more inclusive level of the work, since the choice to use chance as a creative technique is itself not a product of chance at all. It is the result of calculation or conscious intention—a calculation sanctioned by game-theory, which tells us that if one player makes a random move, his partners must also resort to a random strategy. And this is where the anti-novel defeats us, because as readers we cannot justify chance strategies of reception, for that would mean the dissolution of articulation. As a result, we are forced to strive for integration, to pretend that the work is a coherent whole.

Another factor in this context is that literature makes general use of the structures of indirect description or allusion. Whenever something is completely known—i.e., when it is fully rooted in a given culture—it can be understood or deduced from a single sign or allusion, and because of this, any given state of affairs can be made vividly present for the "culturally practiced" reader even through the remotest circumstantial reference. This indirect description is a method of structuring a work by "remote control" guidance of the reconstructive efforts of the reader's imagination, not only in space, but also in time. Every description of a situation taken from the repertoire of culturally known situations invokes the repertoire of possible issues appropriate for it, and these issues are what the reader will anticipate. Within the framework of this structured anticipation, she or he will make his or her decisions by following directions

given in the text, even when they are few, or barely present. (For instance, we can speak of blatantly erotic situations, or others which have hidden erotic content held in constant suspension.) Indirect, "remote control" description is dictated either directly by cultural norms (as, for example, the prohibitions against expressly naming and presenting what the culture considers too drastic), or by the author's individual choices and thought. In the latter case the descriptive structures are generally full of gaps; they are either incomplete, or they are dim mirror images of completely different, unnamed, unarticulated, and thus merely intuited, structures. This displacement of description into circumscription can happen gradually, and furthermore, either discontinuously or continuously. To transform circumscription into description, one can either move over into the as yet unnamed, untouched center of the problem by offending cultural prohibitions (by speaking plainly of things that had been previously forbidden, or by introducing obscene words into the vocabulary); or one can go in the opposite direction, one can attach to the culture's generalized structures of reference still other references, whose proper territories are even further from the concrete events.

Because of this systematic refusal to speak plainly, the reader begins to feel unsure whether he or she really understands what the description is concretely about, and this gives rise to the semantic wavering that characterizes the reception of contemporary poetry. (Not all poetry, certainly: there is randomly composed poetry, but we can discern a high level of "systematic indirection" in the finest poems of Grochowiak, for example.) All these approaches have a common origin: as the level of the reception's indeterminacy rises, the reader's own personal determinations begin to waver. In practice, it is often impossible to determine whether a given narrative structure is only very indirect and elliptical, but essentially homogeneous, or one deliberately damaged by "chance noise," or even perforated, softened, and bent by another, discordant structure. Furthermore, since one can also create multilayered structures, even the concrete quality of the described object or situation can be transformed beyond recognition and reshaped from one level of articulation to another. Thus, it is often impossible to determine categorically whether the basic structure of description is an image of *order* or of *chaos*. We cannot always distinguish the consequences of chance intrusions from the planned transformations of a particular creative design.

How do these methods and vocabulary bear upon SF?

In the first place, we consider the primary unsolved problem of SF the lack of a theoretical typology of its paradigmatic structures. Since writers of SF do not even recognize the existence of this problem, the structures they use most frequently are neither aesthetically nor epistemologically adequate for their chosen themes. An example of aesthetic inadequacy is the practice of authors who attempt to write mimetic (pseudorealistic) works, and yet model such phenomena as "contact with another civilization" or an invasion from outer space after the relationship between detective and criminal. (Two aliens in Hal Clement's *The Needle*—a criminal and a detective—"hide" in the bodies of two humans; and the detective, the "symbiont" on the boy who has become his "host," searches for the criminal "concealed" in the body of an unknown man.) This cognitive process results in anti-empirical narrative. In the closed ecological system of Isaac Asimov's story "The Canal Worker,"[2] the director of the planet's sewage system is essential for the life of all. He is unexpendable, yet precisely because of his low social position he is the object of general contempt. The basic structural assumption is obviously anti-empirical. Those who were of low status long ago, such as butlers, maids, or housekeepers, are today

worth their weight in gold—and the relations between the housekeeper and her "masters" have changed radically. Nowadays, the housekeeper is almost the ranking member of the family; she is indulged, her caprices are respected, her whims attended to. Therefore, if we simply extrapolate this transformation of social conditions, we can see that, in Asimov's society, the [canal worker] cannot be a man on whom the life of the whole community depends and still be treated as a pariah.

The choice of narrative structures can often be anti-empirical even in works that otherwise pose interesting problems, such as *Flowers for Algernon*. The structure of such works, reminiscent of the curves of normal distribution (or the inverted letter V), originates with a certain type of tale. In the action of *Flowers for Algernon*, a retarded young man's intelligence at first expands to an extraordinary degree, but no sooner does he experience the joy of intellectual creation, than he regresses back to idiocy with terrible speed. The work is interesting psychologically, but it poses the problem of "intelligence expansion" as a "rise and fall" paradigm—which is not very plausible, precisely because its origin is in fairy tales; but more importantly, it prevents the author from examining the social-cultural dimensions of his hypothesis about the artificial increase of intelligence. He requires his newly intelligent hero's sudden restupefaction for dramatic effect (for this curve of the action presents a personal drama, the tragedy of an individual's fall from the heights of wisdom, arduously and barely achieved, and at the same time it creates the closed structure of events that automatically shapes the whole progress of the action). This extremely simple model would not be adequate to show the consequences of intelligence augmentation for the whole culture; and yet these consequences would be well worth treating. A university professor is a universally respected figure with a high social status, both because it is hard to become a professor (certainly not everyone who wishes to can become one), and because such specialists have a very important role in the culture (they are the ones that pursue creative research, and educate the host of specialists that make up the foundation of civilization). If, however, the augmentation of intelligence permitted anyone to become a university professor, and if this happened to become the easiest and most desirable solution for everyone, then society would have to defend itself against the destructive consequences of the situation. All those who would still be willing to be drivers, sewer-workers, builders or milkmen—in spite of the fact that it is within their power to attain the highest level of creative intelligence—would have to be generously compensated. They would come to be surrounded by the halo of noble renunciation of their innate potential for development for the sake of the community. If such a novel were written as a grotesque, the sewer-worker would be the admired, respected, outstanding personage, the lofty spirit, while the professor would be merely a mediocre little man, a tiny gear in the great mechanism. (There would be, of course, many other consequences of such a "geniusification" process that we cannot consider here. They can be deduced with the proper reasoning. But an arbitrarily chosen closed structure of events, such as the paradigm taken from fairy tales, is certainly not appropriate for the task.)

Thus, SF takes flight from the models and methods of reasoning we have sketched here to the rigid, simplistic structures derived from fairy tales and detective novels. Because of this, the system of narrative structures generally used is muddled, and is inadequate for the futorological thematics of SF. In their choice of narrative structures, most SF writers fail to consider any criteria of empirical adequacy for and the best possible arrangement of the objects and situations they wish to describe. They try to conceal the "dubious origin" of such

structures (the detective novel, romantic stories, fairy tales), which leads to the unintentionally grotesque style characteristic of most SF.

The second problem of SF is the unresolved relationship of the narrative to phenomena that are as yet not associated with appropriate descriptive structures, since they are the first of their kind. Meetings with such unknowns at first leads inexorably to semantic-descriptive paralysis. At such times, the greatest dilemmas that humanity has, over the centuries, conquered in the course of its "natural gnoseological evolution" surface all at once. I am thinking here of the problems of categorizing and articulating new phenomena—and thus of their inclusion in the established schemes of identification and recognition—all the decisions that together give a final definition of what, precisely, a new phenomenon is, what it means, how it can be described, what ethics it implies, and so forth. Judging from the popular output, SF is completely unaware that such problems exist, that they must be considered and consciously and concretely resolved. If the new phenomenon is of a qualitatively different scale—as contact with "aliens" in outer space, for example—it is all but certain that the repertoire of received, ready concepts will not be able to accommodate it without considerable friction. In all likelihood, a cultural, perceptual, and perhaps even a social-ethical revolution will be necessary. Thus, instead of the assimilation of the new, we must imagine the reordering and even the destruction of fundamental concepts, the revaluation of truths that were previously indisputable, and so on. To refer such phenomena to slick, closed, and completely unambiguous structures we must simply consider a flaw. We can learn which structures and methods are the most appropriate from the history of science—by examining, for instance, the vicissitudes of physics, with its whole series of conceptual-categorial revolutions. (In this sense, the completely fantastic, 100% *invented* history of the "new cosmogony" would still be true to reality, at least structurally, since the succeeding conceptual orders were "turned inside out" and reordered either precisely in this way or similarly in each science's actual course of development.)

SF can thus learn from science as well as from other forms of literature, such as experimental prose. But it cannot learn through the kind of passive imitation characteristic of the English new wave of SF. Experimental literature, as we noted, introduces into the creative process different forms of "noise" (the chance generator), and the criteria for selecting structures created in this way are purely aesthetic. SF should add to these another and separate set of criteria for cognitive adequacy. (Some equivalent to "noise"—the significant dispersion of opinions, or the contradiction arising simultaneously from the same sources—arises whenever a particular science confronts a new and unfamiliar phenomenon, and enters the phase of rapid conceptual reorganization. At the same time, this "noise" is never pure nonsense; science has not simply slipped into chaos.) Authors of SF must therefore draw upon the paradigmatics of transformations.

Clearheaded "internal" critics of SF have long been displeased with the genre for its flight from the real problems of civilization. But criticism must deal non only with the text's relations to the external world. It must evaluate not only the structure of the things described, but also the structure of the description itself. The former generally determines the choice of themes, while the latter determines the sum total of the rules governing the treatment of the material—and these rules are not automatically defined by the chosen theme.

SF remains mired in a stage of theoretical self-reflection similar to the aggressive, extreme reductionism of neo-positivism ("every science, from biology to psychology, must be reduced to the language of physics!"). When asked whether such a reduction is practicable or not, the enthusiastic neopositivists

answer with yes, their opponents with no, and that usually puts an end to the argument. The neopositivists, amazingly, have not recognized the simple fact that the reductionist program is based on a fallacy. They wish to posit a logical dichotomy by way of exclusion of the middle, whereas the historical nature of scientific understanding does not allow such a conceptualization. Biology and psychology certainly cannot be deduced from modern physics. At the same time, we cannot be sure that the physics of the future (which cannot, in principle, be reduced to the physics of the present, just as Einstein's model of the universe cannot be reduced to Newton's, nor the indeterminacy of quantum physics to Laplacian determinism) might not create transitional branches that will intersect with corresponding branches of the biology or psychology of the future (general systems theory). For that matter, we might attain the systhesis in yet another way, as the cyberneticists envision it: the systhesis would come about, not on the level of particular sciences, but on the next higher level of abstraction, with the discovery of the constants common to all the branch sciences.

SF is reminiscent of neopositivism's aggressive reductionism in that it acts as if the miserable repertoire of the detective story and the adventure novel were sufficient for structuring any phenomenon in the whole spectrum of the infinite universe, regardless of its time, place, and degree of complexity, and all the situations in which human civilization may ever find itself. Thus SF designates its problems (contact with "aliens," the spirit in the machine, the instrumentalization of values, etc.), but it does not embody them in narrative structures.

In summary, it is clear that among the criticisms levelled against existing SF, the most important is this matter of opportunities systematically squandered. We must deem it a serious flaw of the genre that it has no independent, rational, and normative criticism which is neither destructive nor apologetic and which is committed not only to SF, but also to the more encompassing relations between culture and literature on which the fate of both depends. For this reason, my intention has not been so much to write the definitive monograph on SF, but rather to prepare the outline of a rational, internal critique.

NOTES

1. The preceding essay has been Englished from the Hungarian translation of the concluding chapter of Lem's *Fantastyka y Futurologia* (*SF and Futurology*, 1970) — eds.

2. The translators were not able to track down the original English title of this short story; and our own inquiries have been less than fruitless inasmuch as they have cast doubt on its authorship as well — eds.

RÉSUMÉ

Stanislaw Lem. ***Metafantasia: les possibilités de la science-fiction.*** *— On fera voir trois types possibles de SF au moyen de trois exemples imaginaires.*

1. A partir de certaines recherches en cours, un récit sur un système de soutèrement géologique permettant d'empêcher les tremblements de terre. Un tel récit est

nécessairement sans ambiguité, les normes et valeurs qui en déterminent la dynamique ne sont pas à mettre en cause.

2. Le gadget-thème est ici un produit chimique permettant de séparer la sensation de plaisir de l'activité sexuelle. On peut imaginer diverses raisons pour sa diffusion. Conséquences: effondrement démographique et inquiétude des gouvernements qui essayent divers moyens de propagande "incitatrice," mais en vain. On peut conjecturer sur les crises économiques et morales qui s'ensuivent. De nouveaux canons de la beauté apparaissent déterminés par l'incongruité de toute référence sexuelle désormais. Une certaine conjecture anthropologique s'inscrit dans la conception d'une oeuvre de cette sorte.

3. Un livre de vulgarisation scientifique, dans cent ans, expose en détail les plus "récentes" théories cosmologiques. L'absence totale de quelque signal "astrotechnique" que se soit a engendré une crise et requis la production d'une nouvelle image de l'univers. On suppose qu'une première génération stellaire est apparue dans la galaxie (notre soleil appartient à la seconde) où des civilisations planétaires sont entrées dans un jeu de coopération cosmique, ni action militaire ni échange de messages, pour les raisons de distance et de délais. Les Hautes Civilisations, gouvernées par la raison collective se sont groupées ainsi et ont modifié l'univers. L'hypothèse explique l'expansion de l'univers, les pulsars, les quasars comme des faits artificiels déduits de cette stratégie universelle. La multiplicité des modèles mathématiques de l'univers s'explique par le fait que, justement, de multiples modèles construits y ont été testés et appliqués successivement.

Le récit no. 1 est un récit d'aventure technique; il appelle une rhétorique réaliste. Le second peut être traité selon différents modes: réaliste parodique, satirique, grotesque. Les personnages resteront dans la dépendance des canons littéraires. Le troisième exclut au contraire tout appel aux conventions réalistes et aux micro-structures narratives canoniques. De nouvelles *méthodes ou conventions sont requises qui tiendront des modèles historiographiques, du collage de fragments discursifs et scientifiques hétérogènes. Il est essentiel de voir que certains récits de SF échappent axiomatiquement aux* narrables *préconstruits dans l'histoire littéraire.*

SL passe ensuite en revue certaines hypothèses sur la philosophie des sciences et sur la méthodologie structuraliste. Il fait un parallèle entre la succession des paradigmes scientifiques et la genèse évolutive des espèces vivantes. Là aussi les paradigmes prototypiques déterminent le champ des dérivations possibles. Or, en littérature, il y a cet axiome latent que tous les grands modèles typologiques ont déjà *été découverts. À la réflexion, rien n'est plus douteux. La civilisation en créant des problèmes neufs, crée aussi de nouvelles possibilités du narrable et du fictionnel. On peut spéculer là-dessus à partir de formes de déviance ou de marginalité par rapports au stock des récits canoniques: subventions satiriques et comiques, "anti-stories" à la Twain, narration "désensibilisée" ou froide. De telles transpositions et déplacements peuvent produire des résultats esthétiques et épistémologiques valables. La littérature n'a pas épuisé les anciens modèles mythiques ou religieux et leurs transgressions possibles. La littérature se nourrit d'interdits et de normes. L'effondrement de tout tabou et l'empirisme pur créent une liberté inconfortable. L'art moderne est à la recherche de "résistances" en vue de pouvoir les subvertir ou les parodier. Déjà.,* Don Quichotte *opère la collision de la mystique chevaleresque et de la trivialité réaliste. Les prohibitions et les résistances doivent cependant s'imposer à l'artiste de l'extérieur. Il ne peut se les imposer "gratuitement." La littérature s'efforce de prouver ce qui est logiquement et empiriquement* improbable. *Telle est la source de sa polysémie. Une autre possibilité qui demeure est la superposition de structures hétérogènes entrant en dissonance. Le nouveau-roman français a combiné l'effet de surimposition et celui du dénudement sémantique.* Les Gommes *de Robbe Grillet ou* la Maison de rendez-vous *illustrent bien ces aspects. Lem mesure la relation écriture lecture qui se détermine dans ces pratiques de l'indétermination et du message "parasité" de bruits purs.* (MA)