

Creando un futuro

Creating a future

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■ Hacia un modelo integral de creatividad universal

Este trabajo busca presentar una manera universal de pensar sobre la creatividad; una manera que no aísla la creatividad para estudiarla.

Aparentemente mucho, si no todo, se espera de la creatividad. Expectativas tan altas —que también se encuentran en las demandas de algunos artistas que piden libertad total e incondicional para ser creativos— son vanas y excesivas en términos de lo que realmente podemos lograr. Los límites de lo que podemos saber y lo que podemos lograr tienen que ver con la estructura fundamental de la realidad y con nuestra posición ontoepistémica en ella. Por *sistema ontoepistémico* me refiero al hecho de que al menos una parte de un sistema está organizado de tal forma que intenta entender o conocer el sistema al cual pertenece.

En un sistema ontoepistémico observar la realidad cambia la realidad.

De hecho la ausencia de observación conlleva una ausencia de cambio. Al observar la realidad no sólo cambiamos nosotros —que somos la parte de la realidad que está observando— sino que también cambia esa parte de la realidad que está siendo observada. En este punto, el conocimiento pierde su inocencia y nos hacemos responsables por lo que sabemos y por lo que no sabemos. Recuerden la Segunda Guerra Mundial cuando toda una generación dijo “no lo sabíamos”. Nuestra posición ontoepistémica como individuos, como cultura y como especie conlleva una carga sustancial de peso moral.

Esa conclusión importante también implica que la creatividad, la cual es un elemento esencial de todo sistema reflexivo, tiene su peso moral. Cada sistema capaz de referirse a sí mismo debe contener la habilidad creativa para poder sobrevivir. Todo sistema ontoepistémico debe ser creativo, si no para existir, sí al menos para ser suficientemente estable, viable. En otras palabras, nuestras habilidades cognitivas y creativas nos ponen frente a un reto: el de garantizar

y construir un futuro, no sólo para nosotros sino para la realidad.

En un mundo determinista —un mundo donde cada cosa que existe sigue por necesidad una sola fórmula inicial— no hay lugar para la creatividad. En tal mundo la creatividad es una ilusión, tampoco hay lugar para la ciencia; en tal mundo no hay necesidad de ninguna explicación, no habría evolución. La ontología y la epistemología coincidirán completamente. No habría necesidad del conocimiento como tal.

Por otro lado en un mundo completamente arbitrario o azaroso, tampoco hay lugar para la creatividad. En tal mundo no seríamos capaces de construir una distinción significativa, cognitiva u ontológica entre procesos “normales” y “creativos”. En tal mundo, la noción de creatividad sería completamente trivial. En este caso, tampoco habría lugar para la creatividad ni para la ciencia.

Una débil conclusión de estas observaciones es que la existencia de la creatividad no es inconsistente con nuestros marcos de referencia globales. Una conclusión más firme



sería que el universo no sólo permite o tolera la creatividad, sino que requiere la existencia de la creatividad, no sólo en el sentido reduccionista de que la creatividad es una consecuencia natural del universo, sino más bien en el sentido que sin creatividad el universo, tal y como lo conocemos, podría no haber existido y si, por alguna razón, el universo perdiera sus poderes creativos, estaría destinado a desintegrarse.

Todo sistema autoreferencial y por definición todo sistema ontoepistémico se involucra en problemas fundamentales que no pueden ser resueltos si no hay cambios o adiciones al sistema –paradojas–. Sugiero aquí que la creatividad involucra, primero, una selección entre los elementos disponibles en el nivel de complejidad que generó la paradoja y, segundo combina tal selección con algo nuevo y construye un nuevo nivel de complejidad.

Comenzando por una serie de premisas perfectamente aceptables y razonables, una paradoja llega a una conclusión que contradice las bases sobre la que fue construida.

Necesitamos la autoreferencia precisamente porque el sistema no es suficientemente determinista para que lo ontológico y lo epistémico coincidan completamente, generándose entonces paradojas. Esto no nos deja más opción que tratar de solucionar las paradojas a medida que ocurren. En ese sentido, las paradojas se comportan como eventos catastróficos, que requieren e imponen cambios fundamentales en el ambiente donde ocurren. Una de las formas más elegantes de manejar las paradojas generadas por la autoreferencia es introducir conceptos de lenguaje-objeto y de metalenguaje, de acuerdo con el análisis de paradojas semánticas de Tarski. Esto nos lleva a tener dos ni-

veles distintos de referencia: la autoreferencia y la referencia entre comillas (es decir substituir esta frase por “esta frase”). Ambos niveles, aunque íntimamente relacionados, no se pueden reducir uno en otro, pues se reinstalaría la paradoja. A pesar de que la autoreferencia puede ocurrir en cada uno de los niveles individuales, ya se ha instalado una salida de escape a la paradoja.

La razón por la cual estos niveles de complejidad son importantes es porque cambian la autoreferencia del lenguaje en una herramienta constructiva y de consistencia en lugar de destructiva. En el nivel recién creado, una nueva estructura puede ser desarrollada aunque restringida por las condiciones impuestas por sus orígenes.

La combinación de reflexividad y consistencia tiene poder generativo, porque para poder continuar, requiere ¡creatividad!

Es necesario tener claro que lo que ocurre en tal ambiente generativo es, primero, una selección de un nú-

mero de elementos del total disponible y, segundo, la introducción de un nuevo elemento, en este caso las comillas. Me parece que estos dos aspectos proveen de un marco de referencia suficientemente rico para investigar el funcionamiento de la creatividad en la realidad.

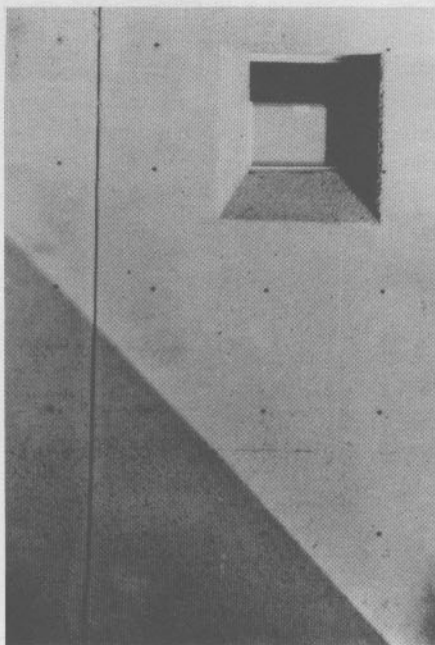
La vida, por ejemplo, aparece como las comillas puestas en una selección de elementos en el nivel de los elementos químicos.

Es necesario subrayar que este sistema generativo continuará creando nuevos niveles de complejidad y que la solución a una paradoja llevará, en principio, a la creación de nuevas paradojas. En otras palabras, las paradojas no pueden resolverse permanentemente.

Las paradojas necesitan de la creación de nuevos niveles de complejidad para solucionar las inconsistencias que surgen en cada nivel que es generado para resolver las inconsistencias del nivel previo. Entonces cuando un nuevo nivel de complejidad es introducido, para poder verlo claro, debemos mirar la paradoja desde la distancia; una distancia que precisamente está presente cuando observamos el problema desde un nivel mayor de complejidad.

El otro elemento constitutivo necesario para establecer un sistema generador en acción es expresado en el teorema de Gödel, que plantea que sistemas consistentes contienen planteamientos reales que no pueden ser comprobados por el sistema. La interacción entre el teorema de Gödel y las paradojas fundamentales causadas por la autoreferencia es “responsable” de la relativa unicidad e independencia de cada uno de los niveles de la realidad.

Cuando un sistema crea un nivel mayor para retomar la consistencia





que se pierde cuando alguno de sus niveles cae en paradojas semánticas, lo que sigue, y de acuerdo con el trabajo de Gödel, es que el recién creado mayor nivel siguiente contendrá una "nueva fase" que no puede ser derivada de niveles inferiores. La biología, para usar el ejemplo anterior, es más que sólo química. Contiene una expresión verdadera: vida, que no puede ser reducida al nivel de la química. Como resultado, los niveles de la realidad no pueden ser reducidos uno al otro sin perder la consistencia ganada cuando se introdujeron los nuevos niveles de complejidad. Nuestra existencia prueba, entonces, que las paradojas no son puramente destructivas.

La creatividad es una parte esencial de lo que somos y de quienes somos en la actualidad. No sólo porque la creatividad es un factor esencial en muchas de las cosas que hacemos, sino porque creatividad es o fue un factor esencial en nuestro pasado evolutivo. Esto implica que nuestra aproximación a la creatividad debe ser fundamentalmente interdisciplinaria. Desde una perspectiva disciplinaria, la cuestión de la creatividad ni siquiera existe, excepto, tal vez, como parte de una agenda metodológica o heurística.

En principio, creatividad involucra tomar riesgos porque nunca hay garantía para el éxito. De hecho, es muy difícil determinar cómo el éxito de la creatividad puede ser medido. Esto también es cierto para la creatividad humana. Cuando uno se enfrenta con un problema fundamental y trata de resolverlo creativamente, no hay garantía de que el problema sea realmente solucionable. Cuando existe tal garantía, no está involucrada realmente la creatividad. Cuando mucho, la resolución del problema será



cuestión de estrategia o, más formalmente, una cuestión de lógica.

Uniendo los dos conceptos anteriores, no puedo observar la diferencia fundamental entre la función de la creatividad en el ámbito de la evolución biológica y la creatividad en el ámbito humano. Especialmente desde una perspectiva global, el intento de hacer tal distinción tiene un efecto contraproducente en cualquier investigación sobre creatividad, pues nos lleva a enfocarnos en el cómo en lugar de enfocarnos en el porqué de la creatividad.

La importancia de este cambio en el enfoque va más allá de un mero cambio de perspectiva. El porqué de la creatividad tiene un mayor impacto que el cómo de la creatividad. Claro que la creatividad en el nivel biológico no funciona exactamente igual que en el nivel cultural, aunque el nivel cultural ha evolucionado a partir del nivel biológico y aunque los cambios culturales todavía requieren un nivel biológico para llevarse a cabo. Esto

significa que desde el punto de vista del cómo de la creatividad, somos muy propensos a no ver que la creatividad es un elemento esencial presente en cualquier sistema suficientemente complejo.

El siguiente punto es saber si necesitamos o no de la creatividad para entender la totalidad de la realidad, no en el sentido de necesitar ser creativos para hacer eso, sino si la creatividad como tal es un concepto esencial de nuestros modelos. Dándole vuelta a la pregunta, podríamos preguntar si verdaderamente podemos entender la creatividad humana sin mirarla desde una perspectiva más universal.

El arte sin ciencia está en riesgo de caer en la ilusión de que la verdadera creatividad es lo mismo que la libertad total. Ciencia sin arte sólo es relevante en el punto de que nuestro futuro está parcialmente determinado por nuestro pasado. Puesto que nuestros intentos de entendernos y entender el mundo en el cual vivimos, son factores importantes en los cambios que tienen lugar en la realidad total, no podemos arriesgarnos a ser menos cautelosos y cuidadosos. En otras palabras: un acercamiento integral a la realidad es parte de las condiciones que le dan significado a nuestra existencia. ▲

(Síntesis de Sergio Bojalil Parra)



■ Towards an Integrative Model of Universal Creativity

What this paper sets out to do, is to present a universal way of thinking about creativity—a way that does not isolate creativity in order to study it. From the point of view of scientific methodology, such an isolation would make perfect sense. In order to get a grip on a complex situation, a scientist will typically try to create a highly controlled situation—an experiment—in which the effect of one single variable can be analyzed. In an early stage, scientists may do little more than locally measure changes in the experimental setting. In a later stage, they may attempt to predict correlations between changes and try to cause such a predicted event, in this case usually a change in the measurement.

However, even without taking into account the pragmatic questions related to the notion of measurement, there are some fundamental limits to what such an approach can explain or even just clarify. In quantumphysics, for example, it turns out to be impossible to determine—measure—both the position and the momentum of a subatomic particle at any given moment. When we try to determine the position of a particle, we can no longer find out its momentum, and vice versa.

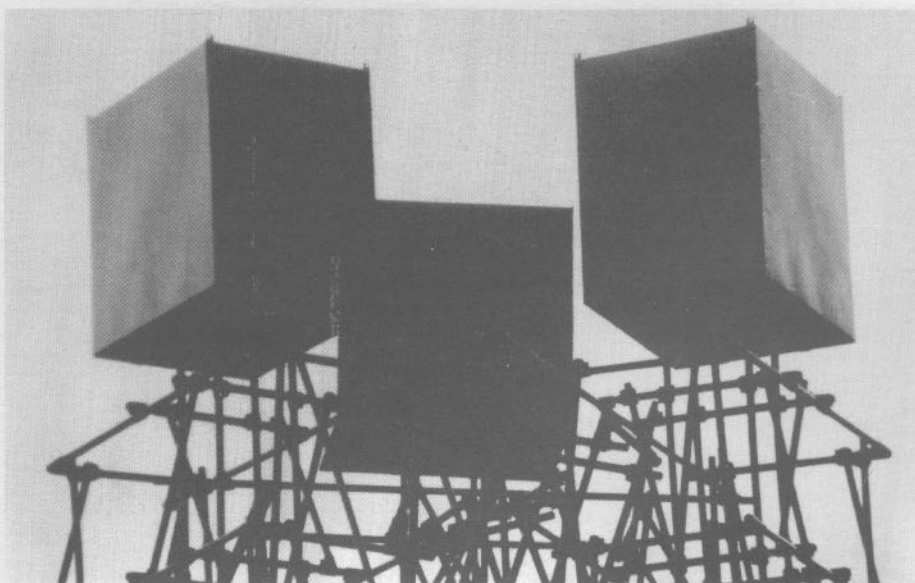
For an outsider looking at the enormous amount of resources made available to scientists, it is tempting to claim that all it takes to get out of this impasse is somewhat more creativity—some may even use the word “imagination”—on behalf of the

experimental physicists. Whether or not this is a case of human hubris or simply a matter of an oversimplified concept of the scientific process does not really matter: Apparently much—if not everything—is expected from creativity. Such high expectations—which we also find in the claims of some artists that in order to be creative they need total and unconditional freedom—are vain and misleading in terms of what we can realistically expect to accomplish. The limits on what we can know and what we can accomplish are not—or at least not completely—the result of a still incomplete knowledge about how to set up and carry out experiments. These limits, rather, have to do with the fundamental structure of reality and with our onto-epistemic position in it. By “onto-epistemic system” I simply refer to the fact that at least a part of a system is set up in such a way that it will attempt to understand or to know the very system that it belongs to.

In an onto-epistemic system, observing reality changes reality. In

the case of our human knowledge this is true, of course, in the rather trivial sense that we ourselves belong to reality: If we, being a part of reality, are somehow changed by the observations we make—and that obviously is the whole point of making observations—then observing reality changes reality. Some of these changes can be fairly easily measured so for example the neuro-physiological changes related to perception and memory. Others are less clearly profiled but nevertheless very real. When I see a car coming straight at me, I am rather inclined to change my behavior and make a run for my life. In fact, this works both ways: the absence of observation entails an absence of change: the blind and deaf person crossing the street next to me may not change his or her behavior as efficiently as I will. Somewhat ironically one might add that the behavior of this person too will change at the instant when he or she observes the car...on impact

From these examples it is clear that the specific nature of our





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observations has a tremendous effect on the specificity of the changes that occur. From this it follows that specifically scientific way of observing reality through measurements is likely to imply a highly specific type of changes in our human behavior, including our attempts to understand ourselves and our environment.

But a stronger claim must be made: by observing reality we not only change ourselves—the part of reality that is doing the observing—but we also change that part of reality that is being observed. At that point, knowledge loses its innocence and we become responsible for what we know. As a matter of fact, we also become responsible for what we don't know, a point that became very clear under the dramatic situation after the 2nd world war when a whole generation claimed “Wir haben es nicht gewusst—we didn't know”

This is not the same as saying that the “political correctness-people” are right. On the contrary, they draw conclusions that can in no way be

justified unless in a totally coherent and deterministic world that is not ours. Regardless of the contents of their claims, the very fact that they make such claims violates the onto-epistemic conditions of our existence. However, what my approach does imply is that our onto-epistemic position, as individuals, as a culture and as a species, carries a substantial amount of moral weight.

This is an important conclusion because it implies that creativity too, which is an essential feature of every reflexive system, carries this moral weight. As I will show further in this paper, every system able to refer to itself must contain a creative ability in order to maintain itself. Every onto-epistemic system must be creative, if not in order to exist, then at least in order to remain sufficiently stable to remain viable. In other words, our cognitive and our creative abilities put us in front of a task that is literally bigger than ourselves: the task of guaranteeing and making a future, not only for

ourselves but for the totality of reality.

Let me use this opportunity to make a little note about the very specific nature of self-observation as it follows from these remarks. Observing ourselves changes us twice, once as the observer and once as the observed. This is not only true for human self-observation. Whether or not this double and reflexive change applies, depends on the scale of the observer and the observed. If one is willing to accept that the universe, through human observation or otherwise, is observing itself, then reflexivity becomes an integral part of every attempt at observation or, more generally, understanding.

I believe that we have some very good reasons to accept this assumption, because at the level of human self-reference too, we must ask the question where this, self-reference is taking place. Regardless of whether yes or no we point at our “mind” or our brain as being responsible for our reflections upon the universe and ourselves, we will always be confronted with questions regarding the function of subsystems when we do so. It is obvious, for example, that the ways our brains function will to a very high degree affect the functioning of the brain mind as a whole. But does that mean that we can say that our understanding of the universe is restricted to the brains—either as relatively autonomous elements or as an, in this case biological level of organization of matter? I will return to these questions later, but at this point I would like to point out that the least we can say is that, even if we consider brains to be “privileged partners” in the human reflexivity business, the result of their



functioning goes well beyond the braincells themselves: They will influence the behavior of the totality of the human system. Again: If this argument holds for a human system, then I see no reason why it should not apply to the global or universal system—the totality of reality—that we are a part of.

Let me try, at this point, to rephrase the problem that we are facing as clearly as possible. In order to study creativity scientifically, we cannot but interfere with the creative process itself, meaning that at least part of the phenomenon will defy our understanding. This interference, which follows from the general conditions of onto-epistemic systems as I have introduced them, becomes very tangible when we realize that in order to study creativity, the researcher must either look at it after it happened—but then the fact that it happened will have changed how it is perceived—or he or she must interrupt the creative process but then these interruptions are bound to interfere with the process and to change how it takes place.

This obviously does not mean that we cannot study creativity from a scientific point of view. However, it does mean that there are intrinsic restrictions on what such a study can accomplish. Apparently we find ourselves in a situation where the fundamental limits or restrictions on our ability to understand apply to the very device—creativity—that we need precisely because of these limits. It is precisely because science, in principle, cannot explain everything, that the reality or the universe in which such a science is operative must be creative in order to persist.

This may seem like an extremely minimal startingpoint to talk about

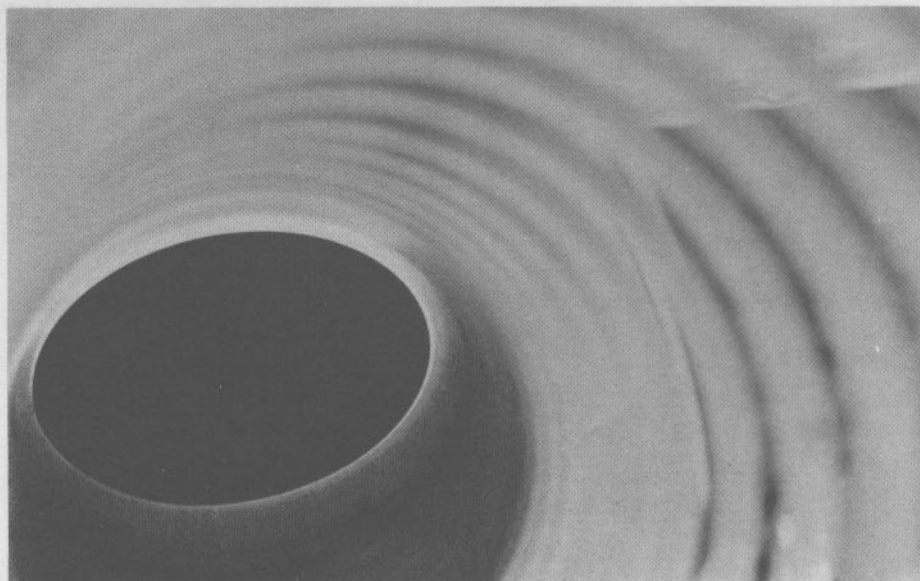
creativity. It is and it also should be if we want to avoid violating the fundamental conditions of knowledge in general and human knowledge more specifically. Which are these conditions?

In a world that is totally deterministic—a world in which everything that exists follows with necessity from an initial formula—there is no room for creativity. In such a world, creativity is an illusion. In such a world, also, however strange this may sound, there is no place for science either. Although in such a world, in principle, everything could be described in strictly deterministic, linear terms, in such a world there is no need for any explanation. It is even improbable that such a world would evolve, let alone that some fundamental changes would take place in it. In such a world, ontology and epistemology coincide completely. There would be no need for knowledge as such. We can rest assured: From quantum physics we know that indeterminacy is an

essential feature of reality and, as far as the need for knowledge is concerned, that is something we experience every single day.

On the other hand, in a world that is completely arbitrary or random, there is no room for creativity either. In such a world, we would not be able to make a cognitively or ontologically meaningful distinction between “normal” and “creative” processes. In such a world, the notion of creativity would be completely trivial. In this case too, as in a completely deterministic reality, we find that not only creativity but also science doesn’t belong. But this time also, we don’t need to panic. After all, the sun is still rising in the east and setting in the west, we have been able to land on the moon, and I know that when I open my hand, I will drop whatever I was holding. Obviously, some phenomena are fairly stable and predictable, even though many of them are less precisely defined than one might expect.

A weak conclusion from these two observations is that the existence





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of creativity is not inconsistent with our global frame of reference. However, a much stronger conclusion would be that not only does the universe allow or tolerate the existence of creativity, but that it requires the existence of creativity, not in the reductionist sense of creativity being a "natural" consequence of the universe, but rather the other way around. Without creativity, the universe as we know it could not have existed, and if, for some reason, the universe was to lose its creative powers, it is bound to disintegrate.

This strong view obviously does not restrict or confine creativity to the realm of humanity: Not only humans require creativity in order to exist. On the contrary, if creativity has at all something to do with maintaining the delicate balance between determinacy and indeterminacy, it makes good sense to see creativity as a universal principle because determinacy and indeterminacy are universal concepts.

This stronger claim obviously follows from the systemic condition

that self-referential systems in general—and therefore, by definition, all onto-epistemic systems—run into fundamental problems that cannot be resolved without changing or adding to the system.

How can we understand this need for creativity and the basic conditions that 'govern'—'determine' obviously being too strong in this case—its behavior? What I will try to show, at this point, is that it makes good sense to suggest that creativity involves, first of all, making a selection among the elements available at the level of complexity that generated the paradox, and, secondly, combining that selection with something new and build a new level of complexity.

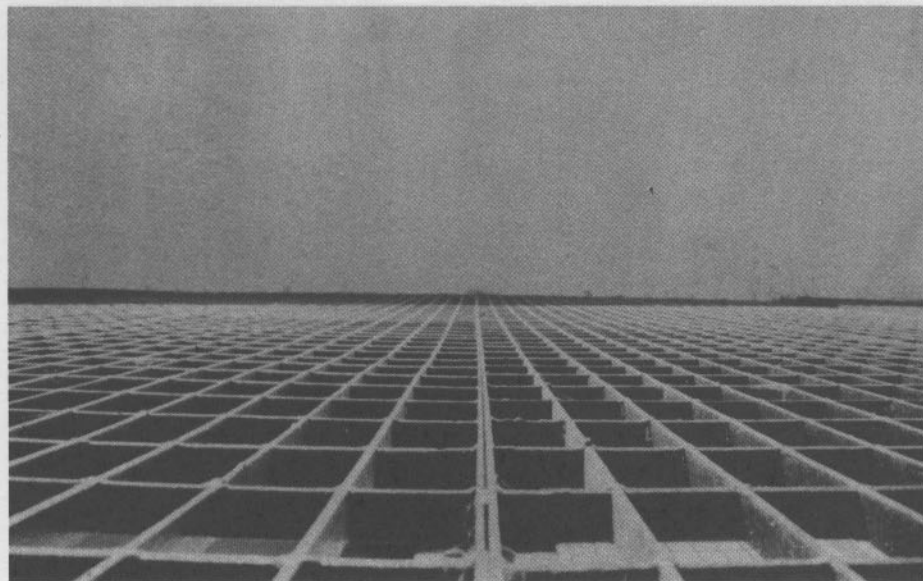
Let us turn, first of all, towards a classical logical environment. Within such a system, the occurrence of A while A is the case, threatens the functioning of the system as a whole. For all intents and purposes, it does not really matter whether we are talking about a binary or at a multiple-valued system: We can always rephrase the notion of a

paradox as the simultaneous occurrence of any two or more events that mutually exclude each other.

The problem with paradoxes is that they, once introduced in a logical system, make it possible to derive every single possible proposition from it, regardless of falsehood or truth, and even regardless of a much more prosaic notion such as the functionality of the system. Starting from a series of perfectly acceptable and reasonable premises, a paradox leads to a conclusion that contradicts the very foundation on which it was built.

It is important to understand that a paradox is not the same as a fallacy. A fallacy, such as "all men can see, therefore a blind man can see" (tips particular fallacy being of the *secundum quid*-type) is based on a logical error, in this case the deduction of a specific statement from a more general statement without taking into consideration the specific conditions and restrictions applying to the general statement. These apparent paradoxes are fairly easy to get rid of. It is sufficient to correct the mistake in the reasoning: You do not need to change the functioning of the system in order to solve the problem. On the contrary: all you have to do is to remain within the boundaries of the system.

Not so easy to get rid of are true paradoxes—paradoxes intrinsic to the system as it exists. These paradoxes, typically, involve the self-referential ability of a system. It is obvious that, in such a strong case, we will not be able to solve the paradox by requiring a more stringent application of the rules of the system. Self-reference is at the core of an ontoepistemic system and can therefore not be avoided. Telling the system when and





where it should not be self-referential in order to avoid the paradoxes will simply not do the trick: To make such recommendations sufficiently precise and effective would only be possible in a much more deterministic system than the one we are considering—which, for obvious reasons, is not possible: We need self-reference precisely because the system is not sufficiently deterministic for the ontic and the epistemic to coincide completely. In other words, in a system in which it would be possible to avoid the paradoxes, paradoxes would probably not even occur.

This leaves us with no other option than to try to solve the paradoxes as they occur. In that sense, paradoxes behave as catastrophic events, requiring and imposing a fundamental change in of the environment in which they occur.

One of the most elegant ways to handle paradoxes generated by self-reference is to introduce the concepts of object-language and meta-language. The basic idea behind that approach is fairly simple and mainly based on Tarski's analysis of semantic paradoxes. To replace this sentence by "this sentence" (This sentence in quotation marks), is to eliminate the self reference on the level of this sentence and to replace it by a reference made from the level of the quotation marks.

In other words, in order to maintain consistency, the partial reflexivity of language partial, because we do not have to go to another level, and because total reflexivity on a single level implies a closed system has forced us to create two distinct levels of reference. Both levels, although intimately related, cannot be reduced to one another



since otherwise the paradox will be reinstated. Although self-reference can still occur on each of the individual levels, an escape-route has been put in place.

The reason why, in a nutshell, these levels of complexity are so important is because they turn the self-reference of language into a constructive rather than a destructive tool or quality. On the newly created level a new structure can be developed, although restricted by the conditions imposed by its origins. The combination of reflexivity and consistency has generative power because, in order to continue, it requires creativity!

It should be clear that what goes on in such a generative environment is indeed first of all a selection of a number of elements out of all the available elements, and, secondly, the introduction of a new element, in this case the quotation marks. It seems to me that these two aspects provide indeed a sufficiently rich frame of reference to investigate the functioning of creativity throughout

reality. Life, for example, appears as the quotation marks around a selection of elements on the level of chemical elements.

We need to establish that this generative system will continue to generate new levels of complexity. In other words, we need to show that paradoxes can not be solved permanently. The solution to a paradox will, in principle, lead to new paradoxes.

Some paradoxes indeed express or indicate that we cannot reach a level where complete reflexivity and complete consistency can be realized simultaneously. So, for example, does Cantor's set-theoretical paradox, which can be rephrased as "the set of all sets that do not contain themselves as an element". If that set—let's call it A—does not contain itself, it should be an element of A, but A would then contain itself so that A would no longer only contain sets that do not contain themselves as an element Bertrand Russell offered a somewhat more accessible formulation of this paradox. In a





certain village the barber shaves all the men who do not shave themselves, and he shaves only those. The pertinent question then is Who shaves the barber? If he does not shave himself, then he must be shaved by...the barber. But since he is the barber, the barber would shave himself and would therefore no longer shave only those men who do not shave themselves.

These paradoxes necessitate the creation of more and more levels of complexity in order to take care of the inconsistencies that arise on every new level that is generated to resolve the inconsistencies of the previous level. In other words, once a new level is introduced to cope with a paradox on the previous level, the problem of the liar-paradox is not really solved conclusively: the problem potentially repeats itself on the newly created level. This sentence is false leads to 'This sentence' is false, but on that new level, we might say 'This sentence' is false. This sentence is false. In order to solve this new paradox, we have to

make it clear that this means "'This sentence' is false" is false—whereby, once again, a new level of complexity is introduced, for in order to make that clarification we must look at the paradox from a distance—a distance precisely present when we look at the problem from a higher level of complexity.

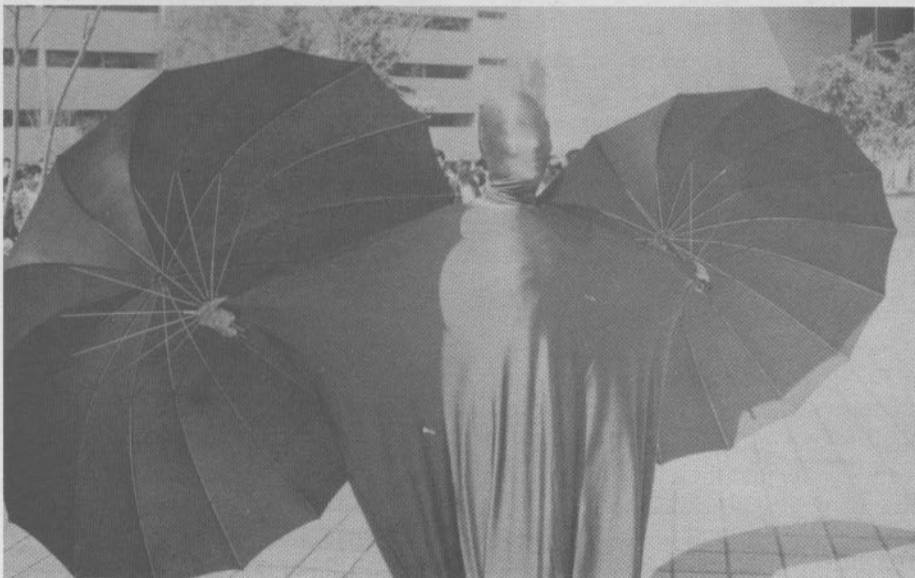
The next constitutive element needed to establish a working generative system that we can use to understand the totality of the world rather than just our human language, is expressed in Gödel's theorem, which states that consistent systems contain true statements that cannot be proven by the system. The interaction between Gödel's theorem—the argumentation of which is quite technical and can be omitted for simplicity's sake—and fundamental paradoxes caused by self-reference is "responsible" for the relative uniqueness and independence of each of the levels of reality.

When a system creates a next higher level to regain the consistency that it lost when one of its levels ran



into semantic paradoxes, then from Gödel's work it follows that the newly created next higher level will contain a "true sentence" that cannot be derived from the lower levels. Biology, to use the same example as before, is more than just chemistry. It contains a true expression, life, that cannot be reduced to the level of chemistry. As a result, the levels of reality indeed cannot be reduced to one another without losing the consistency gained when new levels of complexity were introduced.

If it were at all possible to specify a unique formula from which all the others can be generated or derived without adding something new, then such a formula would necessarily contain or lead to paradoxes. These paradoxes could in principle not be avoided, because solving paradoxes is only possible by introducing novelty, by creating new levels of reality which in turn will necessitate further levels of complexity.





From this, it also follows that it is impossible to just assume that higher levels will completely include lower levels so that we might as well do away with those now-no-longer-useful levels. 'This sentence' is false has no meaning whatsoever if the level of this sentence is done away with. At its best, 'this sentence' is false would then read This sentence is false—which would reinstate the paradox. Paradoxes, in that case, would be purely destructive. Our own existence proves that they are not.

Creativity is an essential part of what and who we are today. Not only because creativity is an essential factor in many of the things that we do, but also because creativity is or was an essential factor in our evolutionary past. This implies that our approach of creativity must be fundamentally interdisciplinary. From a disciplinary perspective the question of creativity does not even exist, except, perhaps, as part of a methodological or heuristic agenda.



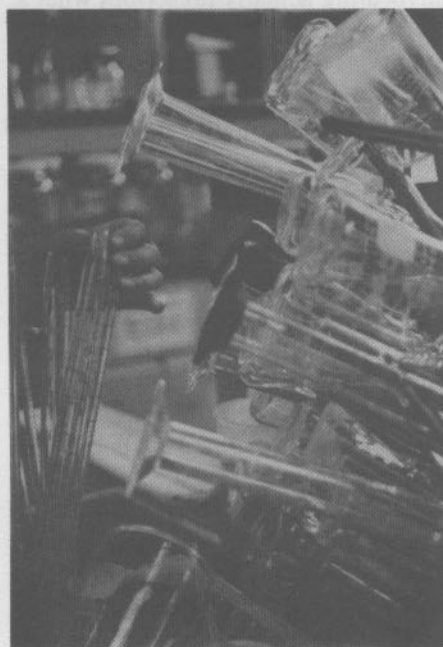
To a biologist, life is very much a given, a premise. To the physicist, on the other hand, there is no fundamental distinction between a physical description of a dead and a living body, between the description of a living organism and a piece of rock. It is only when we look at our past and ask how a physical world changed, at least (and at most!) partly, into a more complex biological one—more complex because more variables are added—that we can ask the question concerning creativity. Creativity, in that sense, provides the links between the different disciplines.

When we isolate creativity at some specific level of complexity in order to study it, we lose that sense of connection, we lose that sense of continuity between the different levels of complexity. For that very reason, evolutionary creation is often referred to as "blind," "without direction," etc. Is it really? Especially when we describe biological evolution on a sufficiently large scale, it is quite obvious that it

evolves towards increased complexity and towards increased flexibility. Of course, not every single step in the process fits that pattern, but then, that is precisely why biological evolution needs creativity: There is no single formula that dictates how things should be done in order to get a specific result.

In principle, creativity involves taking a risk since there never is a guarantee for success. In fact, it is even extremely difficult to determine how the success of creativity can be measured. That is also true for human creativity. When faced with a fundamental problem, and trying to solve it creatively, there is no guarantee that the problem is indeed solvable. When such a guarantee can be given, it is no longer creativity that is called for to solve the problem. At best, solving the problem becomes a matter of strategy or, more formally, a matter of logic.

Putting one and two together, I simply fail to see the fundamental distinction between the function of creativity in the domain of biological





Creating...



evolution and creativity in the domain of humanity. Especially from a global perspective, the attempt to make such a distinction works counterproductively in any thorough investigation of creativity. It leads us to focus on the *How?* instead of focusing on the *Why?* of creativity.

The importance of this change in focus goes beyond a mere matter of perspective. The *why* of creativity has a major impact on the *how* of creativity. Of course, creativity on the biological level does not function in exactly the same way as creativity on the cultural level, even though the cultural level has evolved out of the biological level and even though cultural changes, at least for the time being, still require a biological level to carry them out. This means that from the point of view of the *how* of creativity, we are very likely to fail to see how creativity is an essential element in any sufficiently complex system.

The question then is whether or not we need creativity to understand the totality of reality—not in the sense

of whether we will need to be creative in order to do so, but in the sense of whether creativity will as such be an essential concept in our models. Turning the question around, we could ask whether we can truly understand human creativity without looking at it from a more universal perspective.

Can looking at the techniques of human creativity help us to understand the great works of art that we can trace throughout the history of human cultures? However strange this may sound, I think that such a study will not help us a great deal, not because we still lack a sufficiently deep knowledge of these techniques, but because in those cases, the techniques do not apply. Those great works of art are masterpieces precisely because they could succeed without falling back on a set of techniques. They are masterpieces precisely because they themselves brought new perspectives and new techniques into existence. techniques and perspectives that consequently became available in the culture at large.

In other words, if we try to study creativity through the techniques and strategies that we believe to be essential in the making of art, we should realize that what we are engaging in is not a study of what we might believe to be the conditions of art, namely the creative techniques, but rather the other way round. We will be studying the works of art as preconditions for the techniques that we now currently use to solve a number of problems in a number of different situations. The study of “creative techniques,” therefore, is essentially the study of the past of creativity.

Two somewhat related remarks may be in place at this point. First of all, it is obvious that not any work of art that is labeled “a masterpiece” has actually fulfilled the essential function introduced in this paper. Another way of putting this would be that not everything that is called masterpiece actually is a masterpiece. The approach I am advocating actually prescribes what a work of art should do in order to qualify as a masterpiece. It obviously does not tell you how to make it, but it does tell you what its qualities should be.

The second remark is related to the first one in that it extends the scope of these “masterpieces” beyond art. The introduction of new rules, while perhaps more likely to happen in works of art, can also take place in philosophy, in science, and even in more down-to-earth situations. However, works of art definitely have an edge because of their relatively high exposure and because of the relatively small knowledge base required to access them. After all, one may appreciate a painting by Pollock without a thorough understanding of



its premises. It is much more difficult to make a similar claim about Einstein's relativity-concept which requires a rather extensive scientific background.

Art without science is at risk of freewheeling, entailing the illusion that true creativity is identical with total freedom. Science without art is

only relevant to the extent that our future is partially determined by our past. The integration of the arts and the sciences in the academy of the twenty-first century is a crucial element in the creation of our future. Since our behavior, including our attempts at understanding ourselves and the world we live in, is an

important factor in the changes that take place in the totality reality, we can not afford to be less than cautious and thorough. In other words: an integrative approach of reality is part of the conditions of that give meaning to our human existence.

