FROM COMPUTABILITY TO SIMULABILITY

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ABSTRACT

We are intelligent, so we are conscient. We are in evolution, so we construct. We are not alone, so we have to contribute. Simulation relates function to structure: faith = (intuition, inspiration, imagination) and intelligence = (adaptability, consciousness, intention) are complementary one to another. Intelligence and Faith can converge together to integration, or can destroy each other if not associated by conscience. Intelligent simulation and the simulation of intelligence demand transcending the present limits of computability toward simulability by an intensive effort on extensive research to integrate essential mathematical and physical knowledge guided by philosophical goals. To get a self-aware simulation, i.e., self-control of the simulation process, we build a knowledge hierarchy corresponding to the simulation hierarchy. Then we create the context for a self-organization of the simulation, expressing the countervariant symmetric pair of hierarchy types (simulation, knowledge) in the reference system of the basic covariant hierarchy types (classes, symbols, modules). Therefore, we try first to model the consciousness for the simulation of the intelligence, and then to reach for intelligent simulation. We integrate the different types of hierarchies using the theory of categories. Conscience = (consciousness, inspiration).

ARGUMENT

The power to abstract gives us the right and the duty to manage the Matter as wise as possible so that it assists our Evolution toward Freedom as understood Necessity. A way to begin is hierarchical simulation. Coexistent interdependent hierarchies structure the universe of models for complex systems, e.g., hardware - software ones. They belong to different hierarchy types, defined by simulation abstraction levels, autonomous modules, classes, symbols, and knowledge abstractions. *Divide et Impera et Intellige* on hierarchy types reveals their importance for intelligent simulation. Turning the abstraction into comprehensive construction could be the aim of humanity, the unique God for different cultures of free humans.

The way to freedom is by understanding necessity. We have to recall our conscience, to reintegrate our mind, and to remember that society has to assist humans to live among humans, not to consider that they have only to work for it. An operating system serves the autonomous programs, both for the function of the hard and for development of the soft. Society has to assure health and education for every human, and encourage search and research for every conscient human.

INTELLIGENT SIMULATION

Researching intelligence by simulating it to get to intelligent simulation demands the study of essential abstract structures: the human mind, the different types of hierarchies, and the simulation as relation between static and dynamic structures (Niculiu and Cotofana 2001). We extend the reconfigurability to the simulation itself.

First, we get to self-control of the simulation process by a self-aware simulation. For this, we build a knowledge hierarchy countervariant to the simulation hierarchy. Then, to create the context for self-organization of the simulation, we express both simulation and knowledge hierarchies in the simulation-covariant reference system of the basic hierarchy types (classes, symbols, modules). This derives from the main partition of our Reality (Beauty, Truth, Good). We try to model the conscience for simulating the intelligence, and then to reach for intelligent simulation. Essential relations are sketched next, before searching for conscience models enabling intelligent simulation:

Human = human (Humanity);
human $\in$ Faith $\times$ Intelligence $\rightarrow$ Faith $\times$ Intelligence
Humanity = ({humans}, eternal/ evolving Structure)
evolution $\in$ (Hunger $\times$ Fear $\times$ Love)
$\times$ (Technology $\times$ Science $\times$ Art)
$\rightarrow$ Technology $\times$ Science $\times$ Art
Mathematics $\subset$ Art = Human:: beauty-oriented activity (Science, Technology)
Physics = natural $\cup$ social Science
= Human:: truth-oriented activity (Art, Technology)
Engineering/ Technology = Human::good-oriented activity (Art, Science)

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Simulation∈ Behavior × Structure ⇐ Knowledge
⇐ Intelligence :: information()
Imagination ⇐ | Intuition - Consciousness |
Intention ⇐ | Inspiration - Adaptability |
Consciousness ⇐ reflexiveAbstraction (Intention)
Adaptability ⇐ simplifyingAbstraction (Imagination)

The history of the common measure along the human history can be synthesized along the following line:

... ← Philosophy ← ... ← Culture ← special Knowledge
← materialistic Economics ← spiritual vs. physical Force

Faith and *intelligence* form the yin-yang of our *life* (Way, Truth, Life). ☯ // frontal view

- Faith = (Inspiration, Intuition, Imagination) is associated to the right human brain hemisphere; intuition is the main part of the dark yin, inspiration the dynamical shaped interface to intelligence, whereby the white point linking to the left part, stands for imagination.
- Intelligence = (Consciousness, Adaptability, Intention) corresponds to the left human brain hemisphere; adaptability is the main part of the light yang, consciousness the variable nuanced interface to faith, and intention the dark point linking to faith.
- Conscience = (Inspiration, Consciousness) builds a nondeterministic interface between the conscious sequentially and the unconscious in parallel operating domains of a faithful intelligent mind.

Intelligence is not reduced to sequential operation, but the modern culture has extended dangerously the historical experiment of concentrating our intelligence on reason, that is merely the closure of the adaptability to natural activities. Nature is very important to us, as the starting point of our evolution, but it is only our hardware, eager to assist us in extending our intelligence beyond any limit, aiming to know more of the Reality. The fact that we can not yet solve the dichotomy of Spirit and Matter does not mean they should be balanced in our life. The power to abstract gives us the right and the duty to manage Matter as wise as possible so that it assists us in our Evolution toward

Freedom as Understood Necessity
Georg Wilhelm Friedrich Hegel

Metaphor is an instance of abstraction, so we will use it intensively for abstract matters that are not yet fully approached. For instance, the three first names of Hegel suggest principles to follow in restarting the evolution: peace in Matter and Mind, strong will to keep understanding the Way, insured by the current reconfigurable principles as helmets that defend our mind of false ways, not forgetting we have to fight for and against abstract ideas.

Further, until we reach to a higher knowledge, *alle guten Dinge sind 3*, as we need a triad for any stable approach, and time gets friendly only if we respect the continuity of the evolution, as Georgs parents were inspired when baptizing him.

Einstweilen bis den Bau der Welt
Philosophie zusammenhält,
erhält sich das Getriebe
durch Hunger, Furcht und Liebe
Friedrich Schiller

Conscience is self-awareness of individual faith and intelligence, as well as of the relation to the local context (society) and to the global one (universe). To appear it needs self-knowledge, what could have resulted from community conscience featured by an eternal human structure, e.g., from the past, shepherds, farmers, sailors, Africans, Amerindians, Asians, Australians, Eskimos, ... Each individual recognized himself in his cohabitants, being adaptable and having a lot of intuition.

The evolution of the common measure is conditioned by the conscient construction of intelligent agents to manage the lower stages, as industry enabled the mechanization of agriculture followed by the concentration on economics. The same scheme, or a more suited one, had to be applied long ago, transforming (agriculture, mechanization, industry) by (pure reason, consciousness, intelligence) into (society, sincerity, humanity). Napoleon Buonaparte and Otto von Bismarck started the reform, got convincing, and failed of unknown causes. Their names signify the recursive strategy that was applied by the *pure reason experiment* pioneers: Il Rinascimento, Martin Luther, and René Descartes.

More success had the mathematicians that reapplied the idea, understanding the significance of *constructive mathematics* for the Human (Errett Bishop, Luitzer E.J. Brouwer, Alonzo Church, Kurt Gödel, David Hilbert, Stephan Cole Kleene, Henri Poincaré, Emil Post, Alan Turing):

a. Recognize the limits of the reductionist approach
b. Fully complete the gap to the known limits
c. Go further beyond the limits, extending the approach toward a more human abstract Reality.

"Divide et Impera et Intellige" is again and again planned by Humans, and is again left without the third defining part by stupid humans that try to stop the Evolution on an arbitrary level, appropriate to their adaptability. Furthermore, their materialism transformed the Society, essentially meant to assist the individuals and to assure their communication, in a unconscious unreasonable unmanageable being, that imposes the way of life, of understanding, and the way to follow.

Evolution implied a multiple "Divide et Impera et Intellige" for conscience, associated to generating the *components* lacking of the mind at start, then assisted by them:

- individual-social-universal conscience→*inspiration*↓ (subjective-contextual-objective)
- space-time (structure-behavior) → *imagination*↓
- discrete-continuous (natural-real) → *intention*↓
- beauty-truth-good (art-science-technology).

Das schöne wahre Gute.
Johann Wolfgang von Goethe

1. Mathematics discovers and studies fundamental types of structures: (algebra, topology, order), enabling (construction, orientation, understanding). These are rarely separately used, example of correct and complete integration to be followed by science and technology (Blum et al. 1998).
2. Physics (Traub 1999) should integrate its fundamental force theories, but also, as chapters, all other sciences (natural and social), leading them to apply mathematics really. Social sciences study a universe, as complex and nondeterministic as the natural one, so mathematics is at least as important to them as for natural sciences. This way, science would also be a better inspiration source for mathematics.
3. Engineering has to be closely related to the mathematical approach and integration of parts, not only to mathematical techniques. As Reality contains the abstract ideas, even if physics could explain everything discretely, the power of continuum can not be forgotten, i.e., analog engineering is most important in simulation.

The convergence process of evolution demands struggle against time, with structure as ally (Amoroso et al. 2000). Social and individual conscience are divergent nowadays, as we only performed "Divide et Impera", neglecting "et Intellige". It is high time to correct this.

SEARCHING FOR CONSCIENCE

Conscience demands continuous feedback. Evidently, the anterior relations are oversimplified in order to move towards intelligent simulation. Although we claim they are intuitive and hope they are inspired, to begin, we neglect the essential but too primitive to understand intuition and inspiration. Formalizing reflexive abstraction by the knowledge hierarchy type and simplifying abstraction mainly by the simulation hierarchy type, it follows:

Conscience = knowledge (simulation (Conscience))

The fixed-point relation suggests that we should model conscience associating to any hierarchical level of the construction process a knowledge level.

To solve the fixed-point problem we have to build a metric space where knowledge ° construction is a contraction, i.e., elements implied in the construction should get closer to one another in the formal understanding of the formal construct.

If we consider general functional relations between the essential parts of the faith-assisted intelligence:

Consciousness = knowledge (intention (Inspiration, simulation (imagination (Intuition, Consciousness))))

A generic modeling scheme defines the model universe, e.g., a mathematical theory, a programming paradigm. Every entity has behavior (relations to other entities) and structure (internal relations). Behavior can be functional (context-free) or procedural (context-dependent). An algorithm is an entity that can be computer simulated, so it represents computability, top-down (construction, design, plan) or bottom-up (understanding, verification, learning). The algorithmic approach is equivalent to the formal one: If a sentence of a formal system is true, an algorithm can confirm it. For a verification algorithm of the mathematical sentences, a formal system can be defined, that holds for true the sentences in the set closure of the algorithm's results toward the considered logic operations. Hilbert's formal systems, Church's λ-calculus, Kleene's recursive functions, Post's combinational machines, Turing machines, Chomsky's grammars, Markov-algorithms, are the best-known (equivalent) formalisms for computation, so for algorithm and computability (Hofstadter 1979).

HIERARCHY TYPES

Knowledge and construction hierarchies cooperate to integrate design and verification into simulation; object-oriented concepts are symbolized to handle data and operations formally; structural representation of behavior manages its realization. Hierarchy types open the way to simulate intelligence as adaptable conscience, by integrating the system and the metasystem. Hierarchy is the syntax of abstraction. As there are more kinds of abstraction, there are also more types of hierarchy. Representation is a 1-to-1 mapping from the universe of systems (objects of simulation) to a hierarchical universe of models, so a representation can be inverted. A model must permit knowledge and manipulation, so it has two complementary parts/ views: description and operation. If models correspond to classes, in a formal approach, specifications are instances; for models formalized as languages specifications are expressions. Hierarchies are leveled structures, which represent different domains. A level is an autonomous mathematical structure, containing abstract/ concrete entities that are linked by intralevel relations (Niculiu et al. 1999).

Abstraction relates the levels: this induces an interlevel order relation, partial, concerning entities, and total, regarding the levels. Beyond the hierarchical point of view, the system can be formalized as an autonomous domain, structured by metahierarchical relations, building a level in a metahierarchical system. Hierarchical structures can be processed: top-down and bottom-up.

Coexistent interdependent hierarchies structure the universe of models for complex systems, e.g., hardware/ software ones. They belong to different hierarchy types, defined by abstraction levels, autonomous modules, classes, symbolization and knowledge abstractions. Abstraction and hierarchy are semantic and syntactical aspects of a unique fundamental concept, the most powerful tool in systematic knowledge; this concept is a particular form of "Divide et Impera et Intellige".

Hierarchy results of formalizing abstraction.

Hierarchies of different types correspond to the kind of abstraction they reflect (↑the abstraction goal):

- Class hierarchy (↑concepts) ↔ virtual framework to represent any kind of hierarchy, based on form-contents, modularity, inheritance, polymorphism.
- Symbol hierarchy (↑mathematics) ↔ stepwise formalism for all types, so also for hierarchy types.
- Module hierarchy (↑strategies) ↔ recursive stepwise management of all (hierarchy) types on different levels modularization, closely following the principle "Divide et Impera et Intellige".
- Construction hierarchy (↑simulation) ↔ simulation (= design/ verification) framework of autonomous levels for different abstraction grades of description.
- Knowledge hierarchy (↑theories) ↔ reflexive abstraction ("self-referential", "a deeper sense"), aiming that each level has knowledge of its inferior levels, including itself.

The knowledge hierarchy type offers a way to model conscience. The first idea is to consider/ remember that reality is more than nature, as the continuum of IR is more powerful than the discrete universe of IN.

Understanding and construction have correspondent hierarchy types: their syntax relies on classes, the meaning on symbols, and their use on modules *Figure1*. Constructive type theory permits formal specification and formal verification generating an object satisfying the specification

The theory of categories offers formalism for hierarchy types. Hierarchical types are objects of the ecquivalent categories (functorial isomorphism between) of types of hierarchies. The knowledge hierarchy type communicates to the other hierarchy types, that use covariant functors to communicate between themselves, by countervariant functors.

Intelligence simulation implies a hierarchical approach of different types. Any application of it can be imagined/ built as an educational system in discovering models for conscience and better understanding our conscience. The classical activities in complex systems simulation, that regard different levels of the construction or knowledge hierarchy, can be expressed symbolically, represented object-oriented, and simulated structurally. *Figure2* Complex simulation needs consistent combination of mathematical domains and an intelligent compromise between consistence and completeness.

RESEARCHING CONSCIENCE

The alternative ways followed to extend the computability concept can be compared to approaches known from German literature. They concentrate respectively on the mental world of the good managed by technology, the physical world of the truth researched by science and Plato's world of the beautiful abstractions discovered by art.

1. Faust (Johann Wolfgang von Goethe): heuristics - risking competence for performance, basing on imagination, confined to the mental world.
2. Das Glasperlenspiel (Hermann Hesse): unlimited natural parallelism - remaining at countable physical suggestions, so in the Nature.
3. Der Zauberberg (Thomas Mann): hierarchical self-referential knowledge - needing to conciliate the discrete structure of hierarchy with the continuous reaction, hoping to open the way to Reality.

Recurrence is confined to discrete worlds, while abstraction is not. The difference suggests searching for understanding based on mathematical structures that order algebra into topology. *Figure3*

Evolution is linked to the initial design of mental faculties for surviving of the whole system, but also to the space-time context supposed by communication between intelligent agent. Especially hierarchical reflexive: ideas about ideas and how to get to ideas, objects to synthesize/ analyze/ modify objects, representations on representations and how to build/ understand representations concern the evolutionary intelligence. Intelligence in evolution is the faculty to:

- synthesize/ analyze/ modify abstract objects, i.e., ideas;
- analyze/ modify natural objects and synthesize/ modify artificial objects in the physical world;
- synthesize/ analyze/ modify representations for the mental world (Ageron 2001).

We follow the mathematical paradigm of intelligent simulation by functionally modeling the self-aware adaptable behavior for intelligence simulation. The integration between discrete and analog is again needed, for a most soft adaptability and for conscience simulation as continuous recurrence (analog reaction).

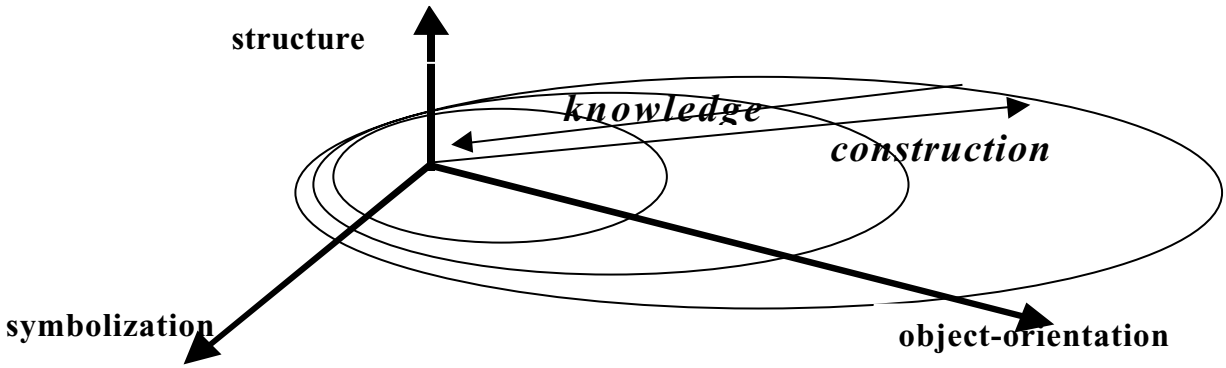

Figure 1: H – diagram

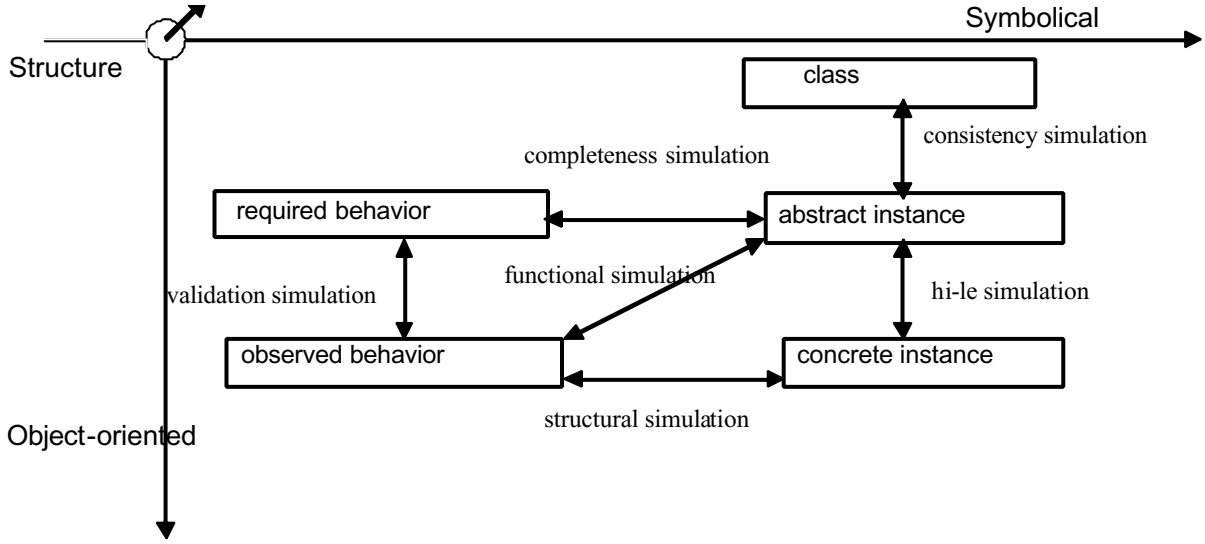

Figure 2: Hierarchical Simulation Paradigm: representation

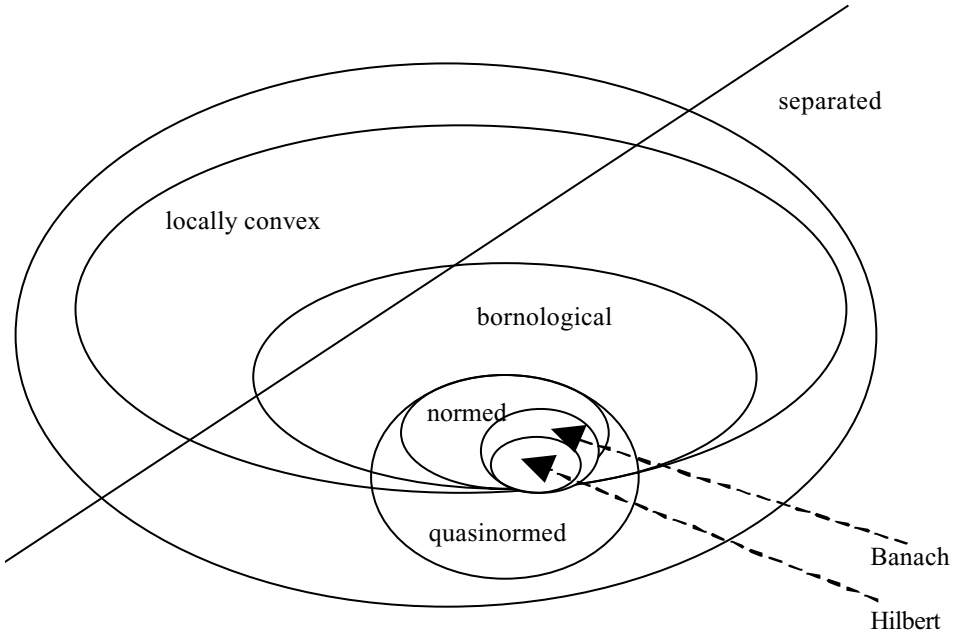

Figure 3: Topological Vector Spaces/Algebra

METAKNOWLEDGE

Recurrence of structures and operations enables approximate self-knowledge (with improved precision on the higher levels of knowledge hierarchies). A continuous model for hierarchy levels, without loosing the hierarchy attributes, would offer a better model for conscience and intelligence (Niculiu and Cotofana 2002). An interpretation of knowledge hierarchies is: real time of the bottom levels - corresponding to primary knowledge/ behavior/ methods, is managed at upper levels - concrete types/ strategies/ models, and abstracted on highest levels - abstract types/ theories/ techniques. Knowledge is based on morphism mapping the state-space of the object-system onto the internal representation of the simulator. An intelligent simulator learns generating and validating models of the object-system (Niculiu et al. 2000). Therefore:

- Representation for design and verification is common.
- Algebraic structures on which the different hierarchy types are based extend toward topological structures.
- Different simulation entities are symbolic, having attributes as: type, domain, and function.

A topology on the space of symbolic objects permits grouping items with common properties in classes (Zeigler et al. 2000). It results in a dynamically object-oriented internal representation that can be adapted to the different hierarchy types. Topological concepts, as neighborhood, or concepts integrating mathematical structures, as closure, can be applied in verification and optimization, for objects and classes as well. The hierarchical principle should be applied to the object of knowledge as to the knowledge structure itself: it mediates the action of a paradigm on an environment. The simulation environment prepares a framework for representing entities and relations of the system to be simulated (designed/ verified), as well as general knowledge about the simulated universe. Knowledge-based architecture bases on separation of representation from reasoning. An intelligent system, i.e., capable of reflexive abstraction, reasons controlled by problem specification and by solving strategies. These are derived from a higher level of knowledge, representing approach principles, structured by an even higher level containing abstract types. An object-oriented simulation framework permits the representation of different knowledge levels, each having a concept hierarchy, possibly abstraction/ structure/ symbolization leveled. Knowledge-based architecture (Keutzer at al. 2000), both at environment and simulation component level, ensures flexibility of the framework realization, by defining it precisely only in the neighborhood of solved cases.

For representation, this principle offers the advantage of open modeling. The user describes models, following a general accepted paradigm that ensures syntactic correctness, leaving the meaning to be specified by user-defined semantic functions that control the simulation.

For example, a module in an unfinished design can be characterized by constraints regarding its interaction to other modules; the constraints system is a model, open to be interpreted, thus implemented, differently, adapting to criteria in a non-monotonic logic. If one of the imposed properties (design constraints) is considered as not being fulfilled after applying a technique, using a model and suitable methods for measure and improvement, different strategies permit altering one of the technique/ model/ method. The process repeats for the initial behavioral specification or one resulted from prior insufficient improvement. This calls for an intelligent choice of the system that assists/ automates the design. The methods are recursive to handle different components in the behavior specification of the system. The process continuation is controlled by measurement functions, called for each of the improvement functions.

Explanation is an essential concept for knowledge-based systems. It can be expressed as proof in a deductive system, whose axioms are the equations constraining component models and input signals, theorems are simulation results, inference rules represent logic and domain-specific calculus. Using constructive logic, e.g., intuitionist predicate logic, behavior/ structure of the system can be extracted from the proof. All simplifying hierarchies contribute to the reaction, while knowledge hierarchy stores, analyses, locally integrates, informs the awareness realizing parts, and globally integrates. Interlevel relations in a knowledge hierarchy are interpreted as planning (top-down) and learning (bottom-up).

Learning derives a formal structure on the upper level, e.g., a static structure, from experiences on the lower level, i.e., procedures executed using resources that are not present at the upper level, e.g., time. It has two complementary aspects: induction and deduction.

- Induction transforms extensive knowledge on lower level into intensive knowledge at an upper level, using nonreflexive abstraction, e.g., approximation, isolation, equivalence, emphasis, and idealization.
- Deduction produces intralevel concepts, e.g., conditioning, association, stress, imitation.

Planning transforms declarative knowledge (formal, but limited) in partially procedural knowledge (unlimited, but implying a context with resources that are not formalized at the upper level; the main resource is time).

Artificial intelligence studies planning as reasoning about actions. Actions are elements of a lower level, generally represented by states (instances of upper level functions in the presence of a context) and operations (determining state transitions). The plan is a noncommutative system of declarative knowledge; extreme cases are rule set and sequential procedure.

REFLEXIVE ABSTRACTION

Mathematics contains structures that suggest to be used for self-referent models. The richest domain in this sense is functional analysis (Rudin 1973. It integrates algebra, topology and order: contractions and fixed points in metric spaces, reflexive normed vector spaces, inductive limits of locally convex spaces (Penrose 1994), self-adjoint operators of Hilbert spaces, invertible operators in Banach algebra. Let $(U, \{H_i \in S_h\})$ be a universe, structured by hierarchies H_i, and S_h the set of hierarchies defined on universe U:

- $H = (Rel_{eq}, \{(Level_j, Structure_j) | j \in S_l\}, Rel_{ord}, \{A_j | j \in S_l)$ is a generic hierarchy,
- S_l the set of hierarchy levels
- Rel_{eq} - equivalence relation generating the levels,
- $Structure_j$ - structure of level j,
- Rel_{ord} - (total) order relation defined on the set of hierarchy levels, and
- $A_j \in \{(x, y) | x \in Level_{j-1}, y \in Level_j\}, j \in S_l$ - the relation of abstraction.

U is a category, e.g., containing Hilbert spaces with almost everywhere-continuous functions as morphisms, enabling different ways to simulate self-awareness. A hierarchical formal system can be defined as:

$(U, \{H_i \in S_h\})$, $card(U) > \aleph_0$ //hierarchical universe
$\Sigma = F \cup L \cup A \cup K$ // functional objects
$F = \{f : f: U^* \rightarrow U\}$ // global functions
$L = \{f : f: Level_j^* \rightarrow Level_j\}$ // level structures
$A = \{f : f: Level_j^* \rightarrow Level_{j+1}\}$ // abstractions
$K = \{f : f: Level_j^* \times Level_{j+1} \rightarrow Level_{j+1}\}$
// knowledge abstractions
$I = \Sigma^* \cap R$ // initial functions
$R = \{r | r: \Sigma^* \times R^* \rightarrow \Sigma \times R\}$//transformation rules.

For example, considering self-adjoint operators as higher-level objects of the knowledge hierarchy, these levels can approach self-knowledge in the context of knowledge about the inferior levels as of the current one, and having some qualitative knowing about the superior levels. The correspondence problem, i.e., to associate the knowledge hierarchy to the simulation hierarchy, is managed by natural transformations over the various functors of the different hierarchies regarding the simulated system. To complete the simulation of the intelligence's components, intention is first determined by human-system dialog.

Further than modeling conscience to simulate intelligence, we have to try to comprehend inspiration, may be using Lebesgue measure on differentiable manifolds or unseparable Hilbert spaces. Perhaps even mathematics will have to develop more philosophy-oriented to approach intuition.

Conscience it is the link, in our mind, between what we are conscious of and what we are not. Presently, only the extended to Reason adaptability, and the unjustified Intention, are conscious. We can imagine an intelligent machine that looks like a human (robot <= labor, in Slavonic). It accumulates knowledge and behavior rules by preprocessing the senses, and it can change the interior defining rules (reconfigurable) corresponding to the behavioral (professional, ethical) knowledge that is considered most important, e.g., most recent or most decent. Therefore, it can consciously filter the actions that determine a new state of the context, what also means new knowledge to accumulate and to be conscious of (adaptability). It means, the dialog with the external environment determines the intentions. If the system had conscience, the external dialog would be more complex and interesting.

Consciousness only makes the adaptability more efficient, what, among others, transforms the human into the most powerful animal. Why do we compare the system without conscience with an animal, not to a human? It is true that we could compare it to an animal, if we had attributed intuition to it. However, what for should we do this, when the human just adapted to a consumption society? The built artificial objects and the socially useful natural objects send him the necessary messages to adapt consciously at the rising efficiency of the society. He neglects both the warnings from the superfluous Conscience and the unnecessary Intuition. If sometimes the two beasts shout too loudly, it is just unpleasant.

To be useful Intuition should be linked by Conscience to Intelligence, and intelligently bridled by Imagination. More, Intuition should also know to bridle by Intention the Adaptability. Whether he is human or animal, the human is anyway a machine, a social machine. His use is to contribute at the eternity, on an arbitrary level of evolution, of a materialistic consumption society. The evolution is for the human among humans, assisted by a reasonably organized society that develops by the human, for the human towards the Human. We said arbitrary level, however, if the educated and encouraged consumption were not strictly materialistic, the human himself would escape from the vicious circle together with the others. More, the present level is artificial in the human evolution.

The essential limit of discrete computability, inherited by the computational intelligence, is the necessity of self-reference to integrate the knowledge of the levels to that of the metalevels for modeling the Conscience. A hierarchical type representing reflexive abstraction can model the conscious knowledge and the knowing Consciousness, if it categorically collaborates with a simulation hierarchical type. We have to search and research for the aspects of the Reality, and of the human mind that reflects it, even if they are neither constructively nor intuitively expressible. The desire to stop the human evolution on arbitrary stages has no real argument. For the present, the evolution is forced to halt on a inhuman level, a consumption society transforming the society into a beehive without interest for Conscience and Faith, that most probably has been realized by destabilization of all revolutionary forms.

CONCLUSIONS

Conscience simulation demands the extension of computability to simulability. A way to begin is hierarchical analog-digital simulation. Applying "Divide et Impera et Intellige" to hierarchy types, and using the formalism of categories, reveals the comprehensive constructive importance of these types based on structural approach, symbolic meaning, object-oriented representation. Formalizing hierarchical descriptions, we create a theoretical kernel for self-organizing systems. *Simulability is computability using the power of continuum.* There are enough positive signs for this from analog electronics, control systems, mechatronics. Real progress toward this way to extend computation needs unrestricted mathematics, integrated physics, and thinking by analogies. Evolution needs separation of faith and intelligence, understanding, and using consciously more of faith's domain, integrating them to human wisdom, to be divided further to get more human. Metaphorically phrased, the current problem is that *God's ways are uncountable*. We can still hope that *His plans are hierarchical*.

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