FORMAL INFORMATIONAL PRINCIPLES

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This essay shows the formalization possibilities of principles by which informational formulas, that is, informational entities occurring in the happening, eventful circumstances, are constructed in a spontaneous and circular way. In this sense, the formation (forming) of informational formulas becomes phenomenal by itself, not only by the spontaneous and circular use of the discussed principles, but also through the principles-own phenomenality. Formal informational system is an informationally arising system and, in this respect, it differs substantially from the concepts of the so-called well-defined, symbol-static, mathematically axiomatized systems. It could be said that an informational systems is spontaneously and circularly adapting to the situation and attitude (intention) of itself and its environment by the impact of itself and environmental information.

In this essay the following principles and their formalization are discussed and illuminated in a critically formative and subsequent way: spontaneity, decomposition (analysis), composition (synthesis), circularity, particularization, universalization, sequentiality (serialness), parallelization, structuring, organization, algorithmic information, straightforward information, informing, counter-informing, embedding, excluding, metaphysics, and intelligent information of formulas and formal systems. These principles are used within the informing of formulas and formal systems themselves, that is, as principles of their informational arising.

Formalni informacijski principi. Ta spis prikazuje formalizacijske možnosti principov, s katerimi se konstruirajo spontano in cirkularno informacijske entitete, tako kot se pojavljajo kot dogodja oziroma dogodkovne okoliščine. V tej smeri postane formacija (oblikovalnost) informacijskih formul tudi sama fenomenalna ne le s spontano in cirkularno uporabo obravnavanih principov, temveč tudi zaradi principom lastne fenomenalnosti. Formalni informacijski sistem je informacijsko nastajajoč sistem in v tej svoji značilnosti se bistveno razlikuje od t.i. dobro definiranih, simbolno statičnih, matematično aksiomatiziranih sistemov. Lahko rečemo, da se informacijski sistem spontano in cirkularno prilagaja situaciji in atitudi (intenci) samega sebe in svojega okolja z vplivom samega sebe in okoliške informacije.

V tem spisu se v kritično formativni in zaporedni obliki obravnavajo tile principi in njihova formalizacija: spontanost, dekompozicija (analiza), kompozicija (sinteza), cirkularnost, partikularizacija, univerzalizacija, posledičnost (zaporednost), paralelizacija, strukturiranje, organizacija, algoritmična informacija, premočrtna informacija, informiranje, protiinformanje, vmeščanje, izključevanje, metafizika in inteligentna informacija formul in formalnih sistemov. Ti principi se uporabljajo v okviru informiranja formul in formalnih sistemov samih, to je kot principi njihovega informacijskega nastajanja.

INTRODUCTION

In the essay *Principles of Information* [POI], several general rules concerning informational phenomenality (phenomenology) are treated, for instance, the spontaneity, circularity, informing, counter-informing, embedding, sequentiality (serialness), parallelism, structuring, organizing, and intelligence of information. In the present approach, our attempt will be to deliver as strict as possible formalization of the discussed principles for the informational formula development within a concise, self-sufficient theory. Already within the algebraic informational theory [IIA], the basic informational principles came to the surface: the arising of formulas was accompanied, for instance, by the so-called operator particularization and universalization; further, some (unconscious) principles of spontaneous and circular decomposition of operands and composition of formulas were applied. However, these principles were not treated in a systematic, conscious, and straightforward manner. The aim of this essay is to present formal principles for the development of an informational theory. The principles of this sort can also constitute the so-called axiomatic basis of a theory for the informational formula development.

The basic approach at the formula development will be a spontaneous and circular procedure, which starts by an initial informational marker, that is, a single operand symbol or by a set of markers. The formula development will be a subject of the so-called decomposition and composition principles which embrace some other principles, for instance, those belonging to particularization and universalization, serialization and parallelization, circularity and straight-forwardness, spontaneity and algorithmic approach, embedding and excluding of information, metaphysics and intelligence, etc. Hitherto, no attempt for a systematic and meaning treatise of this sort of spontaneous and circular decomposition and composition of informational formulas within a theory was made. Thus, we are standing in the front of the task to develop adequate principles in a formal, that is, axiomatic, theoretic, and symbolically appropriating way, preparing and designing the way fo a senseful theoretical and technological approach. As always in those situations, we are confronted with the problem, how to begin this systematic way, how to preserve the reasonableness, adequateness, and openness of formula development, that is, of their spontaneous and circular arising.

THE PRINCIPLE OF SPONTANEITY

Spontaneity of information is the first principle in the set of basic informational principles. Spontaneity of a formula development concerns the formula decomposition as well as the formula composition. A formula is nothing else than a model, scenario, depiction, or description of a real, mental, or artificial process, phenomenon, situation, or attitude, expressed in the form of informational operands, operators, parentheses, and punctation marks, for instance. It means that in the process of decomposition of a formula as an arising entity its inner components can be identified (brought to the surface or clarity) in a spontaneous way. In the process of composition of a formula as an arising entity its outer counterparts, that is, it concerning entities can be introduced or identified in a spontaneous way.

The basic question within the phenomenon of informational arising is, who or what is the actor of decomposing and composing spontaneity. Formally, the spontaneous actor of the development of formulas can be, for instance, a theory itself, a natural or artificial system, or a living actor demonstrating the faculty of spontaneous developmental action in such or another way. For instance, to a beginning, marking entity, the spontaneity can chose other marking entities which appear within or outside of the beginning entity and connect them operationally into a more complex formal system. In this system, the beginning entity can become a part or component of the decomposed and/or composed system. We argue that spontaneity of this sort is a regular (legal, permissive) principle of decomposition and composition of informational formulas.

Let α be an initial marker, that is, a yet undeveloped formula, i.e., operand marker. The

spontaneous development of the simple formula α can take the following spontaneous informational form:

(1) α;
$\alpha \models \alpha$;
$\alpha \models \xi, \eta, \ldots, \zeta$;
$\beta, \gamma, \ldots, \varepsilon \models \alpha$

In this system of formulas, α as the first formula represents the initial position. The second formula, $\alpha \models \alpha$, shows the beginning of the so-called metaphysical decomposition [IT2] of entity α. The third formula, $\alpha \models \xi, \eta, \ldots, \zeta$, shows the beginning of a composition in which α impacts entities $\xi, \eta, \ldots, \zeta$ in an informational way. In the last formula of system (1), $\beta, \gamma, \ldots, \varepsilon \models \alpha$, entity α is informationally impacted by entities $\beta, \gamma, \ldots, \varepsilon$. The point of system (1) is that formulas in the second, third, and fourth line came into existence in a spontaneous way. This spontaneity can be ascribed to a theory or generative system marked by $\mathfrak{T}$. Thus, formula system (1) can be clarified in the form

(2) α;
$\mathfrak{T} \models (\alpha \models \alpha)$;
$\mathfrak{T} \models (\alpha \models \xi, \eta, \ldots, \zeta)$;
$\mathfrak{T} \models (\beta, \gamma, \ldots, \varepsilon \models \alpha)$

where the acting entity $\mathfrak{T}$, by which formulas in the second, third, an fourth line of system (1) are introduced in a spontaneous way, is explicated.

The following principles will show how spontaneity can come to its action, how it comes to the surface in cases of applications of other informational principles.

THE PRINCIPLE OF DECOMPOSITION

The decomposition concerns always an unrevealed (non-disclosed) entity α which is, simultaneously, the most simple, basic formula α, representing a potentially complex, compound, or composed entity. In formula α, entity α acts (behaves, informs) as a unit which indicates yet unidentified or at some other place identified (determined, revealed, composed) entity (for instance, an expression of meaning, contents, understanding). In this way, a single α as expression is a sign, indicator (in German, das Anzeichen, in French, indice) which can be circularly decomposed, as it will be shown. The basic presumption is that α, in the process of its decomposition, is merely an initial formula of the form $\alpha \models \alpha$, that is,

(3) $\alpha \Rightarrow (\alpha \models \alpha)$

where $\Rightarrow$ is the operator of informational implication and $\models$ is the most general operator of informing (of α). We call $\alpha \models \alpha$ the metaphysics of α, indicating the α-inner informational process; thus, this sort of decomposition is a metaphysical one and must remain in the framework of $\alpha \models \alpha$. If β is a part of α, that is, $\beta \subset \alpha$, then $\alpha \models \alpha$ can be decomposed into

(4) $(\alpha \models \beta) \models \alpha$

where the circularity (cyclicity) of α, that is, $\dot{\alpha} \models \alpha$, is preserved. The metaphysical cycle $\alpha \models \alpha$ can be decomposed (de-constructed, revealed, analyzed, differentiated) to an arbitrary extent, depth, intention and also in the form of distinct cycles, for instance,

(5) $(\alpha \models \beta) \models \alpha$;
$((\alpha \models \beta) \models \gamma) \models \alpha$;
$(\alpha \models \beta, \gamma) \models \alpha$

etc., ad infinitum.

The basic rule of decomposition is the following: entity $\alpha \models \alpha$ can be decomposed serially (sequentially) and in a parallel way preserving the basic form $\alpha \models \alpha$ in any recursively decomposed form $(\alpha \models \beta) \models \ldots \alpha$. This kind of decomposition can occur also in a parallel form, can have parallel pathways (formulas in parallel) of the form $\alpha \models \ldots \alpha$.

If formula $(\alpha \models \beta) \models \alpha$ was one of the general decomposition principles, the other decomposi-

tion principle is

(6) $\alpha \models (\beta \models \alpha)$

which preserves the cyclic nature in regard to α. This duality leads to the presumption

(7) $(\beta \subset \alpha) \Rightarrow (((\alpha \models \beta) \models \alpha; (\alpha \models (\beta \models \alpha)))$

Further, one can have

(8) $((\gamma \subset \beta); (\beta \subset \alpha)) \Rightarrow$
$((((\alpha \models \beta) \models \gamma) \models \alpha); (\alpha \models ((\beta \models \gamma) \models \alpha)))$

etc., in a recursive and mixed recursive way.

Decomposition of $\alpha \models \alpha$ in one or another way means the spreading of formula $\alpha \models \alpha$ in its serial and parallel components and the mutual connection of components and the topic entity α. Through decomposition, formula $\alpha \models \alpha$ can blow up in an analytical and synthetical way, within itself as a serial and parallel circular system of formulas of different kinds. To these components, also outer components, not belonging to α, can be considered, for they can influence α, that is, its structure and organization. For instance, if β does not belong to (is not a part of) α, that is, $\beta \not\subset \alpha$, entity β can influence the metaphysics of α in the form

(9) $\beta \models (\alpha \models \alpha)$

Formula (9) is the typical position, where entity β is observed by metaphysics $\alpha \models \alpha$, that is by α. We see how informational phenomena can impact the arising of the initial formula $\alpha \models \alpha$. By decomposition (spreading, de-construction, delivering, distribution, dissemination), new informational entities can be introduced into the context of the metaphysical formation $\alpha \models \alpha$. The process of metaphysical decomposition is spontaneous and remains in the realm of entity α. The complexity of decomposition (spreading) of $\alpha \models \alpha$ depends solely on the degree and depth of distinguishing and differentiation of new components within α and their connectedness. As mentioned before, decomposition can be the subject of a theory $\mathfrak{T}$, of an outward observer ω, or of a technical tool τ (which possess an adequate technical understanding). In this way, $\mathfrak{T} \models (\alpha \models \alpha)$ or $\omega \models (\alpha \models \alpha)$ or $\tau \models (\alpha \models \alpha)$ are senseful formulas which explicate the action of decomposition of $\alpha \models \alpha$ by $\mathfrak{T}$, ω, or τ, respectively. We recognize how $\alpha \models \alpha$ as a theoretic, observational, or technological object is in no way only a tautological affair; it is the essential starting point at its actual and always potentially possible development.

THE PRINCIPLE OF COMPOSITION

The composition of formulas concerns different informational operands (entities) and their interweavement, that is, their operational connectedness. A composition of operand and operator components in the form of a system of formulas constitutes a new entity. While decomposition (spreading) is in fact merely a more detailed identification (clarification) of an already existing system, composition is the emerging of a new system, defined as informational composition of already composed entities. In fact, the composition and decomposition of formulas can act in a mutually senseful, spontaneous and circular way.

For instance, the metaphysical form $\alpha \models \alpha$ of entity α is an open self-informing (impacting, observing) system which can be decomposed (particularized) in an arbitrary (intentional, comprehensional, unpredictable, phenomenal) detail. If α informs openly, that is, $\alpha \models$, and if β is informed openly, that is, $\models \beta$, then β can become the observer of α. In this situation, one can set $\alpha \models \beta$. Now, formula $\alpha \models \beta$ can be decomposed in greater detail considering the components of α, β and $\alpha \models \beta$, and connecting them within the system $\alpha \models \beta$. We recognize, how decomposition and composition of components become interweaved procedures, proceeding from a hiddenly composed entity into greater detail by decomposition and composing a system in which detailed parts of a problem are coming to the formal surface.

If α and β are separated entities, that is, $\alpha \not\subset \beta$ and $\beta \not\subset \alpha$, then their composition can take several (spontaneous) basic forms. For instance,

(10) $(\alpha, \beta) \Rightarrow (\alpha \models \beta)$;
$(\alpha, \beta) \Rightarrow (\beta \models \alpha)$;
$(\alpha, \beta) \Rightarrow (\alpha \models \beta; \beta \models \alpha)$

etc.

The principles of decomposition and composition of formulas can be grasped also in a pure grammatical sense, for instance, in the form of a system including the following rules:

(**0°**) Symbol α (e.g., α, β, ... , ω) marks an operand; symbol $\models$ marks the most general type of operator; symbols '(' and ')' are parentheses.

(**1°**) α, $\alpha \models$, $\models \alpha$, and $\alpha \models \alpha$ are formulas.

(**2°**) Each formula can be used as an operand (recursiveness of formulas).

By rules (0°), (1°), and (2°) any formula can be decomposed and/or composed, starting by the symbol α. Let us have the following developmental steps, for example:

(11) α;
$\alpha \models$;
$\alpha \models \beta$;
$(\alpha \models \beta)$;
$(\alpha \models \beta) (\models$;
$(\alpha \models \beta) (\models \gamma$;
$((\alpha \models \beta) (\models \gamma)$;
$\models ((\alpha \models \beta) (\models \gamma)$;
$\gamma \models ((\alpha \models \beta) (\models \gamma)$

etc. A parallel case could be the following:

(12) α; β;
$\alpha \models$; $\models \beta$;
$\alpha \models \beta$; $\gamma \models \beta$;
$(\alpha \models \beta)$; $(\gamma \models \beta)$;
$(\alpha \models \beta) \models (\gamma \models \beta)$; $\delta \models (\gamma \models \beta)$

etc. The parallel has the meaning of introduction of parallel (newly appearing) formulas within a formula system.

THE PRINCIPLE OF CIRCULARITY

Circular schemes (scenarios, models, phenomena, processes, situations, attitudes) in the form of formulas can appear in various ways. By definition, an informational entity α itself is a circular phenomenon. The basic form of this circular phenomenality we call the metaphysics of α and denote it symbolically by $\alpha \models \alpha$. In a formula, the circularity of an entity α is expressed by the repeatedly appearing operand α in this formula. Formula $\alpha \models \alpha$, which marks the α's metaphysics, can be decomposed only by the extension of operator $\models$ in such a way that at the beginning and at the end of the decomposed (extended) formula there is operand α, for instance, $(\alpha \models \beta) \models \alpha$ or $\alpha \models (\beta \models \alpha)$. In the first case, process $\alpha \models \beta$ informs α; in the second case, entity α informs process $\beta \models \alpha$; in both cases entity α is involved circularly, but differently.

A different form of circularity is the parallel one. Parallel circular schemes are, for instance,

(13) $\alpha \models \beta; \beta \models \alpha$;
(14) $\alpha \models \beta; \beta \models \gamma; \gamma \models \alpha$

etc. Formula (13) shows the parallel circularity of the first degree, formula (14) of the second degree, etc. The so-called metaphysical circularity is the serial one, and is, accordingly to the extent of decomposition, of a higher degree (of greatest possible detail). Circularity of an operand α means its recursive appearance in formulas in a serial or parallel way.

The serial and parallel type of circularity occurs at the design of formulas in a natural (spontaneous) way. For instance, the metaphysical circularity of α, that is, $\alpha \models \alpha$, can be expressed (expanded, broadened) by its informing $\Im$, counter-informing $\mathbb{C}$, and embedding $\mathfrak{E}$ of information α, counter-information γ, and embedding information ε, respectively. Various kinds of schemes representing this metaphysical phenomenality of α can be appropriated. The most common (universal) one could be, for instance,

(15) $(((((\alpha \models \mathfrak{S}) \models \gamma) \models \mathfrak{S}) \models \varepsilon) \models \mathfrak{S}) \models \alpha$

However, several other metaphysical schemes can emerge during the process of decomposition, the serial as well as parallel ones.

Another, not necessarily metaphysical type of circularity of α concerns the so-called understanding $\mathfrak{U}$, which can appear as an intelligent component of informing $\mathfrak{S}$ within α. Usually, understanding $\mathfrak{U}$ produces (informs) a meaning μ_α of the understood situation inside of α and outside of α by α. Thus, a basic scheme of the understanding formula is

(16) $((\alpha \models \mathfrak{U}) \models \mu_\alpha(\xi)) \models \alpha)$

where ξ can concern α as well as an outside entity β or both of them. Of course, parallel metaphysical as well as understanding schemes of formulas can be constructed accordingly to the needs, concepts, and scenarios of the imagined reality. The process of the circular decomposition and composition of formulas is always a recursive one for some existing and arising operands and, in any case, parallel (new, additional) formulas for describing circular and non-circular (straightforward) phenomena can be introduced.

THE PRINCIPLE OF PARTICULARIZATION

Particularization of formulas is a procedure which proceeds from a general concept into more concrete detail of given phenomena in a decomposing way. Thus, in general, universal formulas are extended into corresponding particular forms. Particularization can be performed simply on the operator level when a general operator in a formula is replaced by an adequate particularized operator. Particularization concerns decomposition as well as composition of formulas (their sequentiality and parallelization) into more accurate detail in the sense of a descent to a sufficiently adequate concreteness. The terminal situation of a particularization is achieved through a stepwise procedure, descending in the imagined detail of a problem. Particularization is always a top-down construction of a formula (system), that is, from the beginning-general to the particular.

Particularization can also add formulas, operands, and operators to existing systems of formulas with the aim to concretize, analyze, explain, and complete the expression of concepts, scenarios, positions, attitudes, etc. In such procedure of formula development, other principles of informational development can be used (spontaneity, circularity, sequentiality, parallelism, etc.). The most simple act of particularization is the replacement of a general operator by the particularized one which, in an adequate manner, explicates the nature of informational impact between the concerned operands. In general,

(17) $(\alpha \models \beta) \Rightarrow (\alpha \models_{\text{part}} \beta)$

is a scheme of operator particularization. For instance, a theory, several concerned entities by themselves, or an outer observer can be imagined to be the actors of a particularization process.

THE PRINCIPLE OF UNIVERSALIZATION

While particularization concerns a top-down strategy of formula fitting concerning the problem, universalization is a bottom-up search from already concretized situations to the generalized ones. Universalization does not mean a simple replacement of a concrete formula by the general one; it is an introduction of new formulas which express general relations between operands and can be, afterwards, particularized again. Universalization introduces universal processes of informing into the context of a formula development. It performs as a bottom-up construction of formula system being on the way from the concrete to more general.

Particular cases can always signalize universal possibilities of their phenomenality. On the operator level, the universalizing principle can be the implication

(18) $(\alpha \models_{part} \beta) \Rightarrow (\alpha \models \beta)$

In this situation, the particular case $\alpha \models_{part} \beta$ is in no way neglected; it does not vanish necessarily from the observed system of formulas. But, the introduced general formula $\alpha \models \beta$ can now be decomposed in a new, different way in the form of a parallel phenomenon. Universalization can be understood as a spontaneous principle in the domain of a theory $\mathfrak{T}$, an observer ω, or a technical tool τ. In the universalization formulas, the general operator of implication $\Rightarrow$ can be particularized, for instance,

(19) $(\alpha \models_{part} \beta) \Rightarrow_{\mathfrak{T}} (\alpha \models \beta)$;
$(\alpha \models_{part} \beta) \Rightarrow_{\omega} (\alpha \models \beta)$;
$(\alpha \models_{part} \beta) \Rightarrow_{\tau} (\alpha \models \beta)$

yielding general schemes of the so-called operator universalization.

THE PRINCIPLE OF SEQUENTIALITY (SERIALIZATION)

Sequentiality concerns a serial development (composition, decomposition, circularity, particularization, universalization, etc.) of formulas under consideration. Circular sequentiality leads to the recursiveness of the occurring of operands. For instance, metaphysics, memory, self-constructive informational systems, preservation of a situation (a thing, body) or attitude (mind, consciousness), etc. can be recognized as sequential and, simultaneously, circular phenomena. The sequentiality of a phenomenon can be expressed also in a parallel circular way. Thus sequentiality in regard to the form of a formula or a formula system is twofold: serial (expansion of a formula by insertion of operands and operators) and parallel (expansion of a formula systems by formulas which within the left sides of operators $\models$ have operands already occurring in the existing formulas).

The development of a serial sequentiality in the formula $\alpha \models \beta$ can be shown in a stepwise manner by the following example:

(20) $\alpha \models \beta$;
$(\alpha \models \beta) \models \gamma$;
$(\alpha \models (\beta \models \delta)) \models \gamma$;
$(\varepsilon \models (\alpha \models (\beta \models \delta))) \models \gamma$

etc. A twofold circular expansion of the last formula in system (20) would be the case

(21) $((\varepsilon \models ((\alpha \models (\beta \models \delta)) \models \varepsilon)) \models \gamma) \models \alpha$

where the sequential circular expansion concerns α as well as ε which recursively appear in formula (21). While entity ε seems to form a proper subcycle of formula (21), entity α is a cycle which improperly enters into the ε-cycle, performing an interweavement of α-cycle and ε-cycle.

Sequentiality can concern the sequential depth structure of a formula, descending not only into a greater detail of a formula through serial analysis and structuring, but also interweaving sequential structures among themselves in any imagined way. At such structuring of a formula also some parallel cases of formulas can emerge, being the consequence of the depth analysis of an original formula. New, additional formulas can expose the faculty of the so-called parallel sequentiality which, in the most primitive case, can have the following form:

(22) $\alpha \models \beta; \beta \models \gamma; \gamma \models \delta$

etc. Parallel sequentiality can become circular, if to formula system (22), formula

(23) $\delta \models \alpha$

or any similar formula concerning the occurring operands in (22) is added.

The principle of sequentiality belongs to the most primitive approaches of the serial formula development, which considers the understanding of a formula and positions and attitudes of its operands. In short, this procedure of development can be called also the formula serialization.

THE PRINCIPLE OF PARALLELIZATION

Parallelization means introduction of parallel formulas by decomposition and composition of a formula; at this occasion parallel formulas emerge as a consequence of the depth analysis, synthesis, and splitting of a formula situation. The emerged formulas broaden a formula system and connect the arisen operand entities in a parallel or some other way. Through parallelization, a formula system becomes not only more complex, but also additionally interweaved, where interweavement concerns the arisen and the existing operand entities.

The principle of parallelization embraces the parallel composition and decomposition in a spontaneous, circular, particular, universal, and other ways. Parallelization means the growing in number and extent of informational components (operands and operators) and their interweavement through splitting the operand situations and attitudes. Parallel decomposition of a process, phenomenon, scenario, etc. is a splitting of the imagined (understood, comprehended, appearing) process, phenomenon, scenario entirety into parallel, interconnected entities. As an example, the following developmental steps within a parallel decomposition can occur:

(24) α;
$(\beta, \gamma \subset \alpha) \Rightarrow (\alpha \models \beta, \gamma)$;
$\alpha \models \alpha$; $(\alpha \models \beta, \gamma)$;
$(\delta, \varepsilon \not\subset \alpha)$; $(\delta, \varepsilon \models \alpha)$;
$\beta \models \delta$; $\gamma \models \varepsilon$

etc. The first formula α is the initial situation. By the second formula, entities β and γ within entity α are observed. This fact implies that components β and γ are informed by α. The third formula opens the possibility of metaphysical decomposition of α by $\alpha \models \alpha$ and explicates formula $(\alpha \models \beta, \gamma)$ which was implied by the second formula. The fourth formula observes that entities δ and ε are not the constituents of α, however, they impact α as the outer components. The fifth formula introduces the informing of δ by β and ε by γ, etc. A sequential (serial) consequence of the last parallel system can be the following:

(25) $((\delta, \varepsilon \models \alpha) \models \beta, \gamma) \models \delta, \varepsilon$

etc. If, consequently, entities δ and ε become parts (constituents) of α's metaphysics $\alpha \models \alpha$, system (25) closes into

(26) $(((\delta, \varepsilon \models \alpha) \models \beta, \gamma) \models \delta, \varepsilon) \models \alpha$

although in system (24), initially, $\delta, \varepsilon \not\subset \alpha$ was assumed.

Parallelization of formal systems can offer new interweavement of entities which can be in contradiction with the initial situation. A parallel decomposition brings to the surface new informational attitudes which may neglect or annul the initial conditions or force the observer to resolve the emerged contradictory situations, i.e., to change the observational conditions. Parallelization, as an introduction of parallelism of formulæ belongs to the most intelligible natural and artificial phenomena.

THE PRINCIPLE OF STRUCTURING

Structuring a system of formulas means to apply the principles of decomposition and composition, particularization and universalization, sequentiality and parallelization in a spontaneous and circular way. Structuring of a formula system can use, mix, and connect the discussed principles and those which follow. It can be said that the structuring as an active entity structures the already structured system to some extent, gains the arising of structure. Structuring is an informational component in the realm of information, where the principles of information [POI] are closed under information, that is, underlie the logic of informational arising.

Structuring means to restructure and to structure anew a structured informational system. Structuring acts like an informational component with characteristic informing, that is processing of structuring information which leads to a new structure. Structuring is a composed and complex use

of singular principles of information.

Structuring can get its concrete sense as a particular, that is, informationally determined form or process of shaping, arising, emerging of an informational system in a structural way. For instance, structuring $\mathfrak{S}$ as a structuring activity and potentiality belongs to the structure entity σ which informs $\mathfrak{S}$ how to structure a primitive or system entity α in question. Thus, primordially,

(27) $(\sigma \models \mathfrak{S}) \models \alpha; \alpha \models \sigma$

where σ observes α, that is, its structure σ_α and where σ_α serves as the reference for structuring α. Thus, one can imagine,

(28) $(\alpha \models \sigma) \models \sigma_\alpha;$
$(\sigma_\alpha \models \sigma) \models \mathfrak{S};$
$\mathfrak{S} \models \alpha$

or, in a cyclic form,

(29) $((((\alpha \models \sigma) \models \sigma_\alpha) \models \mathfrak{S}) \models \alpha) \models \sigma$

The last scheme represents two perplexed cycles concerning the entity to be structured, that is, α, as well as the structuring entity σ. This scenario performs as long as the structure entity σ is not satisfied with the structure σ_α. In this function, entity σ can use a reference or dynamic understanding of σ_α for the decision making how to structure α and since when to stop the structuring of α. A concrete process of structuring can be particularized to any necessary extent (detail), thus, specifying the process of structuring of the entity in question.

THE PRINCIPLE OF ORGANIZATION

A strict distinction between structure and organization remains vague. In some way, however, it is possible to differentiate the phenomena of structuring and, as a consequence of a structure, the arising of organizational relations, for instance, the interweavement of structural informational entities, by which the nature of connectedness, impact, dependence, conditionality, etc. comes into existence. Organization means a supplement in the understanding of structure of a formula system. Informationally, structuring causes the so-called organizational relations which are nothing else than the additional, to the structure occurring informational processes. Thus, the arising organization seems to be a consequence of the structure introduced by an informational entity.

What could the organization of a formula system, which is a structure of operands, operators and formulas, mean at all? How could the clear difference between the structure and organization of a formula system be observed?

The structure of a formula system could be grasped as a visible arrangement, dispósition, and appearance of operands, operators, and their formulas. Of course, the structure of a formula hides also the meaning of structuring and the comprehension of occurring formula components. The structure of a formula is a consequence of structuring (grammatical, syntactic) rules, which govern the composition of formula constituents (operands and operators).

The organization of a formula concerns its depth structure which is not only grammatical. Organization is related to the interweavement of meaning and understanding of occurring operands and operators, their parallel and circular connectedness and to the impact of occurring organizational forms with processes of decomposition and composition, that is, with the arising of informational formulas. In a semiotic way, organization is an arrangement of operands and operators in a semantic and pragmatic manner, is also a semantic and pragmatic (spontaneous) disposition of operands and operators in a formula. The observing organizational view can cause the arising of new formulas within a formula system. For instance, explaining a system of formulas through the addition of formulas represents an organizational decomposition of the system. Organizing seems to be a particular view of structuring and vice versa. Both, structuring and organizing, are compositional as well as decomposing principles which can enrich, broaden, advance, and complete

a system of formulas under investigation.

The first look at a formula system can be merely structural; afterwards, through study, analysis, and development of the system, the first look becomes more and more organizational. If structure is a sort of system identification, organization is the understanding of the structural meaning. This is the well-known cycle, which comes into existence between the structural meaning and organizational understanding. This cycle gains the development of structure and organization of a formula system in a structuring and organizing way.

Let us imagine the following structure (σ) and organization (o) development system ϑ for a formula system φ:

(30) $(\vartheta \models ((((\varphi \models \sigma) \models (\mathfrak{S} \models \varphi)) \models o) \models (\mathfrak{D} \models \varphi))) \models \vartheta$

Formula (30) describes a circular development system (ϑ) with two significant development subprocesses, which are structuring ($\mathfrak{S} \models \varphi$) and organizing ($\mathfrak{D} \models \varphi$) of the formula system φ. However, the development of a formula system φ can be expressed also in a traditional parallel form, for instance, as

(31) $\varphi \models \sigma(\varphi)$;
$\sigma(\varphi) \models \mathfrak{S}$; $\mathfrak{S} \models \varphi$;
$(\sigma(\varphi), \varphi \models o(\varphi)) \models \mathfrak{D}$; $\mathfrak{D} \models \varphi$;
$(\mathfrak{S}, \mathfrak{D} \models \vartheta)$; $\vartheta \models \varphi$

where $\sigma(\varphi)$ and $o(\varphi)$ are the intentional structure and organization of formula system φ and, $\mathfrak{S}$ and $\mathfrak{D}$ the structuring and organizing mode of the development system ϑ, respectively. This development system seems to be φ-circular and the improvement (learning, adaptation) of ϑ is governed by structuring $\mathfrak{S}$ and organizing $\mathfrak{D}$, however, still remaining within the cycle of development of φ.

THE PRINCIPLE OF ALGORITHMIC INFORMATION

Algorithmic information is a well-determined, self-sufficient entity which can be repeatedly applied (understood, used) as a clear, data-stable, definitive recipe (procedure, process) for solving a certain type of problem. Particular algorithmic information is, for instance: mathematical algorithms for various purposes (solving of equations, calculating values, deducing and proving of theorems, developing theories, searching for axioms and principles, etc.); computer programs expressed in different programming languages (well-structured application programs, expert systems, artificially intelligent tools, etc.); and theories of sciences, in general, which have to deliver reliable and repeatable results and predictions. The principle of algorithmic, that is, well-defined, disciplinarily structured, or scientifically doctrinaire information pervades the entire realm of mathematics, computer science, and sciences in general. Furthermore, a certain piece of algorithmic information guaranties that the process it describes can be effectively transferred to a technical tool (automatic equipment, robot, computer, etc.). The contents and structure of an algorithmic information can be always applied, understood, or learned by a materially realized technical tool or a mental system.

Algorithmic information belongs to the so-called realm of data. In contrast to information, data informs in an identical (repeatedly, definitively regular) way and depends only on data, that is, on well-defined arguments. Algorithmic information is not informational yet in the sense of informational arising. Algorithmic information performs as a functional or procedural determined data structure for handling data. But, data δ as a function or argument [IT2] is nothing else than

(32) $\delta \Leftrightarrow_{Df} (\delta \models, = \delta)$

which initial metaphysical form is $\delta = \delta$. Algorithmic information performs as a tool for solving a kind of problem irrespective of the values of arguments which inform (impact) algorithmic in-

formation (procedure, program) in differently occurring situations.

THE PRINCIPLE OF STRAIGHTFORWARD INFORMATION

The main characteristics of a straightforward information is that it is not explicitly circular. For instance, formula $\alpha \models \beta$ is straightforward while $\alpha \models \alpha$ is not. Irrespective of the extent of decomposition, a metaphysical information as a whole cannot be straightforward. Implicitly, the circularity of straightforward information occurs. For instance, within $\alpha \models \beta$, informational entity α as well as β are circular. Also, the parallel circularity of the system $\alpha \models \beta; \beta \models \alpha$ does not violate the principle of straightforwardness. Thus, consequently structured parallel systems can keep the principle of straightforwardness. This principle excludes any explicitly circular scheme (formula, scenario). To achieve the state of straightforwardness of a formula system, circular formulas can be decomposed in an adequately parallel way. However, this could mean to reduce a natural scenario into an artificial model.

In most cases, both principles of circularity and straightforwardness will be used at the decomposition and composition of formulas together with other principles. The straightforwardness means the hiding, concealment, and placing out of sight the circularity of operands. This happens in a natural way at speaking, writing, and thinking in any language. It may happen that clearly parallel cases of an implicitly circular structure are interrupted. The best examples of this sort are the so-called concepts of words in a dictionary. A word is rarely defined (conceptualized) by itself. However, in a semantic net of words, circularity (tautology in a transitive sense) always exists. Thus, the principle of the so-called straightforward information is, in fact, the vagueness (hiding) of the circular nature of informational entities in question.

The sciences are inclined to the straighforwardness because it enables the abstraction by simplification and reduction, or a satisfactory explanation of otherwise circularly (recursively) perplexed phenomena. The principle of straightforward information concerns a unidirectional, shortened, and decisively unambiguous way to the solution of a problem.

THE PRINCIPLE OF INFORMING

Informing of things is the most basic principle in the realm of information. It says that an informational entity α informs and is informed and thus implies the system

(33) $\alpha \models; \models \alpha$

This system determines entity α in its actual and potential entirety [IT2], irrespective of its material, mental or, in general, phenomenal nature.

Informing of entity α, that is, $\Im_\alpha$ or simply $\Im$, can be observed explicitly; it is implicitly present in operator $\models$, that is, in formula $\alpha \models$ as well as formula $\models \alpha$. Thus, entity α can be decomposed in regard to its informing $\Im$. The following straightforward implication seems to be reasonable:

(34) $\alpha \Rightarrow (\Im \subset \alpha; \alpha \models \Im; \Im \models \alpha)$

It says that informing $\Im$ is a constituent of α, however, α and $\Im$ inform each other and are informed by each other. Another form of informing $\Im$ within α can be conceptualized circularly, for instance, as

(35) $\alpha \Rightarrow ((\alpha \models \Im) \models \alpha)$

This circular scheme presumes that informing $\Im$ is a subordinated (subjected) component of α and, certainly, that $\Im$ informs α circularly. Thus, the following implication in regard to the initial situation described by (35) seems to be reasonable:

(36) $((\alpha \models \mathfrak{Y}) \models \alpha) \Rightarrow (\mathfrak{Y} \subset \alpha; \alpha \subset \mathfrak{Y};$
$((\mathfrak{Y} \models \alpha) \models \mathfrak{Y}));$
$((\mathfrak{Y} \models \alpha) \models \mathfrak{Y}) \subset ((\alpha \models \mathfrak{Y}) \models \alpha)$

Here, the cycle of informing $((\mathfrak{Y} \models \alpha) \models \mathfrak{Y})$ is subordinated to the main (origin) cycle $((\alpha \models \mathfrak{Y}) \models \alpha)$. Both, entity α and its informing $\mathfrak{Y}$ are parts of each other within the eventfulness (happening of informing) of α. That α and $\mathfrak{Y}$ are parts of each other means that they mutually and perplexedly exchange the roles of subject and object: if in one of the events of α, α impacts $\mathfrak{Y}$, then in another event, $\mathfrak{Y}$ impacts α, or they may impact each other even simultaneously, that is, in the way of a proper (simultaneous) interaction.

It is to say that informing $\mathfrak{Y}$ of α is not or cannot be exhausted in a decomposing way. Entity α and its informing $\mathfrak{Y}$ can hide various forms of entities and to them belonging informing. The most general components are, for instance, counter-informing of counter-information and embedding of information by the so-called embedding information. These cases will be treated separately in the next two sections and together with informing as the whole, in the framework of metaphysics of an informational entity.

THE PRINCIPLE OF COUNTER-INFORMING

The principle of counter-informing is an attempt to grasp the arising or coming of information into existence through an explicit (revealed, disclosed) happening of an informational event. Within informing $\mathfrak{Y}$ of entity α, counter-informing $\mathfrak{C}$ is the recognizable entity within $\mathfrak{Y}$, which is directly concerned with the arising of information, called counter-information γ. Counter-informing $\mathfrak{C}$ is nothing else than informing of counter-information γ, of course, within the entity α and its informing $\mathfrak{Y}$, respectively.

While it has just arisen or it is still arising, counter-information γ as a distinctive entity within α which is not informationally connected (embedded in respect) to entity α yet. It performs as an isolated entity within α as long as it is not embedded (informationally connected) by virtue of the so-called embedding information ε. The similar holds for counter-informing $\mathfrak{C}$ within informing $\mathfrak{Y}$. So far, counter-informing $\mathfrak{C}$ is an isolated part of informing $\mathfrak{Y}$ of entity α.

We see that to be a part of something, but to be not connected to something, means simply to be not embedded in something. This is the characteristics of an informationally isolated part of something. It means that an entity can produce a subentity within itself which does not impact the entity itself yet. The arisen, isolated part of an entity has to be connected to or embedded into the entity to contribute to the arising of the entity as an integrated, whole thing of its parts.

We have to introduce a particular operator for the so-called not connected informing, for instance, $\not\subset_{con}$. Thus, at the arising of counter-informing $\mathfrak{C}$ within informing $\mathfrak{Y}$ and at the arising of counter-information γ within entity α, we have the following situation:

(37) $\mathfrak{Y} \models \mathfrak{C}; \mathfrak{C} \subset \mathfrak{Y}; \mathfrak{C} \not\subset_{con} \mathfrak{Y};$
$\alpha \models \gamma; \gamma \subset \alpha; \gamma \not\subset_{con} \alpha;$
$(\mathfrak{Y} \models \alpha) \models \mathfrak{Y}$

The isolated counter-informing $\mathfrak{C}$ performs in regard to $\mathfrak{Y}$ as a strange (unconscious), to $\mathfrak{Y}$ yet unobserved entity, which produces the unobserved counter-information γ. It means that in the first step of counter-informational arising there is no observing in the form

(38) $\mathfrak{C} \models \mathfrak{Y}; \gamma \models \alpha$

or, explicitly,

(39) $\mathfrak{C} \not\models \mathfrak{Y}; \gamma \not\models \alpha$

Operator $\not\models$ explicates the non-informing or non-observing situation. The observing in the sense of formula (38) occurs after the so-called embedding of counter-informing $\mathfrak{C}$ into informing $\mathfrak{Y}$ and counter-information γ into entity α in question. After the process of embedding, both counter-informing $\mathfrak{Y}$ and counter-information γ lose the

status to be counter-informational entities. They become regular informing and regular information, respectively.

Counter-information must be understood as the possible increase of an informational entity when the process of embedding of counter-informational components into the original informational entity is taking place. Counter-information γ is that informational entity which arises out and within of the informational entity α by virtue of its open informing $\Im$, that is, as a parallel open system

$$(40)\quad \alpha \Rightarrow ((\alpha \models \Im) \models; \models (\alpha \models \Im); (\Im \models \alpha) \models; \models (\Im \models \alpha))$$

The adequate circular, parallel, and open system would be, for instance,

$$(41)\quad \alpha \Rightarrow (((\alpha \models \Im) \models \alpha) \models; \models ((\alpha \models \Im) \models \alpha); ((\Im \models \alpha) \models \Im) \models; \models ((\Im \models \alpha) \models \Im))$$

The counter-informing as the phenomenon of informational arising can take place within system (40) or (41).

THE PRINCIPLE OF EMBEDDING

The embedding of information can be understood as the act of reception, observation and/or, finally, the perception of information by an entity. The process of embedding is an accumulative and integrative process in informational sense regarding the entity in question. It is the basic principle of appropriation of information by information. By embedding, the outside or inside unconnected information comes into consideration by the entity which embeds.

The embedding itself proceeds from the basic informational assumption $\alpha \Rightarrow (\models \alpha)$. The question is: which information comes from others and the entity itself as that which has to be embedded? In other words, what are the other things and the thing itself for the thing itself? Or, how to the general question *What is a thing for other things?* the antisymmetric (inverse) question *What are things for the thing in question?* can be considered as the origin question concerning the embedding of information?

The concept of embedding proceeds from formula $\models \alpha$ in the sense

$$(42)\quad \alpha, \beta, \gamma, \ldots \models \alpha$$

This formula illustrates a (partial) process by which entities α, β, γ, ... are in the process of embedding, where entity α observes them and can be impacted by their informing. The potentiality of embedding can be expressed, for instance, by formula

$$(43)\quad \alpha, \beta, \gamma, \ldots \models (\models \alpha)$$

or by implication

$$(44)\quad (\alpha, \beta, \gamma, \ldots \models (\models \alpha)) \Rightarrow (\models (\alpha, \beta, \gamma, \ldots \models \alpha))$$

Embedding of information means the modus of information for itself (in contrary to information for others).

THE PRINCIPLE OF EXCLUDING

How can informational entity β be or how can it stay excluded in regard to an entity α? Entity β is excluded in regard to α if it does not inform α in any way. Thus the exclusion principle could be symbolized by

$$(45)\quad \beta \not\models \alpha$$

Operator $\not\models$ is a symbol for a certain non-informing. However, *how does β not inform α?* could be another question. In fact, an explicit form of non-informing between entities can be understood already as a particular case of informing between entities. Immediately we speak out a case of non-informing, we have to do with a particular form of informing.

The proper case of the exclusion of information could be the vanishing, disappearing, forgetting

and, certainly, non-observing of certain information.

THE PRINCIPLE OF METAPHYSICS

In regard to the entity as entity, the metaphysical as a thing has the meaning of to be entirely concerned with the entity itself, that is, with the thing within the thing itself, however, still in an open, environmentally impacted manner. For instance, an observing thing as observer always produces its metaphysical information, that is, it observes the observed thing by its metaphysics or metaphysical components. To understand the principle of metaphysics μ, one has to observe several metaphysical phenomena. If α is one of the metaphysical components within entity β, we use the symbolic notation $\alpha \subset_{\mu} \beta$. Then the following can be observed:

knowledge $\subset_{\mu}$ belief;
belief $\subset_{\mu}$ truth;
truth $\subset_{\mu}$ logic;
logic $\subset_{\mu}$ language;
language $\subset_{\mu}$ mind;
mind $\subset_{\mu}$ central_nervous_system

etc. We see how metaphysical components are (hierarchically) nested (already partly embedded) in each other. For instance, belief roots partly in knowledge (is informed by it); truth is a consequence of belief and knowledge. The conscious of truth impacts the arising of logic. Language is the eventfulness for knowledge as well as belief and truth. Mind is the home of language, where language (for instance, speech acts, writing) creates mind. The central nervous system arises under the impact of the mentioned metaphysical components. All of these components are circular and spontaneous, structured and organized, autonomous and interactive.

However, not only mental phenomena (knowledge, belief, truth, logic, language, mind, central nervous system, etc.) are understood to be metaphysical. Regardless of its nature, every thing has its metaphysics, that is, the inner phenomenality (processing, form) of thing [IT2]. From the point of view of language, the human logic is always metaphysical. The mind as the entire mental phenomenality is metaphysical too from the point of view of the central nervous system. For instance, the consciousness of man can never surpass the mind in a non-metaphysical way. Thus, for man, there is not possible to think outside of a his/her metaphysical (mind-concerning, neuronal, autopoietic) background. Metaphysics is the beginning and the end of each informational (philosophic, rational, irrational, scientific, etc.) phenomenality. It can develop, arise, reach any metaphysical point, concern, achievement, development as an open, environmentally impacted system, but cannot surpass its instant potentiality and actuality in the framework of its instantaneous openness and (informational) arising.

Metaphysics is one of the four specific modes of informing of things. It is senseful to list these modes to keep the insight into the problem of informing and the context of informing in which metaphysics can be distinguished among other phenomena concerning the informing of things in general. In the case of entity α, we clearly distinguish:

(46) $\alpha \models; \models \alpha$ as entity α *itself;*
$\alpha \models$ as entity α *for others;*
$\models \alpha$ as entity α *for itself;* and
$\alpha \models \alpha$ as entity α *in itself.*

As we see, the essential attributes of these distinctions are: *itself, for others, for itself,* and *in itself.* All four modes of informing are open:

(47) $((\alpha \models; \models \alpha) \models; \models (\alpha \models; \models \alpha))$;
$((\alpha \models) \models; \models (\alpha \models))$;
$((\models \alpha) \models; \models (\models \alpha))$;
$((\alpha \models \alpha) \models; \models (\alpha \models \alpha))$

Now, these modes of informing of entity α can be applied to metaphysics $\alpha \models \alpha$ as an informing entity. Thus, it is possible to distinguish the following:

(48) $((\alpha \models \alpha) \models; \models (\alpha \models \alpha))$ as *metaphysics itself;*
$(\alpha \models \alpha) \models$ as *metaphysics for others;*
$\models (\alpha \models \alpha)$ as *metaphysics for itself;* and
$((\alpha \models \alpha) \models (\alpha \models \alpha))$ as *metaphysics in itself.*

These formulas can have sense in the framework of the metaphysical decomposition.

Proceeding from $\alpha \models \alpha$ as a metaphysical situation of α means first of all that α informs α and that formula $\alpha \models \alpha$ is not only an ontological expression in the sense α *is* α, but also α *is not* α. Why the second, negative statement is senseful? Because $\alpha \models \alpha$ means that α changes itself through its informing and that a comparison of a state of α by its subsequent state never gives a statement of the type α *is equal* α, that is $\alpha = \alpha$. This comment explains the reasonableness of introducing the metaphysical, in fact, ontological formula $\alpha \models \alpha$.

The metaphysical is always concerned with the auto-cyclicity in an open way. The so-called metaphysical components, that is, components of a metaphysical entity α, have the metaphysical structure in itself. For instance,

(49) $(\beta \subset_{\mu} \alpha) \Rightarrow ((\beta \models \beta) \subset (\alpha \models \beta))$

or also

(50) $(\beta \subset_{\mu} \alpha) \Rightarrow ((\alpha \models (\beta \models \beta)) \models \alpha)$

If γ is an outer component which impacts α, then, in general, it can also impact the components of α. In this case, formula (50) becomes

(51) $(\gamma \models \alpha; \beta \subset_{\mu} \alpha) \Rightarrow ((\gamma, \alpha \models (\beta \models \beta)) \models \alpha)$

In the last formula, entity γ, which impacts α, is a distinguished outer component, which is not impacted by α. It means that α, together with its component β, as the metaphysical observer of γ, does not impact γ so far. In every case of observation, a thing α can observe its environment and/or the thing itself only in a metaphysical way, that is, through (the decomposition of) $\alpha \models \alpha$.

THE PRINCIPLE OF INTELLIGENT INFORMATION

Intelligent information, marked by ι, belongs to metaphysical information. It appears as as a part of a thing's metaphysics, that is, as the so-called intelligence of things (beings, minds, programs) which can understand things and can be understood by intelligent things. Thus, things appear to an intelligent information as to be intelligible, that is, apprehensible by the observing thing. Intelligent information performs in an observing and self-observing way. Concerning its arising, emerging, coming into existence, and unforeseeableness, it is thrown into counter-informational situations where it tries to solve some environmentally and by itself impacted problems, searching for an intelligent meaning and understanding of a solution. As any proper information, intelligent information is an unforeseeable phenomenon in the sense to delivering solutions, which can be recognized as intelligent by itself and other intelligent observers. At this point, intelligent information encounters the domain of the so-called communal intelligence, that is, by a certain community governed intelligent information.

Intelligent information possesses its own intelligent counter-informing $\mathfrak{S}_{\iota}$, which is the component for unforeseeable production of new information. When observed, intelligent information can be carefully decomposed (analyzed, specifically composed, particularized, etc.), proceeding from its initial metaphysical situation $\iota \models \iota$. Within the phenomenon of intelligent information several other components can be observed which contribute to its further identification (decomposition, de-construction).

What does intelligent information produce, how does it arise? Intelligent information arises in connection with the occurring, appearing unpredictable situations when it is thrown into the happening and eventfulness of its environment and itself. Besides classical metaphysical components which are intelligent informing $\mathfrak{I}_{\iota}$, intelligent counter-informing $\mathfrak{S}_{\iota}$ and intelligent embedding $\mathfrak{E}_{\iota}$, producing (informing) intelligent information ι, intelligent counter-information γ_{ι} and intel-

ligent embedding information ε_ι, respectively, several other forms of intelligent information can be considered. Let us try to show a classification of intelligent information on the global level, where understanding and the informed meaning are coming into the foreground. Intelligent information ι as metaphysical information is decomposed through its initial situation $\iota \models \iota$. Intelligent information has to include a sort of understanding $\mathfrak{U}$ (roughly, intelligence) which substantially impacts the arising of ι. Intelligent information is always an understanding information, that is,

(52) $\mathfrak{U} \subset \iota ; (\iota \models \mathfrak{U}) \models \iota$

The next question is, how does understanding $\mathfrak{U}$ impact intelligent information ι? What does $\mathfrak{U}$ produce? Understanding $\mathfrak{U}$ as the producer of intelligent information ι produces the so-called intelligent meaning μ_ι for intelligent information ι in a metaphysical way. That means

(53) $(\mathfrak{U} \models \mu_\iota) \models \mathfrak{U}; \mu_\iota \subset \iota$

Commonly, meaning μ_ι belongs to the category of informational (e.g. linguistic) concepts which as products of an understanding do not belong to understanding information, that is, $\mu_\iota \not\subset \iota$. However, in a general scenario of understanding $\mathfrak{U}$ within intelligent information ι, there is

(54) $((\iota \models \mathfrak{U}) \models \mu_\iota) \models \iota$

In a different situation, formula

(55) $(\iota \models (\mathfrak{U} \models \mu_\iota)) \models \iota$

or even formula

(56) $((\iota \models ((\mathfrak{U} \models \mu_\iota) \models \mathfrak{U})) \models \iota$

can be appropriate. The last formula shows the direct nesting of cycle $(\mathfrak{U} \models \mu_\iota) \models \mathfrak{U}$ within cycle $\iota \models \iota$. Several other combinations of cycles concerning intelligent entities ι, $\mathfrak{U}$, and μ_ι are possible.

Certainly, when arisen, meaning μ_ι performs as metaphysical information $\mu_\iota \models \mu_\iota$ impacting understanding $\mathfrak{U}$, yielding

(57) $(\mu_\iota \models \mathfrak{U}) \models \mu_\iota$

Thus, in a further way expanded form of formula (56) could be, for instance,

(58) $((\iota \models (((\mathfrak{U} \models \mu_\iota) \models \mathfrak{U}) \models ((\mu_\iota \models \mathfrak{U}) \models \mu_\iota)) \models \iota$

In this sense, intelligent information approaches to the attitude to be more and more cycled, where informational cycles can overlap in a parallel way too. Scenarios corresponding to concrete cases can be constructed by means of the demonstrated informational language.

CONCLUSION

Information as a phenomenon appears as nothing else than the connection (interaction, influence) between things performing as informational entities. Formalization of the connection (impact, phenomenality) from one thing to another thing is an informational phenomenon by itself and performs as regular information. Formulas and systems of formulas are informational entities of the observer who observes things and their interaction (impacts). In this sense, formulas and systems of formulas are understood to be the interface between the reality of things and observers (things) of things. Informational entity is a symbolism which appears between the observed and observing thing set (understood) by the observing thing.

It becomes evident that an intelligent informational phenomenon, as a consequence of performing, behavior and being of an intelligent thing, can be satisfactorily symbolized only by an intelligent informational formula. What is an intelligent formula and how does it behave? In short, intelligent formula performs as intelligent information. It means that it must be metaphysical in informational way, that it must be observing and self-observ-

ing, arising, emerging and coming into existence, in short, adaptable to the circumstances and to its throwness into unforeseeable situations and attitudes. In contrast to a mathematical formula or a computer program, informational formula is a changeable and emerging structure so far. Only in particular cases, it can take the role of a static, data, mathematical, or program structure to serve as a mechanical tool for an unchangeable and dedicated purpose. In contrast to a mathematical notion, informational formula has its own intention, skill, and rationality accordingly to which it can develop, emerge, arise autonomously through impacts coming from the world, itself, and the thing to which it mediates (communicates, informs).

The eventfulness of a formula or a formula system images the events belonging to things which a formula or a formula system depicts. In this function, formula is the symbolic coping of situation existing between the thing in question and its world. In parallel to the thing in the world, the formula is thrown in the world of observation and its own behavior (functionality, adequateness against a situation), impacting the observing thing, its metaphysics. Thus, a situation, its symbolical expression, and observing constitute a system of entities impacting them not only consequently but rather in an interactive manner. Symbolization of phenomena is in the position to become information for others, for observers of things and for observers of observers. Within occurring positions and attitudes of events higher informational forms and processes emerge, for instance, the phenomena of intention, consciousness, self-consciousness, unconsciousness, and other intelligently structured entities.

The construction of formulas through the use of the discussed principles opens the way to spontaneous and circular possibilities for the emerging of formulas. Principles themselves are—as we could see—openly arising informational entities which, in a concrete case, are involved into situations of decomposition, composition, particularization, universalization, informing, counter-informing, embedding, etc.

One of the aims of this essay is to reveal the importance of informational understanding of formulas, to give them the emerging faculty, by which things themselves and their interactions can be symbolized in a more natural, adaptable way. An informational formula is nothing else than an interface between the world and the thing in the world. It is an emerging symbolic depiction of being-in-the-world. It comes closer to the reality of a thing through its emerging structure than any statically structured symbolism (mathematical, programming language) could ever come. The principles of this essay have to be understood also as a changeable, emerging information for informational development of formulas which have the ability to depict real situations and real attitudes of things in question.

REFERENCES

[POI] Železnikar, A.P., *Principles of Information,* Cybernetica **31** (1988), 99-122.

[IIA] Železnikar, A.P., *An Introduction to Informational Algebra,* Informatica **14** (1990) *1,* 7-28.

[IT2] Železnikar, A.P., *Informing of Things II* (in Slovene), Informatica **15** (1991) *3,* 29-43.

A COMMENT