L O G I C

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Introduction

Textbooks and dictionaries often define logic as a science about the forms of thinking. Such definitions are twice in error: first, logic is not a science, and second, it is not confined to thinking.

Consider the common usage of the word. In everyday life it refers to human activity in general, and logical reasoning little differs in that respect from any other logical act. Logical behavior often is accepted with content, while too much spontaneity generally bears negative connotations. Also, one might speak about various events evaluating them as quite logical or entirely unexpected. However, such an evaluation can only apply to something that comes as a result of people's activity; we never call, say, physical events logical—they just happen according to natural laws.

This gives us a few basic characteristics of logic, the clues to deeper comprehension:

1. Logic is an aspect of human activity.
2. It can refer to individual behavior as well as collective action.
3. It has to do with regularity and predictability.
4. It has to do with the social acceptance of behavior.

The list is in no way exhaustive, but there is something to start with. At least, we can immediately conclude that logic is not mere drawing conclusions, as many philosophers try to demonstrate; moreover, drawing conclusions can sometimes be unacceptably illogical, as long as the situation does not imply it. For instance, if you are to show your love, you must show it right away, without justification; if you have to kill, you kill without theatric gestures and pathetic monologs. Reflection comes later: first, the wound, and then the pain.

We can also discard the idealistic tendency of exaggerating the ubiquity of logic, identifying it with any regularity at all. There is matter, and there is reflection; they are not the same, albeit impossible without each other. Logic is an essentially social phenomenon, and there is no need to stick it to the other levels of the whole.

Thinking is a special case of activity, and it can, in particular, be assessed from the logical side. Still, it is not necessarily the formal correctness that matters; primarily, we primarily pay attention to the proper choice of means to achieve proper ends. You can never prove a socially inacceptable thing, however hard you try. And this is right, since lack of acceptance comes from a logical fallacy. Well, some of your ideas can stay in the long run, which will only mean that your present problems come from addressing the wrong audience, which is not entirely logical, is it?

Yes, some people are utterly incompatible with the world they have to live in. They are right for themselves—but the society is not ripe enough to acknowledge their truth. This is a tragedy, and the beauty will logically perish, and this implies the death of the world that sentenced it to death.

To put it in dull narration, some behavioral patterns are acceptable to one social group, while rejected by another. Which is logical for one community is not necessarily logical in a different world. There is no absolute truth for all times. That is, any logic can only exist within a definite cultural formation, and the development of the society results in the development of logic.

Any development obviously implies some change; but it also implies something to change, that is, something which is preserved in the course of development for some time. This explains how the idea of abstract logic independent of any cultural differences could form. The commonality of logic means commonality of life. Period. If people's life is to drastically change, their logic will follow. All I say today is subject to future revisions, remaining as a part of human history, a level of development and an inner capacity.

Logic Incorporated

Every particular kind of activity is characterized by its own logic, and no activity is possible without any logic at all. In the philosophical slang, logic is an attribute of conscious activity. For laymen: you behave as a conscious being when you are logical, and you become mere thing if you lose logic. Of course, conscious activity has other attributes, and reducing it to logic would be a logical fallacy.

In the world governed by the division of labor, those well paid are apt to believe that their occupation is especially important, that it requires some outstanding personal qualities and expresses the core of the culture. Logically, this leads to the attempts to usurp certain cultural areas.

Here comes a professional logician and says: I studied logic all my life, and know all about it; I am officially acknowledged as such, and gain a decent living explaining the others what logic is. This immediately produces a roar of laughter in professional science: you, who cannot tell a quark from a quasar, will teach us logic! It is only by studying natural laws that one comes to understanding any regularity at all; sciences cultivate logical thought, and the scientific method is to be used to describe logic itself. Alright, replies a popular painter, can you explain that my art is sold at Sotheby's for real bucks, while your books are never bought save by a few crazy cranks? Something attracts people to my painting, and I'll tell you what it is—they are absolutely logical. The arts are pure logic in its most crisp and immediate form; we call it beauty.

They are all right, in a way. Logic is everywhere; each and every profession contributes to its comprehension, since its very existence follows from the refinement of certain behavioral patterns to distinguish them from the rest. And no profession is sufficient to explain logic.

Thus, nothing prevents us from collecting the currently known schemes of reasoning, and that would be a regular science analogous to, say, ethnography. However, such a study would never tell a universal logical principle from mere cultural fluctuation. For instance, traditional courses of logic enumerate the forms of syllogisms; but they never tell us under which conditions these forms are applicable—and in which cases one should better try something else. Why statements are built of notions? Where do the different truth/verity systems come from? How do people develop axioms and primary concepts? To answer these and other similar questions, one needs something more general than science; one has to appeal to the fundamental principles of making all kinds of decisions, including decisions about the adequacy of reasoning. This is the domain of philosophy.

In fact, philosophy is what I am doing right now, writing these lines. Here, I mainly treat logic from the philosophical side. As long as I do that, for me, logic is a part of philosophy. This does not mean that it must always be that way. I esteem any other choice, and, as a philosopher, I must incorporate the very possibility of choice in my philosophical logic, tracking the social roots of individual preferences.

Logic and Freedom

The common idea of logic is that it is something to *obey*, a kind of formal regularity imposed by the current cultural conditions on the acts of an individual to ensure their conformity with the social standards. This level of logic is like common moral in ethics.

Some people would protest against any obeisance, advocating absolute freedom beyond all norms. So

what? How do they express their freedom? They try to do something unusual, visibly violating the traditional ways. Isn't it logical for the kind of activity they choose? Even abstaining from any activity at all is a social act logically following from a definite motive.

It might seem that logic is the opposite of freedom, unavoidably putting limit to fantasy and inspiration, cropping desires. Not at all. Logic rather selects the reasonable from random, the spiritual from spontaneous. There are numerous examples of how trying to be original by any means results in primitive imitation, herd behavior; the pursuit of the unusual often ends in banalities. Mere denial of tradition is not enough; one also has to produce something valuable. This positive side of negation, true creativity, is associated with some inner logic; to catch it is the first task of creator. Sometimes, the necessary logic does not yet exist, so that it has to be developed in the course of creation. Still, the very process of development implements a definite logic, there is no arbitrariness.

To be free, one must be properly equipped. If you have no means of coping with situations, you become a slave of chance. If you lack knowledge, you get dependent on the opinions of the others. If there is no will, there are obligations. That is why being logical is so important for freedom. It prevents one's getting lost in fallacies.

Knowing the limits is another side of being equipped. Each tool should be used in an appropriate manner. When the existing tools are insufficient, one can temporarily fool nature with a tricky combination of something at hand, but the true solution requires development of technology. Consciously following some logic, people become free to consciously change it. Once the rules are accepted, they are no longer imposed.

Logic structures actions to efficiently advance to the desired goal, but primarily you must know what you want. This is the first logical principle, and the first principle of freedom.

Hierarchical Logic

In the general line of the hierarchical approach, logic assumes numerous layered structures and systems reflecting both the history of its development and the modes of its application. There is no absolute form; the whole of hierarchy can be unfolded starting from any single idea. The argument about the best logic possible is hence entirely meaningful.

Historically, there were many special "logics", with all kinds of names: classical, speculative, higher-order, modal, alternative, fuzzy, constructivist, stochastic, situational, *etc*. Each of them represented one of the possible conversions of logic as such, without any epithets. A few hierarchical structures presented here arise each in its specific context, and they can coexist at any moment, since human activity is hierarchical, with each level demanding an appropriate logic.

Syncretic, analytical and synthetic logic

The adequacy and congruity of activities occurring in people's everyday life is the first manifestation of logic. If one acts according to the natural order of things and the current social expectations, this action is often called a "natural", or "logical", consequence of the objective and social situation. Internal life of a person obeys, from this point of view, its own logic; in particular, the typical routes of thought differ from one individual to another. This level of logic, where the forms of activity are not separated from the activity itself, may be called *syncretic*.

On the higher *analytical* level, the forms of one's activity become imposed on that activity as external regulations, often codified and officially accepted. For a typical example, take the traditional rules of logic studied by math students as an *a priori* basis of any rigor. More examples: the laws of a state, the rules of a game, editorial guidelines for the contributors to a scientific journal *etc*. These forms are relatively independent of the underlying activity, and their modification may seem a matter of convention, though, in fact, there are objective limitations and requirements.

The *synthetic* level of logic assumes that both the rules and their justification become conscious.

People may intentionally change the rules for a more adequate behavior in the changing environment, so that no logical scheme is considered absolute and applicable in any situation. This means that synthetic logic does not admit any complete description, since any specification will only refer to a particular manifestation under certain conditions.

Rational, dialectical and diathetical logic

In the basis of any practical activity one finds general rationality based on the repetition of the activity's structure. Such *rational logic* deals with stationary activities, the "standard" forms preserved for a long time. At the syncretic level, rationality appears as *common sense*; on the analytical level, one can find the classical modes of reasoning described by Aristotle; in philosophy, this way of reasoning is called *metaphysical*. Being a necessary stage of any research, and an indispensable component of any thought, rational logic uncritically used beyond the limits of its applicability leads to biased opinions rather than knowledge and wisdom.

Dialectical logic removes metaphysical rigidity demanding that every action should be viewed in a wider context, along with its alternatives. Everything has its opposite, and the opposites are equally valid; any activity develops in struggle and mutual reflection of the opposites, and their unity can only be achieved in a higher-level activity. An example of syncretic dialectics is provided by the pragmatic attitude to the world. Analytical dialectics has been widely exercised by the ancient and medieval sophists, and this is the highest form of dialectics possible in philosophical idealism. Synthetic dialectical logic was developed in XIX-XX centuries by K. Marx, F. Engels and their followers; for political reasons, this line did not receive much public attention.

At its highest level, logic becomes aware of the universal reflectivity, when every category implicitly contains all the other categories, and the whole can be reconstructed starting from any arbitrarily selected element. Unlike dialectics, this logic does not lead to an infinite sequence of levels, the higher ones fixing the contradictions of the lower; rather, it is always aware of the whole hierarchy. Any unfolding of this hierarchy into a sequence of levels according to the dialectical schemes is considered as a particular possibility related to many others, and one arrangement of categories is as admissible as another. Still, these arrangements are not arbitrary, and the rules governing them could be called *diathetics* (intentional arrangement in a specific context).

Intuition, reasoning, comprehension

No logic is possible before the object and purpose of activity come to awareness. For instance, a formal definition assumes some previously formed conceptions that do not need to be defined at present. Similarly, for a formal deduction, one must be aware of the intended result, which cannot be obtained in a deductive way. This preliminary context is said to be *intuitive*; however, every act of insight must be logical to be practically useful.

The major part of logical research is about *reasoning*, discourse, formal derivation. On this level, the forms of activity are detached from the activity itself; reasoning can use them in an arbitrary manner, producing all kinds of abstract combinations. The "objectified" character of such logic simplifies its study by scientific methods, and its formal nature admits wide usage of mathematics.

There is yet another level of logic closely related to its development. Eventually, we are not satisfied with immediate results or deep knowledge—we also need *comprehension*, which gives us the feeling of mastery, of power, of freedom. The application of logical forms to practical tasks brings forth their interrelations, leading to the formation of higher-level logical schemes.

Adequacy, singularity, creativity

This distinction reflects the very definition of subjectivity as universal mediation. The subject takes the world as an object (nature) and reproduces it as a product (culture). Eventually, the whole world becomes thus transformed, reorganized to satisfy people's needs, assimilated in the culture. The logic

of conscious activity will reproduce this fundamental hierarchy.

Indeed, one of the usual connotations of the word "logical" is "quite natural". We also speak of the "logic of things" as something to be followed in reasonable behavior. This objective logic is to organize people's acts in accordance with the already established (natural) regularities that are apparently independent of our will. This kind of behavior is considered as adequate.

On the contrary, subjective logic reflects the diversity of human ways, when the same goal is achieved quite differently by different characters. In common usage, we express it as being natural (logical) "for him", or "for her", albeit differing from our own manner. That is what we expect of the others, and of ourselves. In particular, calling somebody irrational, we mean a definite subjective logic.

Finally, the individual modes of action can be socially accepted as a common productive pattern, to become "second nature". This productive logic is creative, since it assumes a common significance of one's singularity, being useful for the others.

Inner logic, formal logic, intension

To make a thing, one needs some material to be properly shaped, that is, the form of the thing must express what it really is, its content. For instance, I take English words as my material and organize them in phrases and paragraphs to produce a description of logical hierarchy (the content of the text). These components imply three specific kinds of logic. Obviously, the choice of material will impose certain restrictions on what can be express and in which way. This inner logic can be rather restrictive; thus, there are ideas that are clearly conveyed in Russian, while it is very difficult to find an appropriate wording for them in English; conversely, some ideas are much easier to express in English. And, if I took musical notes or colors for the material, I would be driven to a quite different manner of expressing hierarchical logic. The organization of material, the form, is also associated with definite principles, formal logic. Forms are not entirely arbitrary, they depend on each other, and one has to obey some formal rules (like the grammar of the English language, or, say, the norms of coherent discourse) to produce meaning and sense. And, of course, both material and form are only needed to convey the whole, the content, and the logic of the whole is to be reflected in both inner and formal logic; in a sense, lower level logics are used to build models of intension.

Reflectivity

The different facets of the hierarchy of logic are not independent, since they refer to the same. In some situations one might, say, consider the triad *rational → dialectical → diathetical* as another expression for the triad *objective → subjective → productive*. However, in a different context, these two triads may represent the orthogonal dimensions of the whole, to consider objective, subjective and productive rationality along with objective rationality, dialectics and diathetics. All these schemes are mutually reflected (in Hegel's sense). Each of them can be used to unfold the hierarchy of another.

On the other hand, each hierarchy manifests itself either in a structural way, as a hierarchical structure, or in the systemic way, as a hierarchical system, with each level of the hierarchical structure becoming a separate entity interacting with the others; on the synthetic level, the hierarchy reveals itself in a sequence of development stages. Consequently, all different "logics" are present in any logic at all, occupying specific positions in the hierarchy of the whole, the special logic of an individual activity.

Truth

Logic is commonly associated with the idea of truth, whatever it is. People are apt to think that following some formal prescriptions can produce (prove) something beyond doubt, requiring no other substantiation. However attractive, this thought encounters serious objections at closer examination. That is why some people even tried to avoid the very mentioning of truth, restricting consideration to mere formal correctness (logical positivism). Still, a true philosopher will certainly make an attempt to cope with this difficult problem, taking the risk of discovering its utter intractability.

As already mentioned, logic has to do with regularity and social acceptance of behavior. Obviously, the aspect of regularity is related to proof, while the connotation of common acceptance is intuitively closer to sociality. That is, both formal deduction and truth belong to the hierarchy of logic, to its different levels. This implies a possibly non-trivial interrelationship between the two; in particular, proof does not necessarily produce truth, as well as truth does not always need to be formally right.

Since logic is an attribute of conscious activity, it is natural to correlate its levels with the levels of activity. The hierarchy of activity, like any other hierarchy, can present itself in different ways (hierarchical structures, positions of hierarchy). Thus, in the scheme of general psychology, each activity unfolds itself in a sequence of actions, while each action assumes a sequence of operations. Consciousness is associated with the level of action, while the levels of operation and activity correspond to the two kinds of the unconscious, the subconscious and the superconscious. The relation of an action to the possible operations constitutes its meaning, while the relation of the same action to the encompassing activity gives it sense. That is, any conscious action is meaningful and has sense.

Similarly, in logic, we can admit that any logical act must be formally correct (an analog of meaning) and pursuit some truth (a kind of sense). The idea of truth is thus related to the completeness of the hierarchy of activity, to consciousness (or, rather, to its highest level, reason).

Thus the practical nature of logic is reestablished once again. Logicians can be satisfied with the objective necessity of formal operation, while scientists can be reassured of their seeking for truth rather than formal entertainment. The lack of either component destroys logic.

The two facets of logic are approached by the corresponding levels of philosophical logic, epistemology and gnoseology. The former studies the general organization required for an activity to be logical; the latter is occupied with the correspondence of logical forms to reality. In epistemology, we discuss such categories as correctness, completeness, consistency, coherence, verification, falsification *etc*. Gnoseological study introduces the categories of objective, relative and absolute truth, plausibility, adequacy, knowledge, applicability and others.

The psychological analogy can be further elaborated to include hierarchical conversion. In psychology, activities can fold into actions, and actions into operations; conversely, actions can become full-fledged activities, while their operations get lifted to the level of action. In logic, this corresponds to the development of logical schemes from the patterns of activity, and conversely, to implementing logical schemes in practical activity; these two opposite trends could be called abstraction and concretization, and the necessity of their combined involvement has always been (following Hegel) stressed in Marxism.

Returning to the definition of truth, we observe that any social attitude is a complex phenomenon; it has many aspects representing the same hierarchy. Some kind of acceptance is appropriate to logic, some other kind to ethics, or ontology. It seems plausible that, in logic, we accept the very way of doing something, rather than one's personality, or somebody's deeds. We can despise a person, but find some logic in his acts; similarly, we can disapprove the goals, but acknowledge the adequacy of methods. In this picture, truth refers to the correspondence of one's acts to their idea, which is an objectified form of a subjective hierarchy.

This correspondence has many complementary aspects. For example, one can put stress on the goals, and truth will take the form of efficiency. That is, if I can do something my way, then I'm true, and if you cannot get the desired effect, you are doing something the wrong way. As the opposite of this pragmatic approach, I could rather cherish my own feelings and be satisfied with my inner truth regardless of the possibly disastrous consequences of activity. The others may burst of indignation and sizzle with contempt, but they cannot deny my subjective integrity and objective consistency. The ability to combine the inner and outer truth is known as wisdom, and it is rarely attained.

Similarly, scientific truth and poetical truth complement each other, and there are few people who can equally master them both.

However, the opposites are not as different as they seem to be. For instance pursuing inner truth can be

easily reinterpreted as an efficient way of getting to the desired goal, but this goal lies inside the subject rather than in the outer world. Conversely, frequently accentuating the palpable goals can be treated as a specific personal attitude, a manifestation of an inner structure. The both poles are objectively necessary for cultural development, which reveals their common truth.

In general, the hierarchy of truth reflects the hierarchy of logic. Truth will always come out as some hierarchical structure (the traditional values of *true* and *false* being the simplest case). However, one structure is as possible as another, and there are nontrivial interrelations between different structures, so that any transition requires folding one structure and unfolding another, in a different dimension. Thus, in place of *true* and *false*, we obtain the opposition of *right* and *wrong*, *correct* and *faulty*, *consistent* and *eclectic*, or even *good* and *evil*. And, of course, there are much more complex structures of truth than simple dichotomy. Since any human activity contains all these aspects, it can be evaluated using any possible logical structure, an each choice is equally justified.

In the same line, treating logic as a system, we come to the admissibility of quite different production systems, and there is no absolutely correct or absolutely false reasoning, nor a uniquely acceptable way of action.

Does that mean the absence of any logic at all, purely random behavior? No, it doesn't. However, logic is not as simple as some people picture it, though it comprises the very possibility of oversimplifications, and even sheer arbitrariness. Instead of criticizing the others, one should rather try to comprehend their truth and seek for the ways to resolve the inevitable contradictions.

Discreteness and Continuity

Traditionally, logic is identified with reasoning, and thus considered as essentially discrete. Normally, people distinguish one thing from another, and act step by step, thus revealing the discrete side of their activity. However, this does not mean that human activity is entirely discrete, and there is no place for continuity. Indeed, the distinct operations are embedded in a continuous state of action that lasts from the beginning of the action to its end. The action is also a part of some activity, which does not have a definite beginning or end and might be thought of as purely continuous motion, so that all the apparent discreteness should be treated as limited and virtual.

In the hierarchical approach, one finds the idea of hierarchical conversion revealing discrete structures and functionally differentiated systems in a larger whole that cannot be reduced to any of its particular positions (outer manifestations). Human activity is essentially hierarchical, as it reflects the hierarchy of the world in general. The distinction between its discrete and continuous aspects is relative, depending on the particular position of hierarchy. To adequately reproduce (and control) the organization of human activity, logic must incorporate certain means powerful enough to embrace its continuity as well.

And, indeed, we can discover intrinsic continuity in any logical form.

For instance, every logical scheme is discrete since it contains a finite number of logical positions and junctions. However, both logical positions and logical junctions can be unfolded in different ways, which makes them essentially continuous, though the inner continuity of logical positions is different in kind from the outer continuity of logical junctions, which gives the two complementary aspects of continuity. However, due to universal reflectivity, logical positions and junctions are interchangeable in any scheme, so that internal continuity can be made external, and vice versa. In this way, logic integrates both the continuity of activity and its divisibility into separate actions, accounting for the possible shifts of the motives onto the goals, with actions developing into activities.

The discrete aspect of logic reflects the hierarchy of activity as it has objectively developed in a particular cultural context. The two kinds of logical continuity correspond to the infinity of the ways that could lead to the present level of development and the infinity of directions of further development. The present is different from the past and the future, but it is never isolated from them,

implementing one of the possible transitions from one to another.

The level of logical reasoning implies the existence of the lower-level intuitive logicality, as well as the higher level of comprehension. One could observe that intuition and comprehension are essentially continuous, as compared to the discreteness of reasoning. However, logic is the unity of discreteness and continuity on every level, and it is only the relative dominance of one or another that varies from one position of its hierarchy to another.

Logical Organization

The three fundamental levels of organization are structure, system, and hierarchy. Structures reflect the distinction of separate parts of the whole, as well as their interconnection; this is the static picture taking the elements and links of the whole simultaneously. The dynamic aspect of any distinctions is represented by the systemic view, which represents possible transformations of one structure into another. When structures form within systems, and systems become elements of a structure, we obtain an instance of hierarchy, which puts the stress on structural and functional stratification reflecting the directedness of any changes (development).

Considering logic as a whole, one can certainly discover its structural, systemic and hierarchical aspects. Due to self-conformity of any hierarchy, every part of logic will manifest specific structures, systems and hierarchies. The logical aspect of any human activity is thus combining its logical structure (the fundamental interdependencies between the different aspects of the activity), its logical system (the way one stage of activity comes after another), and its logical hierarchy (acquired skills and the directions of their development). Different cultures accentuate different kinds of logic, and there may be practical tasks requiring the domination of the structural, systemic or hierarchical view. In real life, people usually notice the dominating level of logic, and they may be unaware of the related aspects. However, all the three levels of organization must be present for an activity to be successful.

When logic itself grows into an activity, it develops the same three levels, though different kinds of logic manifest them differently. Typically, there are some logical structures (logical forms) related to each other according to a number of rules or procedures (a logical system). The application of logical rules is regulated by social tradition (logical principles), which determines the possible variations of the logical system.

On the other side, any human activity normally presents itself in a definite hierarchical position, necessarily containing all the other aspects in a hidden way, as the lower levels of hierarchy. For each position of hierarchy, the logic of that activity must come in a specific position too; different logical conversions will reveal structural, systemic and hierarchical logic in the narrow sense of the word, as servicing the structural, systemic and hierarchical aspects of activity correspondingly.

Classical Logic

Classical logic is probably the most developed part of logic in general, and its numerous aspects are widely discussed in the literature. Still, the origin of logical rules and the overall organization of classical logic are yet poorly comprehended, and this hinders the development of the other levels of logic, since classical logic forms a natural basis for their formation, and they cannot be comprehended without relating them to classical logic. Unfortunately, the invention of symbolic logic has distracted the efforts of logicians from the general logical ideas to their special models, so that the study of the fundamental principles has been replaced with the enumeration of the possible formal schemes. However, classical logic, like any logic at all, is not merely formal; it necessarily comprises some ontological and ethical aspects. The exaggeration of the formal issues has estranged logic from ordinary life, limiting it to formal science and engineering. The lack of logic in human activity may

support swindlers and profiteers, but it is incompatible with the development of consciousness and reason.

What is classical?

Enumeration of the typical schemes of reasoning given by Aristotle and his school is commonly considered as the origin of logic as a special discipline. However, in Aristotle's books, formal reasoning was never treated as separate from the other aspects of being, including both physical nature and the movements of the human soul. This tradition of philosophical logic has never been interrupted in the course of many centuries, and it continues to the present time. The opposite of classical logic, sophistry, tried to reduce reasoning to mere manipulation with abstractions, and this line has got its clear expression in the modern logical positivism, identifying the schemes of reasoning with reasoning itself, formal models of logic with logic, the form of speech with its content.

Still, classical logic does not cover all the scope of philosophical logic, being concerned mainly with its structural aspects abstracted from their development. This relatively static character makes classical logic most useful in everyday life, while it proceeds following the already established cultural norms; however, this inherent rigidity may lead to logical problems in the periods of change, of instability, in crisis situations, or upon encountering a very different culture. The new standards have not yet formed, and one needs a different logic to determine the directions of development; in such cases, dialectical or diathetical logic would be more appropriate.

In classical logic, all the objects are supposed to never change during the discourse, so that the whole complexity of their relations could be observed "simultaneously". Of course, this is not necessarily the simultaneity in the physical sense, but rather in some "logical time", the order of discourse. Classical logic can certainly be applied to motion, and even to development; but this treatment will always be "classical", that is, accentuating static regularities within any process or development phase.

Branches of classical logic

Like logic in general, classical logic is applicable to any activity at all, and not only to formal discourse. However, traditionally, the ideas of classical logic have mainly been developed for the needs of analytical reasoning, which has significantly influenced the terminology; most examples of classical logic are being taken from the domain of discourse, presenting the figures of thought rather than the schemes of activity.

Due to the universal character of classical logic, various applied disciplines treating the logic of any particular occupation can be constructed. However, the universality of logic also means that such special "logics" will be all alike, with mainly terminological difference, and hence it is enough to consider one particular object area, to get the logical tools for another. The logic of that scheme transfer also contains a static component that can be treated within classical logic.

Analytical reasoning is rather convenient for logical study due to its essentially explicit character and the possibility of immediate implementation of any formal scheme. Most logical research has been centered on various formal systems expressible in some natural or artificial language.

Within this "language-oriented" logic, one could distinguish the logic of definition (the formation of notions and logical rules, the logic of *meaning*), the logic of interrogation (the techniques for outlining the problem area, the logic of *sense*), and logic of discourse (including the logic of inference as its most developed component). Depending on objective relations covered and the character of the logical schemes involved, such special forms of classical logic as propositional logic, predicate logic, modal logic and many others have historically formed. Various multi-valued, categorial, fuzzy or stochastic logics continue that line, remaining entirely within the scope of classical logic, however "alternative" they might look.

Logical forms

Notions (concepts), statements (propositions) and inferences (arguments) make the commonly known hierarchy of fundamental logical forms in classical logic. They all are interdependent, and none of them can be reduced to the others. Also, one is free to unfold the hierarchy in a different dimension, considering various non-traditional categorial structures.

The level of *notion* represents the activity of distinction, separating one object from another. Notions are not mere labels of things, they imply knowledge about things in their relation to each other, and hence a notion can be considered as a hierarchy of possible statements about the object.

The notion should not be confused with a word of a natural or artificial language. Notions cannot be simply *denoted*; quite often, the lack of adequate words results in lengthy explanations and clarifications. In many cases there is no verbal explication at all, and one has to learn notions practically, doing something under somebody's guidance.

Statements are built of notions; they relate notions to each other, reflecting the objective relations in the world. Therefore, the number of possible statements is unlimited, since the world is inexhaustible and we will discover ever new relations between notions revealing additional objective regularities. In a statement, notions are connected in definite order, subordinated to the meaning of the statement as a whole. This integral meaning cannot be reduced to the meanings of the notions involved, and even less to a sentence of natural language or a formal construct; whole books may be sometimes needed to convey the meaning of one sentence, and some relations between notions can only be grasped in practical activity.

However, statements are useless on themselves. They merely express ideas in a form, suitable for further production of other statements, in an inference scheme. Every statement has numerous consequences, without which the sentence has no sense; that is how one comes to the idea of the statement as a hierarchy of possible conclusions.

Inference is used to produce new statements (conclusions) from a number of other statements (premises) subordinated within a specific inference scheme. Inference schemes represent the most general regularities of the world, including both nature and culture, and they are usually applicable to many special cases. However, this high level of abstraction results in a higher vulnerability of a conclusion, which is most sensitive to minor shifts in the meanings of the notions involved; this implies that the applicability of a scheme must be substantiated for every instance of usage.

Like statements represent various relations between notions, inferences connect different relations to each other. Since a notion can be considered as a hierarchy of statements, an inference can also be regarded as a kind of unfolded notion.

As with notions and logical statements, conclusions do not need to be entirely verbal; rather, they are universal schemes controlling the succession of conscious actions within a specific activity. As long as the activity (and its motive in particular) remains the same, the consistency of activity can be achieved and inspected through logical conclusion.

Adequacy, truth, correctness

Within classical logic, it is implicitly assumed that the notions can be either *adequate* or *inadequate*, statements can be either *true* or *false*, and conclusions can be either *valid* or *incorrect*. This dichotomy lies in the basis of classical logic. The adequacy of notions, the truth of statements and the validity of conclusions cannot be established within logic, since it concerns the relations between the object and the subject, the world and its reflection in human activity. Subjectively, for a logician, the applicability of classical logic to practical activity looks like the subject's ability to arbitrarily construct notions, ascribe truth values, or make conventions about admissible conclusions; this arbitrariness reflects the social position of a logician, always operating with the forms of things abstracted from the things themselves. In reality, logic can only be verified by action, and never by mere formal reasoning. Logic is only an instrument for generating hypotheses, and it cannot produce new "truths" from the already

established.

The dichotomies of the classical logic originate from a special, but very important activity, binary discrimination, or categorization. The very idea of analytical reasoning implies making sharp distinctions, and opposing a particular thing to the rest of the world. Since analysis is a necessary level of every activity, classical logic is universal and ubiquitous; however, since human activity cannot be reduced to analysis, logic in general is wider than classical logic.

Fundamental principles

The basic ideas of classical logic express the most general, universal rules governing the formal aspects of any activity. Traditionally, three logical laws have been widely discussed in the literature: the law of identity, the law of non-contradiction (also known as the law of excluded middle), and the law of sufficient justification. However, logical "laws" are not as restrictive as the laws of a science, and they do not determine the exact form of activity, which also depends on the specific conditions of that activity lying outside the domain of (classical) logic; that is why it would be better to speak of logical *principles* rather than laws.

The principle of identity

Definiteness is a distinctive feature of classical logic. Every notion or a relation between notions, or mutual dependence of such relations, is to remain the same during the current activity, which is thus made consistent, in the classical sense. In classical logic, ideas merely co-exist; they are being defined once and forever, never subject to any change. The same holds for the possible relations between ideas. That is, the principle of identity positions classical logic as an essentially structural approach. Obviously, such a static picture cannot be achieved on the semantic level, since the sense of any word or phrase essentially depends on the context. For instance, a term can be introduced in many ways, with numerous formal descriptions, while the notion is only defined as the unity of such partial definitions. This circumstance is a source of communication difficulties, since no finite text can convey the universality of a notion in full and different people can differently restore the whole from the exposed parts. It is only in common experience and co-operation that the identity of a notion, sentence or conclusion can be maintained; as long as people's activities remain relatively uniform, they will be able to rely on classical logic to organize their social behavior. However, when the society is split to antagonistic classes or exclusive estates, the identity of a notion can only be maintained within the same social group.

The principle of distinction

In the act of binary discrimination, a person is to decide on whether one of the two available actions should be taken in response to a specific situation; the basic form of such a decision is: "To do, or not to do?" *Threshold behavior* can serve as a typical model: if a certain quality of the objective situation is intensive enough, the appropriate action is to be initiated. Numerous ways of implementing this dependence lead to many models of logic; all such models refer to the same human ability manifesting itself in different environments.

Everybody can recall situations, when the very act of choice influenced the position of the threshold, thus inducing the denial of the decision almost made. In classical logic, such situations are forbidden, and any distinctions are to be preserved intact within the same activity. That is, once the situation has been put in a particular category, it will always be in that category, and no action may lead to the opposite decision; actions implying opposite categorizations of the same situation are called *contradictory*, and the principle of distinction does not allow combining them in the same activity.

The principle of completeness

Any human activity actualizes itself in a hierarchy of conscious actions directed to achieving definite

goals. Once the goal is chosen, one has to concentrate efforts on making it closer, which requires a clear view of the goal and rejection of the paths that do not lead to it, as demanded by the principles of identity and distinction. However, one also needs some criteria for terminating the action. Thus, one might decide to stop when the goal of the action has been achieved in full. In classical logic based on binary discrimination any goal is thought to be fully achievable, and any person is thought to be able to distinguish the achieved goal from not yet achieved. The principle of completeness demands that every action should be completed before its results are used in another action. This makes classical logic essentially *sequential*, with all the benefits and deficiencies of this approach.

In the sphere of analytical reasoning, this principle takes the form of the law of sufficient justification: a notion is considered as well-defined only if the definition is specific enough and consistent with other definitions; a statement is supposed to be true only if it can be derived from other statements that have already been justified; a conclusion is valid only if it based on the complete set of premises and does not get beyond the domain of discourse. In the strictest sense, in formal logic, this principle is formulated as the law of excluded middle: any statement is either true or false (and hence its negation is true), and there is nothing in between; this formulation reveals the inherent insufficiency of classical logic.

Fallacies

Within classical logic, any violation of its principles is considered as a logical error. This does not necessarily mean that the results obtained in an erroneous way are themselves erroneous; however, logical errors often have a negative effect, since they are apt to replicate in other similar situations and other logical schemes, which may sometimes result in a serious damage to people's well-being. That is why it is important to know about possible logical errors (fallacies) and avoid them.

There are different classifications of fallacies depending on the adopted conception of classical logic as such; neither of them can be exhaustive, as the other positions of the hierarchy that require appropriate consideration. Thus, among the commonly considered, one could distinguish fallacies of relevance, of ambiguity, and of presumption. Fallacies of relevance refer to the arguments relying on premises that aren't relevant to the discussion (for instance, irrelevant appeals). Ambiguity arises in an argument when one connotation of a word is implicitly replaced by another. Fallacies of presumption mean using false premises to derive any desirable conclusion (for instance, false dilemmas and circular arguments). All such arguments (or acts) violate the principle of identity. Other classes of fallacies arise from violating the principles of distinction or completeness.

Nobody is perfect, and every person will make logical errors. Any unnoticed error will result in a sequence of induced errors and false conclusions, up to apparent paradoxes. The only way to stop this error propagation is to treat any formal results as mere hypotheses, rather than "proofs", and never trust them too much until their validity in their application domain has been practically established. This is a very simple idea: if you are planning to do something this does not mean that you have already done it.

It should be noted that not all fallacies are unmediated. Some people may exploit the others' poor experience with logic to persuade them into wrong actions, using intentionally introduced logical errors. This is one more argument for the necessity of mass logical education.

Fallacies are different from mere delusion. When people do not know something well enough, they may assert something wrong about it, but this is not a logical fallacy, despite its ability to propagate through a sequence of syllogisms. Only when a false statement is intentionally used in an argument, a logical error occurs.

Fallacies should not be confused with *logical paradoxes*. The latter do not violate the principles of classical logic, nevertheless arriving to contradictory conclusions. Sometimes, a false paradox may be encountered, with the results being only superficially contradictory, with a hidden logical error behind the contradiction.

Paradoxes arise in the boundary situations, where the applicability of classical logic becomes

problematic; one can never resolve a paradox within classical logic, and hence a paradox could be considered as mechanism of linking different levels of logic.

Dialectical Logic

There are many books treating various aspects of dialectical logic. However, very few of them are concerned with its specifically logical aspects, while the majority is pondering on the historical issues and trying, for the millionth time, to illustrate dialectical ideas with the same trite examples. The lack of fundamental research comes as a side effect of class struggle in the ideological domain, with dialectics made a slogan of one party and a curse for the other. But dialectical logic was born long before Marx; the elements of dialectics can be found in ancient writers, and it was promoted by philosophical idealism no less than by materialists. As any logic, dialectics is universal and it does not directly reflect the interests of specific social layers. As any logic, it can be used to support quite different ideas, and it is only in practical activity that one way of thought can prevail over another.

For a few thousand years, the humanity developed within the three socioeconomic formations based on expropriation of the products of one's activity by individuals or social groups not involved in the production processes; this phase of human development was necessary to break the primitive syncretism of the earliest communal cultures, but its analytical nature manifested itself in all-penetrating social discrimination, and class antagonism. Classical logic was well suited to reflect such a social organization, commonly known as *civilization*. Now, when the last formation of this phase of social development, capitalism, is approaching its end, the accents must shift to a more dynamic approach allowing for drastic changes and revolutionary development. Dialectical logic perfectly matches this demand.

Unfortunately, dialectical logic is yet too novel for most thinkers and it may seem hard to grasp. This is especially so for English speaking cultures, which have developed a consumer oriented conceptual system that is not well suited to speak of multiple meaning and mutability. For those brought up to enjoy sharp lines, the diffuse and elusive shapes do not carry much sense; one needs some time to get accustomed to their apparent randomness and perceive the inner regularities. Here, we cannot rely on common sense and language traditions; we need a higher level of abstraction. Even in classical logic, a notion can rarely be expressed in a single word or phrase; the more so in dialectics. Still, dialectical thought is not mere play of words, without any practical importance, as many people are apt to think. The rigid determinism works fine during the periods of cultural stability, and the formal scientific standards are appropriate to systematize the already established relations. In crisis situations, the limitations of the traditional rationality become evident, demanding new logical principles to complement the static (structural) approach of classical logic.

The idea of dialectics

While classical logic stressed the static, structural aspects of reality, dialectics is all about change. Nothing can remain the same in dialectical logic, and there are no clear shapes and rigid boundaries. The adepts of classical logic would find it absolutely illogical—and it is certainly not logical in the classical sense. However, despite its apparently arbitrary and even chaotic look, dialectical logic remains perfectly rational, being controlled by quite definite principles. As the opposite of classical logic, it is as crisp and formal, and the very its arbitrariness is merely an explicit form of the imminent arbitrariness of abstract classical logicality. And, like classical logic, dialectics can be made into scholastics, if no rapport to reality is maintained.

The motion of thought, and the course of any other human activity, must reflect the motion of the world, for the activity to be successful. This means that, in philosophy, dialectical logic is as inseparable from ontology as classical logic, being a reflection of a different aspect of the whole.

Classical logic is perfect for description of quiet things that remain nearly the same for a long time, which is in any case much greater than the duration of discourse. We can observe similarity and

repetition, establish firm laws of motion. On the contrary, dialectics is the logic of the transition periods, when nothing is stable and there is no time for contemplation. Of course, this all-embracing mutability is as abstract as the absolute rigidity of the classical world. In reality, some aspects of every activity can well be described classically, while dialectical approach is required in other respects.

Dialectical logic says that even though things cease to be the same and transform into something quite different, these changes are not random or arbitrary, they obey certain fundamental rules, albeit very unusual from the classical viewpoint. This explains the practical significance of dialectics, its heuristic value.

The origin of dialectics

Traditionally, Heraclites is said to be the farther of dialectics in Europe. However, dialectical elements can be found in practically any teaching of Ancient Greece, and, of course, in Aristotle's lectures. It is much later that dialectical and classical logic have become separated and even opposed to each other. In the XIX century, the reverse process of synthesizing the two approaches on a common philosophical basis was initiated, but it is still far from being completed.

Like logic in general, dialectical logic is not an arbitrary construction, and its roots can be discovered in the specific modes of human activity. While classical logic essentially originates from binary discrimination and categorization, dialectical logic is an abstraction of comparison. It is complementary to classical logic in the same sense as considering two distinct things is complemented by considering their common measure, so that the very their difference becomes a manifestation of their unity. This approach is a formal expression of what we usually do in our activities, since drawing the difference between two things is only possible on some common basis. Things cannot differ in an absolute way; they can only be different in some respect. Thus dialectics is implicitly present in classical logic, with its dichotomies being just another aspect of dialectical contradictions inherent in higher-level entities.

It was quite natural to express the ideas contrary to the classical approach in the paradoxical form. Zeno's paradoxes have long since become a standard example. However, dialectics is not mere paradoxes; it can be developed in a positive way, like classical logic. In particular, it has its own logical forms and follows definite principles.

Logical forms

In classical logic, we consider notions, statements and inferences as the different levels of the same hierarchy. In dialectical logic, these forms cannot be considered as definite enough, since notions or inferences can become statements, statements become notions *etc*, within the same activity. However, dialectical logic has its own logical forms that are, quite logically, expected to refer to the general regularities of change.

Indeed, in the idea of change, one always finds three complementary aspects: first of all, there is something to changes (thesis); then, there is something that could be considered as the result of the change (antithesis); and, finally, the transforming proceeds in a definite manner preserving the integrity of the world during the change (synthesis); in other words, there is something that unites the thesis and the antithesis. These are the fundamental logical forms in dialectical logic.

Thesis

Anything can change, and hence become a thesis. The very possibility of determining the thesis implies its relative stability, which makes classical logic widely applicable to its primary description. Notions, statements and inferences are equally admissible to formulate (formalize) the thesis. However the formulation of the thesis does not necessarily require any language, natural or formal. In most cases the thesis is objectively present as a specific aspect of some activity, a historically formed cultural phenomenon. Quite often, the objective necessity of some activity can be considered as its thesis; there is something that must be changed in the course of that activity; otherwise, why should it

start?

Antithesis

As the opposite of the thesis, the antithesis is as abstract and as distinct from anything else; hence classical logic can be used to describe the antithesis as well. The antithesis is a specific thing essentially different from the thesis in some respect, being its *dialectical negation*. The transformation of the thesis into the antithesis necessarily looks like a leap, a jump from one side of a crevasse to another, something unexplainable (and even impossible) from the classical standpoint. Quite often, the motive of activity plays the role of the antitheses to its objective circumstances as the thesis. Any activity is, in this sense, directed from the thesis to the antithesis, and this is reflected in negation as a standard logical operation.

Synthesis

The important point in any act of dialectical thought is that both thesis and antithesis are the states, phases or aspects of the same thing, which hence must be able to manifest itself in the opposite ways recognizable as thesis and antithesis. Otherwise, this is an as plain thing, which can be described in a classical manner as long as its relation to thesis and antithesis is not considered. However, in dialectics, the presence of both thesis and antithesis in the synthetic whole is pictured as its inherent *contradiction*. That is, to grasp the synthesis, one must first clearly observe the two opposites, thesis and antithesis, to develop them in full as separate entities (the *actualization* of contradiction). As soon as this analytical work is over, one is ready to connect the opposites to each other and bring them to unity. However, such a synthesis is not yet stable: its inner contradiction requires further development, and a new cycle of analysis and synthesis. The dialectical process is essentially infinite, which often irritates scientists, who are reluctant to admit that scientific truths are always relative, and every formal model has its limits of applicability.

Fundamental principles

While the laws of classical logic have been formulated millennia ago, the principles of dialectical logic did not receive an explicit expression until the beginning of XIX century marked by the works of Hegel and Marx. However, Hegel's concerns were mainly about his new, speculative logic, and he treated the issues of dialectics in an offhand manner. Marx did not pay much attention to the foundations of logic, being rather engaged in applying Hegel's method to practical matters. The lack of logical theory is felt up to now. The norms of dialectical thought are yet too young to become commonly accepted, or even widely known. The existing formulations are too vague, there is no consistent development. Of course, the bulk of literature eventually accumulates to something resembling a general idea, but an efficient way to learn dialectics is yet to be found. The present exposition is only one more step in this direction.

The principle of integrity

Dialectics cannot rely on the identity of a thing, since each thing can turn into its opposite under certain conditions. There is a more general principle stating that every definite thing is the unity of its opposite aspects, and that it remains the same despite all the transformations. On the other hand, its internal complexity will drive it to exhibiting its opposite sides to the rest of the world, and each thing must develop all its possible forms in full until it can cease to exit. Sometimes, the presence of the opposite aspects in the same thing may take the form of internal struggle, when two opposite tendencies shape the final appearance of the thing, one of them dominating over another. This is why, in Marxist literature, the principle of integrity is known as the law of the unity and struggle of the opposites.

From the classical viewpoint, the internal complexity of individual things looks like contradictory definition ascribing opposite attributes to the same notion. In other words, the first principle of dialectical logic says that *every thesis is contradictory*. Applied to the classical logical forms, it

implies that no notion statement of inference can be specified in full, and hence any construction based on classical logic is essentially *incomplete*. Denying the identity of any notion, the principle of integrity is sometimes referred to as the law of contradiction, compared with the law of non-contradiction in classical logic. The idea of dialectical contradiction is a core of dialectics as such.

In the practical aspect, the principle of integrity demands that every change were based on the properties of the real things, rather than abstract manipulations. To make anything out of something, one has to use that something according to its inherent trends (albeit hidden and non-trivial) instead of raping the world to make things be what they cannot be (the ideological position known as voluntarism).

The principle of negation

While the internal definiteness of a thing is determined by the principle of integrity, the succession of the apparent manifestations of the thing is determined by the principle demanding that every next development phase should be a negation of the original state. In other words, every thesis can (and will) transform into its antithesis under appropriate conditions.

The idea of dialectical negation is quite simple: to produce the antithesis, we have to add something to the thesis that was not originally present there, and, conversely, remove something that should not be present in the result. Adding new features can be considered as removing (negating) their absence. However, in dialectical logic, the changes must be small enough, to preserve the thing's integrity, and there is no absolute change in every respect (which is more like the complement operation in classical logic).

The principle of negation is important to prevent dogmatism. It puts stress on a well-known, but often overlooked, fact that every act is only appropriate in a definite context, and there are no absolute laws, truths, or attitudes.

Dialectical negation is different from negation in classical logic. While the latter leads to an entirely different idea, the former leaves the thing the same, only making it *apparently* (or *functionally*) different; it merely shows how the internal opposites of the thing can manifest themselves in the thing's relation to the world. In classical logic, the negation of negation restores the original thing; in dialectical logic, the negation of negation is opposite not only to the antithesis negated, but also to the original thesis, as negated by the primary negation.

The negation of negation was often said to lead to the thing or situation resembling the original that existed before the primary negation. However, such a view is too simplified to be correct. To return to some features of the original thesis, one must negate the antithesis *in the same respect*, which is not always possible; rather, the negation of negation will result in yet another manifestation of the same thing, which will be different from both thesis and antithesis, retaining them both as its history, and resembling them both, in different aspects. The negation of negation is a *synthesis* of the thesis and antithesis. Any circularity, terminating the sequence of negations, also terminates dialectics, leading to a zone of relative stability, where classical logic should be applied.

The principle of measure

The fundamental principle that relates the internal complexity of a thing to its apparent motion via a series of negations says that every definite thing has its *measure*, a unique balance of its internal definiteness (*quality*) and possible external manifestations (*quantity*). The category of quality conveys the idea of a thing as it is, as that very thing, and not another. The philosophical category of quantity cannot be reduced to mere numerical value; it also includes any structural aspects, systemic behavior, or other external manifestations of internal complexity; this is how things of the same quality differ from each other.

Everybody knows that most things can be slightly modified without ceasing to be the same things. Such changes, irrelevant to the quality of the thing, are called quantitative. However, the principle of

measure states that quantitative changes can reach a threshold, beyond which the quality of the thing would change anyway, producing something quite different from the original. This is the mechanism of dialectical negation.

The other side of the same principle is that the quality of the thing determines when its quantitative changes will put the end to the existence of the thing as such: everything is the cause of its own death.

It should be noted that, since dialectical negation does not entirely annihilate the negated thing, but rather retains it within its negation, qualitative changes do not produce anything from nothing, merely *transforming* the already existing things, but never annihilating them. A change in quality is still a *change*, which implies the retention of something that undergoes the change. This something is reflected in the category of *measure*.

While the principle of negation says that each thing has its limits, the principle of measure states that the limits of a thing are intrinsically determined. This statement is crucial for methodology of science; it demands that, for every scientific model, its limits of its applicability should be expressible *in terms of that very model*. One does not need to explain how important the idea of measure is in the arts: it is enough to indicate that, for an artist, the feeling of measure is the principal criterion of achieving the desired result. Also, the principle of measure is a cornerstone of any philosophy, since it is concerned with the very ability to express the infinite and universal in finite and partial philosophies.

Diathetical Logic

While classical logic deals with static and unchangeable things, and dialectics stresses the aspects of motion and mutability, the hierarchy of logic, to be complete, must have yet another level, retaining a kind of sameness in any change. I will conventionally refer to this level as *diathetical*. Obviously, such logic is well suited for discussing (and planning) development; formally, it can be associated with the idea of hierarchy (idiarchy), just like classical logic mainly corresponds to the structural view and dialectics is generally systemic. This is a synthetic way of action combining the features of classical and dialectical logic. The unity of all the three kinds of logic forms the core of hierarchical logic; however, logic in full is wider than this (essentially analytical) triad.

Why diathetics?

Hegel was the first to consider the synthesis of classical logic, and he called it “speculative logic”. The name does not seem entirely appropriate. Though it clearly reflects the active character diathetical logic and its relation to human creativity, it misses the point that logic does not belong to the sphere of thought; it is predominantly manifested in practical activity. In other words, logic is not mere speculation; it is the way of making all kinds of things, the way of action.

In ancient Greek, the word *diathesis* (and its exact Latin equivalent, *dispositio*) meant intentional arrangement, or a state of being arranged for something. In particular, it was applicable to various representations or exhibitions, as well as the states of mind or moods. Like the other similar words (analysis, synthesis *etc*), the term “diathesis” can refer to both the process and the result.

The name of diathetical logic stresses this idea of being properly arranged for definite purpose. That is, while classical logic provides standard means to treat any kind of problem, and dialectics says that there are no universally applicable tools at all, diathetical logic admits the existence of suitable instruments for every task, but it also indicates that one task would probably require different instruments than another, and there is a problem of adequate choice. According to diathetical logic, people need to find appropriate ways of solution for each problem, individually selecting from available means (or inventing new tools, if needed). The same goal can be achieved in different ways; there is no unique path. However, every kind of work requires specific methods, and it cannot be done in an arbitrary way, applying random instruments in a random manner.

In diathetical logic we use certain logical forms and principles, but we are free to develop new logical

forms and revise the mode of our reasoning and action. We are never restricted to any predefined (or prescribed) rules, as long as we observe the goal and act purposefully. That is, diathetics implies all-penetrating creativity, including its reflexive application to creativity itself. This is not mere predisposition; rather, it means the active search for the right way of positioning.

Logical forms

In classical logic, we found such fundamental forms as a notion, a statement (proposition) and an inference. The forms of dialectical logic are thesis, antithesis and synthesis. Both classical and dialectical forms are embraced by the primary forms of diathetical logic: categories, categorial schemes and paradigms.

Categories

To start with, one could consider a category as a very general (and virtually universally applicable) notion. However, due its universality, a category can represent any logical form at all, becoming a synonym of "a logical form in general", something to convey the idea of a certain mode of action.

To use categories, people do not necessarily need diathetical logic. Quite often, categories are taken in a particular respect, without explicitly stressing their universality—just like any hierarchy can be unfolded in a specific way. For instance, categories delimit various artistic schools; they distinguish one science from another; any philosophy is developed around a central category, thus becoming distinct from a different philosophy.

One can rarely denote a category with a single word. Outside the context, such a designation is meaningless, it has no sense. The same word can represent quite different categories in different situations, and people often dispute in vain, confusing different things of the same name. It is only in action that any abstract words can become saturated with definiteness, referring to real situations rather than mere mental constructions.

Since there is no human activity outside a social context, categories are never usable on themselves, without any reference to other categories. That is, a category becomes meaningful only in a categorial scheme representing the general conditions of the activity reflected in that category. The different hierarchical positions of the categorial scheme provide the possible connotations of the same category, revealing its multiple aspects.

Categorial schemes

Every logical scheme can be treated as a structure, a system, or a hierarchy. In any case it corresponds to certain (analytical) aspect of human activity, and cognition in particular.

Structurally, a logical scheme contains a number of logical positions (placeholders for categories) linked to each other with logical connectives. The structural aspect of a logical scheme is commonly used in definitions. Every logical position is characterized by a unique collection of properties, and any process of categorization (which is the basis of analytical thought) relates an empirically distinguished object to a position in some logical scheme. Conversely, an object can only be defined by its relations to the other objects, which is reflected in an appropriate logical scheme.

As a system, the same logical scheme may, for instance, describe a number of possible inferences. The systemic aspect of a logical scheme implies splitting it into a number of substructures, and any such substructure is considered as producing the rest of the scheme. Such an "inference" is meaningful only within a particular scheme, and the reliability of the inference depends on the current paradigm. Indeed, the same logical structure can be involved in different categorial systems, thus producing different inferences; when the differences are irrelevant to the practical needs, the categorial schemes can be considered as equivalent. But this is not the absolute equivalence of classical logic, since the

differences are still retained somewhere deeper in the hierarchy. A categorial scheme (like any logical derivation at all) is to produce hypotheses, which have yet to be practically tested.

From the hierarchical viewpoint, a scheme represents the levels and directions of development. The scheme is then understood as a number of interrelated structures or interacting systems, forming higher-order integrity. The levels of the resulting hierarchical structure or hierarchical system will represent one of the possible paths of development, from simpler to the more complex schemes. In logical hierarchies, higher levels are usually considered as more general than the lower levels; that is, the hierarchical view of a categorial scheme reflects the levels of generality. However, development can proceed in different ways, which become logically related only within a definite paradigm. The same whole can be made of different constituents, and different organization can lead to the same overall behavior. However, that "sameness" is determined by something wider than a categorial scheme.

Paradigms

Like categorial schemes reflect the levels of generality of categories, paradigms refer to the universality of logical schemes. They distinguish a number of "fundamental" schemes, considering all the others as their specific variants, or representations. Different activities are possible within the same paradigm; also, any activity can develop into a different paradigm.

A paradigm is the basic mechanism of transferring schemes from one activity to another. It makes people prefer some schemes rather than some others, and reuse them from one activity to another.

Paradigms can also be considered as a mechanism of scheme generation. This process obeys its own logic, which does not fit into the classical or dialectical model, though, of course, any particular instance of scheme generation implies both classical and dialectical reasoning. Resembling logical inference, scheme generation does not, however, assume any predefined logic. Schemes can be empirically found, derived from other schemes, or simply suggested for some general reasons, and these three ways are intertwined in the development of logic. Scheme derivation can be integrative (constructing a new scheme from a number of other schemes) or differentiating (unfolding a scheme). Since any object and its environment are mutually reflected, logical positions and logical junctions are transmutable within the scheme, and this is yet another way of scheme production. All these possibilities co-exist within the same paradigm, which determines the overall balance of the available technologies.

Due to reflectivity and convertibility of hierarchies, there is no absolute distinction between categories, schemes and paradigms. A paradigm can sometimes be represented by a category, or expressed with a categorial scheme (a model).

Fundamental principles

Up to recently, diathetical logic has never been extensively discussed. The first explicit formulation by Hegel has also become the last. And, of course, one cannot expect any comprehensive exposition of its principal laws.

But diathetical logic is millennia old. Many people have implicitly used it in their practical work, within some special research, or as a part of a different methodology. There are numerous hints scattered in the literature. A preliminary summary of this implicit development reveals at least three ideas that could pass for the logical principles.

The principle of objectivity

Diathetical logic accepts that any reflection of a thing is dependent on that very thing. There is no activity without an object, and no thought without something to think about. People may approach the same thing differently, but all these special views will present the different aspects of the same and hence be mutually coordinated. In other words, people have to account for the objective aspects of the

situation in their activity, be adequate and consistent, to achieve anything. This applies both to the definition of the object (the way of separating it out of the integrity of the world) and its treatment (the modes of operation, the associated ideas). If we do something, it necessarily reflects some aspects of the general organization of the world, regardless of the origin of this organization; natural things are as objective as products of human activity, and social processes are as objective as physical motion or life. The principle of objectivity helps to distinguish one activity from another, presenting every activity as the unity of all its structural, systemic or hierarchical aspects. This principle also demands to subordinate one's creativity to real needs, instead of wasting time and effort on something meaningless. No restriction of the human fantasy, but rather a conscious control directing it to the common advantage. Moreover, one can assert that every human fantasy, however weird, does not come from nothing; it will always reflect something in the real world, though that something shouldn't be explicitly indicated, or even emerge to awareness.

Inconsistent and purposeless behavior is not compatible with reason; it brings people down to animals. Conscious people can imitate purposelessness for some reasons (for instance, to loosen the grip of tradition and achieve new logicality); but their behavior remains objective and logical, albeit in a different way. Lack of objectivity is always destructive, and no activity can proceed outside particular culture and specific natural conditions. Understanding human behavior requires reconstruction of the basic traits of the objective situation.

The principle of reflection

Though people pick out distinct things from the integrity of the world, these things still belong to the world, being interconnected with all the other things. In logic, this leads to the possibility of describing one thing through another; exploring one area of activity, we get some understanding of many others. If somebody has mastered one kind of activity, he can cope with many similar activities, or invent, by contrast, adequate modes of action in complementary activities. Human culture forms a whole, with each part depending on each other. This allows scheme transfer between very distant areas of activity, which can produce the impression of logic as a universal basis of activity, though the situation is rather reverse, and it is the all-comprising interrelation of activities that gives birth to general logical schemes and paradigms.

Hegel spoke of reflective categories that can only be defined through each other, one implying the other. However, the realm of reflection in logic is much wider, as any category is necessarily related to any other. Any logical scheme can be applied to any activity. This does not mean that such arbitrariness will take place in real life. Developing cultures select their own sets of preferences, and scheme transfer itself obeys certain logic. However, if something seems to be illogical in one culture, it might well become quite logical in another.

Reflection in logic is related to the self-conformity of hierarchies. Every logical category, or a logical scheme, represents the whole of logic. Where at least some kind of logicality has developed, all the other kinds are implicitly present as well, and they advance to the higher levels of hierarchy in its different positions.

The principle of concreteness

In logic, the general direction of development is from empirical observations to abstract forms, and further, to a variety of their practical implementations. Nothing can be defined entirely within logic; originally, logical categories are mere representations of an intuitively felt commonality of things, together with the human ways of operating with them. It is much later, that such empirical categories become abstract ideas applicable to a wide range of activities and hence irreducible to neither of them. As soon as we arrive at that stage, one is tempted to admit the primary role of logic in human activity, and forget about its true source, the objective necessity. Logical laws seem to be constructed *a priori*

and given us as eternal absolute forms of behavior and thought. But abstract principles are utterly inapplicable to real problems, and one has to adapt general ideas to practical needs before they can become efficient regulators of activity. Such practical interpretations manifest different sides of the same idea; however, on the lower levels of logic, they often seem contradictory and incompatible, producing much controversy and public debate.

The principle of concreteness demands that every abstraction should be complemented by a wide range of interpretations, to unfold its real power. Individual acts originally introduced in human activity in a syncretic way, following the objective logic, will necessarily become reproduced as subjective demand, a consequence of one's world vision and convictions. Being abstracted from reality, any idea must return to it as its unifying principle and the common core of superficially different acts.

In other words, to be consistent, logic must eventually grow into practical work. Until something has been changed in the real world, logical reasoning is essentially incomplete, and the truth of an abstract idea can only be demonstrated by practical action.

CONTENTS