Being, Nothing, Becoming
Hegel and Us – A Formalization[1]

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ABSTRACT: Despite its great speculative relevance and despite the fact that it is the very foundation of the Hegelian system, *The Science of Logic* by G. W. F. Hegel is practically an illegible book nowadays. Even for Germans it is a difficult reading. Other books by Hegel (except for the *Encyclopedia*) are reasonably readable. This is not the case of *The Science of Logic*. Almost all technical terms used by Hegel are defined by a conceptual network, in which the components are themselves related to one another. That is the reason for the difficulty of finding a reading guide to direct the reader from one chapter to the next. Initially, the authors of the present paper try to translate Hegel's typical language into usual English, even if some of the richness of the original text is lost. In a second step, they attempt to formalize what has been translated. There is no intention of keeping fidelity to Hegelian orthodoxy; on the contrary, the authors attempt to correct everything they think is an error in the Hegelian system.

Key words: dialectics, Hegel, formalization.

RESUMO: *Ser, Nada, Devir. Hegel e nós – Uma formalização. A Ciência da Lógica* de G. W. F. Hegel, embora de grande importância especulativa e embora seja o fundamento de todo o sistema hegeliano, tornou-se hoje um livro praticamente ilegível mesmo para pessoas de língua alemã. As outras obras (exceto a *Enciclopédia*) de Hegel são razoavelmente legíveis, *A Ciência da Lógica*, não. Isso porque quase todos os termos técnicos empregados por Hegel se definem por uma rede de remissões em que cada conceito adquire seu sentido pelo lugar que ocupa na rede de relações categoriais que, por sua vez, só são determinadas pelo mesmo método. Daí a dificuldade de encontrar um fio condutor que conduza o leitor de capítulo em capítulo. Os autores tentam, neste trabalho, num primeiro passo, traduzir o linguajar hegeliano – mesmo com a perda da riqueza que isso acarreta – para o inglês de hoje. Num segundo passo, é feita a tentativa de formalizar o que foi elaborado antes. – Não há a menor pretensão de fidelidade à ortodoxia hegeliana; muito pelo contrário, o que os autores consideraram erros do sistema foi objeto de tentativa de correção.

Palavras-chave: dialética, Hegel, formalização.

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I. First Book – The logic of being

Two works of two of our major philosophers have deeply impacted on the history of philosophy and influenced all those that came afterwards: the dialogue *Parmenides* by Plato and Hegel's *Science of Logic*[4]. Everything relevant that has been written in philosophy so far is marked deep down by the problems and the solutions proposed in these texts. And, looking ahead, one cannot envision a legitimate philosophy that can ignore the central issues discussed in *Parmenides* and the *Science of Logic*. There is no past without them and – so it seems – without them there is no future in philosophy.

Concerning the *Parmenides*, which in the meantime has been well edited and translated into a number of languages, we have excellent commentaries. This does not mean that the theme has been exhausted, but nowadays we do have several commentaries that have captured the dialogue's central ideas and presented them in a systematic and didactic manner. As far as the *Science of Logic* is concerned, the situation is different. We already have good translations, but there is a lack of competent and comprehensible commentaries. Certainly there are remarkable interpretations of isolated concepts of the Hegelian logic, but we lack commentaries comprising the whole work or one of its three parts. The existing commentaries which cover and comment on either the whole *Science of Logic* or one of its three parts – yes, there are some; sorry for not citing them – are too attached to the text and above all to Hegel's typical language. Such commentaries, mainly the German and the French ones, have adopted what, in analogy to "Economese" – and with the same derogative meaning –, we could call Hegelianese. The commentaries written in Hegelianese – and these are practically all of the existing commentaries – are almost unintelligible, except for readers who have already read Hegel himself and, by reading the original, have already understood the problems discussed. The people who try to read such commentaries end up longing for Hegel's original text. The only exception that I know of is an old book, already outdated in many respects, *A Commentary to Logic*, by John and Ellis McTaggart, which, in spite of serious interpretation errors, was understandable and was written in English, not in Hegelianese. Likewise, among the articles about Hegel being published nowadays there is an enormous amount of texts written in Hegelianese. We cannot tell whether such texts are true or false, simply because it is not possible to extract from them a meaning that is understandable.

This work attempts to understand Hegel, more specifically the first part of the *Science of Logic*, the *Logic of Being*[5], by making a continuous commentary from the first up to the last synthesis, without making use of Hegelianese, except to begin the interpretation. Thus our starting point will always be a short text in Hegelianese with a translation into the English we all speak and understand. Next we dare, at the brink of temerity, an attempt to translate the issues discussed in English into Logicese, that language used by the professional logicians that precedes formalization, and finally into Formal Logic. – Everyone will notice, as we clearly have, that there is a gradual loss of philosophical richness in this process of successive transliterations. Hegel really says a lot more than what we are able to put into the straitjacket imposed by Formal Logic. At each translation, the exuberant richness of Hegel's text loses a little of its original vigor. Where, in the original

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[4] G. W. F. Hegel, Werke in zwanzig Bände. Theorie Werkausgabe, ed. by E. Moldenhauer and K. M. Michel (Frankfurt am Main: Suhrkamp Verlag, 1969), 1983 reprint. Hegel will be always cited according to this edition. The abbreviation (Hegel, 5, 82) stands for page 82 of volume 5 (Wissenschaft der Logik I).

[5] This article is the first chapter of the work that is still in progress.

text, there is the fineness of several overlapping meanings, the chiaroscuro of complementary and inter-determining meanings, we have selected, explained, treated and symbolized just one of them – the one we have considered most relevant. But this is a sacrifice that is necessary for the central meaning of the Hegelian text to become clear in English and afterwards extremely clear and univocal in Formal Logic.

That has meant a big loss for us, a painful one. But why then have we done this? Because the outcome was a gain in clarity and preciseness; by being treated with such accuracy, Hegel's work has acquired new and important dimensions. In addition, at a first level, at a very banal and superficial level, it has become very clear that those who accuse Hegel and the Hegelian system of all sorts of logic heresies are mistaken. As it will be shown later on, it is a clamorous mistake to claim that Hegel denies the Principle of Non-Contradiction, that Dialectics is not a scientific discourse capable of preciseness and formalization; refuted are also those who state that Hegel's work, being more poetic than philosophical, cannot be expressed in true Logic, i. e. Formal Logic. Those who claim that Hegel and Dialectics deny the Principle of Non-Contradiction should silence right now. Or else throw on us, the authors, the first, the second and all innumerable subsequent stones, for, disregarding widespread prejudices among contemporary philosophers, we have tried to forma- lize Hegel's Logic. We would only urge that those stones, as they are thrown, be logical or at least expressed in clear English, rather than in unintelligible Hegelianese. Stones in Hegelianese, when impossible to translate into English, are always viewed with suspicion by the authors of this work. Stones in Hegelianese that do not say anything are not even stones[6].

The *Science of Logic*, as stated by practically all those who have dealt with it, is at the same time a critical history of the main concepts used by Western Metaphysics, a General Ontology, a Natural Theology, a Theory of Knowledge and, finally, maybe even a Logic, or rather a critique of the traditional logics. Everybody agrees that the *Science of Logic* is the hard core of Hegel's system, which, in turn, is a system that is rigorously designed in accordance with the model devised both by Plato and the neo-Platonic philosophers.

The *Logic of Being* constitutes the foundation of the whole Logic and thus of the whole Hegelian system. Hegel starts his philosophy with the beginning, with the historical beginning and the logical beginning. At the beginning of the History of Philosophy we have Parmenides' thesis that everything is the Unity at Rest, so that any movement, as shown by Zeno in his aporias, is just an illusion. Being is the perfect sphere, because it is has no limits, but it also has no movement, just as the Nothing too is empty and says nothing. According to Parmenides, both ways, the way of Being and the way of Non-Being, lead to the view that conceives the world as a sphere without limits, without movement, without any determination. Parmenides' thesis is opposed in Antiquity by Heraclitus' thesis that everything is always in movement. Everything that exists is always and only movement. The Universe is a Totality in Movement. This is the first really metaphysical major problem in the History of Philosophy, and this is also the beginning of Hegel's Logic. It is a historical beginning, as one can see. But it is a logic beginning as well, since there are no other concepts that are broader and more comprehensive, on the one hand, and simpler and emptier of content, on the other. Is the Universe Motionless Being or Totality in Movement? Parmenides or Heraclitus? This is how Hegel, definitely siding with Heraclitus, begins the *Logic of Being*. Everything else, everything that follows are "logical" – in the double

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Hegelian sense of the word – consequences of this first beginning. Following Descartes' golden rule, Hegel moves from the simplest to the most complex. Being, Nothing, Becoming; *Dasein*, Finitude, Infinitude; Being-for-self, the One and the Many, Repulsion and Attraction, Quantity, Quantum, quantitative Relation, and finally the Measure, which flexes over itself and completes the first explicit form of reflection. These are the themes of the Logic of Being as treated by Hegel and as developed in this commentary, in an attempt to formalize the hard core of each chapter. As far as the Logic of Being is concerned, now our only task is "to abandon the external reflection" and enter *in medias res.*

However, we would like to point to the horizons where the issues are posed in order to remind the readers that in the *Logic of Essence*, the second part of the *Science of Logic*, both the tune and the pace change. The *Logic of Being* is the logic of the transition (*Logik des Übergangs*), where one question leads almost linearly to the next question. In the *Logic of Essence* we enter the dialectics of circularity (*Logik der Reflexion*), where one category is defined by the other, constituting, it seems, the most perfect vicious circle; or worse, the most vicious of all circles. All major concepts of traditional Metaphysics are treated here in this way: essence and appearance, substance and accident, form and matter, possibility and necessity, etc. In this second part of the Logic circularity comes to the foreground. If one term is determined only by its opposite and *vice-versa*, how can one avoid the perpetual return of the vicious circle? Is not the vicious circle something to be avoided at any cost? This is where the third part of the Logic begins, the *Logic of the Concept (Begriffslogik)*, where circularity is indeed affirmed, but as a virtuous circle constituting and determining itself, as freedom, as self-engendering nature (*natura naturans* and *natura naturata*), and finally as spirit, creative and essentially reflective activity, reflective with good circularity. This will be the absolute idea.

We feel obliged to warn the readers that in this work we do not try to defend all of Hegel's theses. On the contrary, we will see that there are mistaken theses in Hegel. Important theses, such as the concept of absolute necessity and its relation to contingency (in the Logic of Essence), the idea of an inexorable and *a priori* progress of the dialectic method (passim), the concept of absolute idea (The Logic of the Concept), etc., will be duly corrected when we discuss them later on. We are indeed making an attempt to comment on and explain Hegel's Logic; this does not mean, however, that we will accept and support all of his theses as being true. Thus, this commentary is a critical one, sometimes proposing corrections of the Hegelian Logic. As a consequence, the reader should not expect from the authors a faithful adhesion to the so-called Hegelian orthodoxy. Quite on the contrary, the system that will emerge after this commentary has covered the three parts of the Logic is a system inspired by the historical Hegel, for sure, but it will present completely different features in very important aspects. The modal operator that pervades the system from the middle of the second part of the Logic of Essence onwards will not be the necessity of contemporary Logic, but a deontic necessity, an ought; the absolute idea will be absolute, but the system will be neither closed nor constructed only *a priori*; Ethics will be based on the freedom of the will; and History, although endowed with rationality, will be contingent, etc. But this should be a sufficient indicator of horizons that are still too distant. And, in addition, as one would put it in Hegelianese, at this point these statements have not been demonstrated yet and are merely external determinations. – The *Logic of Being*, which is the part that follows, is the one with the lowest number of corrective interpretations.

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0 With what should the beginning of Science be done?

0.1 Introduction – Contradictoriness and Contrariness

Before the First Chapter, which deals with Being, Nothing and Becoming, Hegel includes, besides a preface and an introduction, a very important text, which he does not enumerate, in contrast with what he always did. This numberless chapter in the beginning of the Logic of Being is extremely relevant in every respect. Without this chapter one cannot understand the internal structure of the Logic, without it one may be led to entirely absurd interpretations, such as the one that states that Hegel denies the Principle of Non-Contradiction.

To find out whether Hegel denies or not the Principle of Non-Contradiction it is enough to check if there is a contrary or a contradictory opposition between thesis and antithesis, which are both false, according to Hegel. If thesis and antithesis are contradictory, then necessarily – due to logical necessity – one of them is true and the other one is false. If Hegel made such a statement, he would deny the Principle of Non-Contradiction. However, if thesis and antithesis are contrary propositions, this does not happen. All Logic since Aristotle has asserted that two contrary propositions, although they cannot be simultaneously true, can be simultaneously false. This does not deny the Principle of Non-Contradiction, this does not deny Logic. Only contradictory propositions cannot be neither both simultaneously true nor both simultaneously false. And Hegel does not state that two contradictory propositions (in the sense that was explained above) are false, but that the contrary propositions are false.

And why are we still discussing this? Why are we still debating this issue more than a hundred and fifty years after Hegel's death? – Because Hegel uses the term "contradiction" – just like Nicolaus Cusanus and other neo-Platonic philosophers – in a broad sense, which most of the time includes both what we call "contradiction" and what we call "contrariness". As a consequence, the term "contradiction" becomes very confusing when used by Hegel and the Hegelians. Hegel himself, in a chapter of the Logic of Essence, qualifies and defines "contradiction" as the synthetic category that conciliates both Identity (*Identität*), which is the thesis, and Difference (*Unterschied*), which is the antithesis. This, "contradiction", in the precise Hegelian sense, is the dialectical conciliation between identity and difference (Hegel, 6, 38-80). In this "contradiction" in the strict Hegelian sense both the identity and the difference are overcome and preserved, and therefore contradiction becomes something highly positive. It is in this dialectically positive sense that we should understand the statement that contradiction is the motor of dialectics, and even the motor that keeps the Universe in movement.

But the term "contradiction", because of its lack of clearly defined contours, sometimes means what we call contrariness. And it is in this sense that Hegel and the young Hegelians state that thesis and antithesis are in contradictory opposition; they say "contradiction", but they mean "contrariness". Hegel's opponents, specifically Trendelenburg and Karl Popper, understand "contradiction" as the "contradictory opposition" in the sense of Aristotle, the medieval philosophers and Christian Wolff. That is the reason for their heavy critique against dialectics and for their claim that Hegel denies the Principle of Non-Contradiction.

But Hegel had, quite to the contrary, the intuition, expressed in several texts, that the Logic of the medieval philosophers and of Wolff, which he simply called Logic, should be reconstructed from its roots. He even states that the

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proposition's logical-grammatical structure, as taught by the logicians in that time, comprising grammatical subject and predicates, was not an adequate instrument to express the speculative truths of his doctrine (cf. Hegel, 8, 80-92): "The struggle of reason consists in overcoming what the understanding has made fixed." (Hegel, 8, 99).

But when Hegel and the young Hegelians speak of the opposition between thesis and antithesis and qualify it as contradiction, they mean, in fact, contrariness. – It is not difficult to demonstrate this. The logical horizon in which Hegel moved on a daily basis was, in spite of all dialectics, that of the Logic of the medieval philosophers and Christian Wolff, the Traditional Logic of the Predicates. And its rule was clear: contrary are the universal propositions in which, if the quantification remains unaltered, the predicate is affirmed in one proposition and denied in the other. These can be simultaneously false, but not simultaneously true. Contradictory, on the other hand, are such propositions in which one proposition is simply the denial of the other (whether the quantification is resolved or not). About the latter, the rule says: if one is true, the other is necessarily false. Now, in Hegel the grammatical subject of all categories is always the same: "Everything that was presupposed in an indeterminate manner and should now be critically reposited is…" This grammatical subject, discussed in the numberless chapter but almost always used as the hidden grammatical subject, pervades all the categories of Logic. It is of it that Being, Nothing and Becoming are predicated. But this grammatical subject is always the same, the quantifier is always the same universal quantifier. According to the rules of the Logic of the medieval philosophers and Wolff, the Traditional Logic of the Predicates, this means that such propositions are contrary rather than contradictory. And, since they are contrary, thesis and antithesis can be simultaneously false. Popper, by the way – let's do justice to him – in his well-known article *What is Dialectics?*, raised – on the basis of the interpretative *Principle of Charity* – the hypothesis that Hegel might have meant the opposition of contrariness; in that case, there would be nothing to object to dialectics in terms of the Principle of Non-Contradiction. But it should be demanded that dialectics present results in its methodological progress.

In the specific case of the formalization of dialectical arguments presented here, the General Scheme transcribed below (A1) will be used. It contains assertions and negations of assertions that are constitutive of the Logical Assertion Square (A2) that is also transcribed below. It is a logical square that is perfectly traditional in terms of the relations between the expressions that appear in its vertices: contradiction between A and O, and between E and I, contrariness between A and E, sub-contrariness between I and O, implication from A to I and from E to O and sub-implication from I to A and from O to E. In the General Scheme and in the Logical Assertion Square we clearly see not only the contrariness of thesis and antithesis, but also the double nature of the synthesis. In Hegel, the synthesis is an *aufheben*, it is an overcoming, but at the same time a preservation. On the basis of the chosen or constructed logical system, the synthesis rejects the assertions of the thesis and antithesis as unilateral and mistaken aspects. On the other hand, the synthesis receives, keeps and preserves the assertions used for refuting the thesis and antithesis as positive aspects that are conciliated in it. The diagram that is used shows, in the language of Formal Logic, the interplay between thesis, antithesis and synthesis.

A) Thesis, antithesis and synthesis in general

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In the scheme that follows 'P' means 'Premise', 'HP' means 'Hypothetical Premise' and 'RA' means 'Reduction to Absurdity'.

A1) General scheme

Thesis	Antithesis
$\vdash c_1 \qquad$ P $\lceil \vdash b \quad$ HP $\lvert \;\ldots\;\ldots\;\ldots$ $\lfloor f$ $\vdash \neg(\vdash b) \quad$ RA	$\vdash c_2 \qquad$ P $\lceil \vdash \neg b \quad$ HP $\lvert \;\ldots\;\ldots\;\ldots$ $\lfloor f$ $\vdash \neg(\vdash \neg b) \quad$ RA

Synthesis

Positive Part

Logical Law Refuting the Thesis $\vdash c_1$	Logical Law Refuting the Antithesis $\vdash c_2$

Negative Part

Metalogical Law of the Refuted Thesis $\vdash \neg(\vdash b)$	Metalogical Law of the Refuted Antithesis $\vdash \neg(\vdash \neg b)$

The logical laws mentioned in the positive part of the synthesis state 'it is law that…'. The metalogical laws mentioned in the negative part of the synthesis, however, state 'it is law that it is not law that…'. With the latter ones, the thesis and antithesis are not only refuted and cancelled, but also preserved and elevated (*aufgehoben*) in the synthesis.

A2) Logical assertion square

A   E

$\vdash b$ Proposition '*b*' is tautological	$\vdash \neg b$ Proposition '*b*' is contradictory
$\neg(\vdash \neg b)$ Proposition '*b*' is not contradictory	$\neg(\vdash b)$ Proposition '*b*' is not tautological

I   O

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0.2 The Absolute as the hidden grammatical subject of all predications

In the Logic of the *Encyclopedia*, Hegel explicitly asserts that the grammatical subject of the first thesis of Logic is the Absolute: "The Absolute is Being" (Hegel, 8, 183). On page 186, he asserts that this Absolute is God, the Highest Being (ibid., 186). Right at the beginning he claims that all categories of Logic are predicates of God (Hegel, 8, 181). And thence arises the problem of how to begin a philosophy that intends to be critical with the concept of the Absolute or God.

It seems at least naïve to posit the Absolute as the hidden grammatical subject of all predications of a philosophical system. Is not the Absolute the point of arrival in Philosophy? Is not the Absolute the highest summit that the human spirit can and must rise to? How can you then posit the Absolute right at the starting point, without an explanation, without a critical spirit? The answer is not given in a clear manner in the Logic of the *Encyclopedia*. Let us go back, therefore, to the *Science of Logic*. The grammatical subject underlying the *Science of Logic* is, as we are going to demonstrate, "All that has been presupposed in an indeterminate manner and should be now critically reposited is…" This grammatical subject, used as the hidden subject, is the outcome of a critical posture that is discussed and justified by Hegel in the numberless chapter titled *With what should the beginning of Science be done*?

Hegel's argumentation, as summarized to its central nucleus, is as follows. Philosophy after Descartes, Kant and Fichte must be critical philosophy. Critical, however, is solely the philosophy that makes no presuppositions. Those who make presuppositions become dogmatic thinkers, since such presuppositions can never be demonstrated and must, therefore, be accepted as dogmas of thinking. But this is noncritical and cannot be admitted. – Descartes tried to solve the problem by starting from the doubt that cannot doubt that it itself is doubting and thus constitutes a foundation that has no further presuppositions. Kant, in turn, based on the success of some principles of the natural sciences and their acceptance by the scientific community, starts from the existence of some a priori synthetic judgments that are true; such judgments are presuppositions consciously made by Kant. But in Kant's view such judgments or principles cannot be denied by anybody, and, therefore, such presuppositions are justified. Thus Kant, although attempting to make a critical Philosophy, makes determinate presuppositions and clearly indicates them. Hegel introduces here a different solution, developed according to his dialectical style of thinking. Critical Philosophy, he asserts – naively, to some extent – cannot make any presupposition that is determinate; if it does so, it falls into dogmatism. But those who make no determinate presupposition are always making an indeterminate one. To not presuppose anything determinate is equivalent to presupposing everything in an indeterminate manner. For the determinate nothing is as empty as the everything that is presupposed in an indeterminate manner. When the nothing and the everything are indeterminate and absolutely empty, they have the same content, that is to say, no content. And this is why critical Philosophy can and must presuppose everything in an indeterminate manner; it starts from the everything that is still indeterminate and completely empty. This is the Absolute as the beginning of Hegel's whole Philosophy. At the beginning the Absolute is, for Hegel, the Everything which is indeterminate and empty.

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Thus, the grammatical subject of all categories of the Logic of Being[7] can be defined as follows: "Everything existent or merely possible that was initially presupposed in an indeterminate manner and must now, in the course of the system's development, be reposited and determined in a critical and systematic manner is…". The suspension points indicate the place where the categories of Logic must be put. Here we have the well-known dialectics between "presuppose" (*voraussetzen*) and "reposit" (*setzen*). It is necessary to presuppose everything in an indeterminate way in order to be able to reposit everything in a determinate way that is critical. The grammatical subject of Hegel's Philosophy is expressed and formulated with great clarity in this numberless chapter; here there is an attempt to make a philosophy which is absolutely critical.

Today, after Frege, Bertrand Russell, Hilbert and Karl Popper, we know that it is impossible to make such an absolute beginning, as it is impossible to make an absolute ending, as intended by Hegel in the category of "absolute knowledge". There is no absolute in this sense, neither at the beginning nor at the end of the system. Today we know that the system has to be open in both directions, forward as well as backward. Just as the absolute idea and the total closure of the system as an absolute end is a contradictory concept, so an absolute beginning, as intended by Hegel, is also impossible and unthinkable.

The absolute idea as the system's ultimate absolute end gets into contradiction because the impossibility of further evolutions gets into contradiction with the central idea of the system, which is the Totality in Movement, the Totality always in a contingent movement of transformation, as will be shown later. The absolute beginning of the system, with no presupposition that is determinate, is likewise impossible, because the philosopher, even being extremely critical, is always presupposing countless horizons, firstly and especially the horizon of the concrete language in which he or she philosophizes. Thus, there is no beginning that can be absolute, as intended by Hegel.

What we can and should do is, as far as possible, make explicit the determinate presuppositions that we are always making and that step by step we continue to make. In this conceptual framework it is clear that we will never be able to make explicit all our presuppositions, just as we will not be able to predict all future configurations of the Totality in Movement. But we can and should, as far as possible, to make explicit the presuppositions that we are in fact aware of making. This does not mean that a short time later someone might not come and found the same system with fewer and simpler presuppositions. By the way, we do not have here the Hegelian *hybris*. We present this essay to the scientific community precisely for them to criticize and correct it as applicable, and in this way carry on a little further the construction of the philosophical system. We are the first ones to say that the theses presented here may contain errors; we are the first ones to state that we have captured only a small part of what Hegel said in the *Science of Logic*. We are the first ones to claim that there is neither an absolute beginning of the system nor a final closure in the category of "absolute knowledge".

And what about justification? What is the criterion of truth of the system, its axioms and propositions? Have we abandoned the philosophical ideal of a critical philosophy? Do we no longer have criteria for truth? No, we have just modernized them. A theory or a system and its axiomatic assumptions are true if and as long as there is internal and external coherence. For a philosophical system, this means that

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[7] In the Logic of Being the grammatical subject is the most universal one, including what is existent and what is possible; hence the use of the Logic of Bound Assertion. In the Logic of Essence, which deals with all existing entities, the grammatical subject is "Every existent that was presupposed and must now be reposited is…"; hence the use of Free Logic here.

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it must have a complete internal consistency and, if it is a system applied to the world's factual reality, be coherent with the phenomena given to us in experience. The internal logical coherence of a system and, if there is reference to factuality, its coherence with the world of phenomena given in experience, this is the universal criterion of truth. It applies both to a theory of Logic, of Physics or of Biology and to the system of Philosophy, which is also a Philosophy of the Real, as we understand and construct it. And what about the truth of the presuppositions? Of the presupposed axioms? They are always hypothetical and are justified together with the system to which they belong. When the system is applied to the factuality of the real world, there must be, besides that, coherence with the phenomena of experience. This turns the issue of justification into a system of good circularity (cf. the Logic of Essence) and allows us to avoid the Aristotelian solution of a primitive *arkhé.*

0.3 The issue of the individual in Hegel and in common sense

A second preliminary observation is necessary here. It does not appear in Hegel's unnumbered chapter, *How should the beginning of Science be done*, but it certainly would appear in it if Hegel were aware of the concept of individual used by most modern philosophers. In contemporary philosophies the modern concept (Descartes, Hobbes, etc.) of "individual" is often uncritically presupposed. The term "individual" is understood in this context by the majority of authors in the modern sense – and in a sense that the common sense considers obvious – of a man, a she-goat, a bacterium, a geometrical figure, a certain number. Socrates, for example, to the common sense and the majority of contemporary philosophers is always and solely a singular individual; we do not stop to consider whether the bacteria existing in Socrates' bowels are parts of Socrates as an individual or they constitute new individuals themselves. We usually admit, silently, the second hypothesis. "Individual" seems to be something obvious to us, post-Cartesian human beings: something singular and only that.

In Hegel, "individual" means something completely different, something clear and well delineated, something quite different from the concept of individual according to the common sense of our days. Socrates, in Hegel, is an individual indeed, but this individual only exists in a constitutive movement which, departing from the individual, goes through the particular and moves on to the universal, returning later, via the particular, to the individual, never stopping. When we stop, we make a theoretical error and a practical injustice. Socrates, according to Hegel, is never only an individual at whom I point with my finger, but is always also a particular, a collective, which is a human group, and a concrete universal, which ultimately is the totality of the Universe in all its differentiations. The individual, in Hegel, is a knot existing in the net of threads that constitute the Universe. When saying the individual we must always say, at least implicitly, the whole Universe. The individual is, in his/her being and existence, just a knot in the net of threads that constitute the texture of the Universe. In other words, the individual in Hegel is never merely an individual, but always also a particular and a universal. This will be discussed and demonstrated at the beginning of the Logic of the Concept (*Begriffslogik*).

In some contemporary books of Introduction to Logic, however, "individual" is only conceived as individual in the sense of the common sense; Socrates and only he is an "individual constant", without any connotation to human groups. The

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individual Socrates is not conceived as a member of a web that constitutes the whole Universe; in this "individual constant" the Universe is neither denoted nor connoted. The same applies to the "individual variables". – Are these Logics correct? Certainly not. – How to express then in modern and correct Logic this individual who is not fully individual, but only a knot in a universal cosmic net? How to express with the variable *x* the dynamics that, starting from the individual, leads, through the particular, to the concrete universal of the Universe? – As the grammatical subject of Hegel's Logic is always the totality of "everything possible or existent that was presupposed in an indeterminate manner and must now be critically and systematically reposited in a determinate manner", there is an immense psychological difficulty for most contemporary philosophers in understanding all this as a meaning implied in the variable "For every *x, x is.*" But this is what we should do and think. And modern Logic, through its good thinkers, already does all that, although it does not always make it clearly explicit.

0.4 The Individual and the Universe in Formal Logic

The post-Fregian modern Logic, in its good thinkers, has a view of the individual and the Universe that is very close to Hegel's view. What we have described above in a somewhat caricatured way about the meaning of the individual and the Universe according to the common sense does not apply to well thinking logicians and to contemporary Logic as such.

Let us compare, point by point, Hegel's opinions, as presented above, with those of a well conceived Logic. According to Logic, individual, individual variable, individual constant, predicate, predicative variable, predicative constant, when used in a language as primitive symbols, have no definitions; they cannot even be defined. Is this uncritical? Is this dogmatic? No. It would be so if Logic stopped here. But the so called primitive terms in Logic acquire philosophical meaning and determination – and thus their "definition" – because they are used in the formulation of axioms, inference rules and theorems. The primitive terms are parts that participate in the constitution of a larger whole from which they acquire philosophical meaning and determination.

In Logic, "individual constants and variables" are primitive and, therefore, non-defined symbols; but they acquire a determinate meaning (*Bestimmung*) if and as long as they are a constitutive part of a larger whole that gives them meaning and determination. However, no matter how strong this determination is, the ambiguity that is characteristic of "natural" languages continues to be present in formal languages under the name of isomorphism. In Logic, as in Hegel's system, the individual only has meaning in the movement that, departing from the singular, goes through the particular (the proposition) and leads to the Universe of the language to which it refers. Logic makes the same dialectical movement preconized by Hegel by conjugating the singular with the universal via the particular.

It is necessary here to make explicit what is an individual in the Logic of Bound Assertion, if and when that Logic is well conceived. We call "referential universe of (existent or inexistent) individuals" the – infinite – totality of all that is possible, existent or inexistent. In Logic, individual can designate, when the term is correctly conceived, not only an object or a person, but also an instant or a point of a physical object or a person, and also the set of instants and points that ranges from the appearance to the disappearance of that individual and that distends in a number of points.

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So, what does the phrase "for every *x, x*…" mean? The phrase "for every *x, x*…" means that we must go through the totality of possible or existent individuals that are constitutive of the Universe to which we refer. If "for every *x, x* …" expressed and focused directly on the totality of the Universe (simply understood as Universe), then "for every *x, x* is black" would mean that the totality of the universe is black. It may be that in this case the substitution is pertinent: if all individuals that are constitutive of the universe are black, then the universe itself is black. Nevertheless, we should take the counterexample into account: every natural number is finite, but the totality of natural numbers is infinite. The properties of all parts and of each part of the universe are not necessarily properties of the universe itself. For this reason, by saying "for every *x, x*…" I am explicitly saying something about each part of the universe and I may be implicitly saying something about the universe itself (e.g. the universe, constituted by black things, is black, or the universe, constituted by the finite numbers, is not finite). In both cases I am talking in an indirect manner about the Universe itself.

Why is it that no Logic and no Philosophy can talk directly about the Universe as such? Why is it that we cannot say anything determinate about it, except in an indirect manner and through the context of the system as a whole? Because when we focus on something determinate, be it a concept, a predicate or a theory, we are always cutting something out of a horizon which is behind and from which we do the highlighting that is the determination. And if we want to focus on this horizon that is behind, on a horizon that is the last one, we are always presupposing a horizon that is still further behind, from which we do the cutting and the determination. This is why there is no horizon that is the last one and the most we are able to do is to talk about the Universe in an indirect way, making a "fusion of horizons", as Heidegger and Gadamer used to say.

We ask further: Does the phrase "for every *x, x*…" express the totality of the Universe, as intended by Hegel, or just a series of conjunctions? Here arises the logical problem of how to build the universal quantification. Through the mere addition of conjunctions? Or, quite to the contrary, is it necessary to presuppose the universal quantifier as a primitive term and, starting from it and from two negations, to construct the existential quantifier?

The definition to which the text above refers is as follows:

$$\lor x\, Px \leftrightharpoons \lnot\, \land x\, \lnot\, Px$$

'For at least one *x*, *x* is *P*' [or 'there is an *x* such that *x* is *P*']
is equivalent by definition to
'for not every *x*, *x* is not *P*'.

The phrase "for every *x, x*…" can only be replaced by a finite series of conjunctions if and only if the universe of individuals is finite. In this sense, "all the apostles were Jews" means "the apostle number 1 was a Jew, ***and*** the apostle number 2 was a Jew ***and***… ***and*** the apostle 12 was a Jew" (the omission points are here a way of shortening the sentence in English; in logic all the twelve apostles should be enumerated). If the universe is infinite, there is no way of making this replacement, for the sentence would never be concluded: "number 0 is finite ***and*** number 1 is finite ***and*** number 2 is finite ***and***…" (the omission points would be the manner of leaving the sentence open in English). In logic, the omission points could only be used if they were defined in terms of phrases

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where they do not appear and where everything that appears has already been postulated or defined. In the case of the infinite conjunction mentioned above as an example, the only way to make the omission points intelligible would be to define them by the universal quantification. This procedure, however, because it is enumerable (although infinite), would impoverish the universal quantification: how can we speak of "all the points of a segment of a straight line" by using an enumerable infinite series of conjunctions?

Therefore, the universal quantification is always more than the series, albeit infinite, of conjunctions. The same applies to the existential quantification, for it is always more than a series, albeit infinite, of disjunctions. Both attempts, so it seems, are doomed to failure. We will see later on (in the Logic of the Concept) how Hegel tries to solve the problem. At any rate, as an answer to the question made above, it would be possible to claim that the phrase "for every *x, x…*" expresses neither the totality of the Universe nor merely a series of conjunctions. But, although the phrase does not express the Universe *as a totality*, it requires that the Universe is traversed *in its totality*.

0.5 The individual existence as factuality

There is an additional problem. In Frege's Logic, which is the one all of us usually use, the existential quantifier means that something really exists, that it is a fact in this world we live in. Hegel's Logic, up to approximately half of the Logic of Essence, never deals with existing entities, but in a very generic manner with "everything that, existent or merely possible, is…". – To avoid as much as possible the almost inevitable confusions, instead of using Frege's Logic with its existential quantifier, we have used – advised by Soares and as developed by him – the Logic of Bound Assertion. In this Logic "for every *x*, *x…*" means "for every *x*, be it existent or merely possible, *x…*". The phrase "to at least one *x*, *x…*" means that a merely possible entity can take the place of that *x*. Through the use of the Logic of Bound Assertion the utterly universal character of the Hegelian Logic is better expressed.

0.6 Numeration

We will follow Hegel's original in the numbering of this text. Hegel's titles will be made of numbers and placed in the center of the page; the subtitles, commentaries in English or in Hegelianese, will be numbered, at the left margin of the page, always beginning with numbers. Thus, "I 1 1 A a" means first book (I), first part (1), first chapter (1), first thesis (A); in this case: The Doctrine of Being (I, first book), Quality (1, first part), Being (1, first chapter), Being (A, first thesis of the chapter). The ordering of the triads in Symbolic Logic and the comments in that language will always be characterized (as they have already been characterized when we inserted here, for example, the general scheme – **A1** –**)** by an initial letter followed or not by numbers, always placed at the left margin.

We drive the reader's attention to the fact that sometimes two triads in Formal Logic correspond to a single triad of Hegel. At other occasions Hegelian triads are simply skipped because they merely repeat in other words what has already been worked on before. But this will be mentioned in each case.

As the Logic of Bound Assertion is the horizon where we place ourselves, it too belongs to this chapter 0 and is transcribed here.

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A3) The Logic of Bound Assertion with Identity (LBA)

The Logic of Bound Assertion – LBA – is a Logic of the First Order Predicates with Identity that, instead of quantification, operates with the bound assertion. The referential universe of the individuals is constituted by everything that can be, existent or inexistent. For this reason, individual constants are not necessary. As a Logic of the Predicates it presupposes the Logic of the Propositions – LP –. Additional postulates will then be gradually added to the LP and instances of the primitive rule of Replacement will be made explicit.

A31) Additional primitive symbols
A311) Variables

A3111) For monadic predicates	P	P_1	P_2	...
	Q	Q_1	Q_2	...
A3112) For dyadic predicates	R	R_1	R_2	...
A3113) For n-adic predicates	P^n	P_1^n	P_2^n	...
	Q^n	Q_1^n	Q_2^n	...
	...	...	...	...
A3114) For individuals	x	x_1	x_2	...
	y	y_1	y_2	...
	...	...	...	...

A312) Constants
A3121) Monadic Asserter Δ
      (Generalizing Bound Assertion)
          [$\Delta x\, Px$: For every x (existent or inexistent), x is P.]
A3122) Dyadic Predicative $=$
      (Identity)
          [$x = y$: x equals y.]

A32) Additional clauses to the recursive definition of proposition
A321) Initial additional clause
        If B is a n-adic predicative variable,
        if l_1, ... and l_n are n individual variables,
        then $Bl_1...l_n$, and $l_1 = l_n$
          are (well constructed) propositions.
A322) Additional generative clause
        If l is an individual variable,
        if $b(l)$ is a (well constructed) proposition
          in which the variable l occurs freely,
        then $\Delta lb(l)$ is a (well constructed) proposition.
A3221) Note on the additional generative clause
        The variable l of the proposition $b(l)$
          is bound (i. e., not free) in $\Delta lb(l)$.

A33) Additional axioms, additional primitive rules of inference and additional definitions
(With the making explicit of instances [for the LBA] of the Primitive Rule of Replacement [of the LP] and with a reserve of numbers for the theorems deemed to be most significant.)

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001 $\vdash (\vdash b(p)) \rightarrow (\vdash b(Px))$ Replacement of p by Px
002 $\vdash (\vdash b(x)) \rightarrow (\, b(y))$ Replacement of x by y

003 $\vdash (\vdash b(Px)) \to (\vdash b(d(x)))$ Replacement of $P\cdot$ by $d(\cdot)$

004 $\nabla x Px \leftrightharpoons \neg\Delta x\neg Px$ Resolution of the Bound Assertion

005 $\vdash (\vdash b(x)) \to (\vdash \Delta x b(x))$ Introduction of the Generalizing Assertion

006 $\vdash \Delta x(Px \to Qx) \to (\Delta x Px \to \Delta x Qx)$ Distribution of the Bound Assertion

051 $\vdash \Delta x Px \to Py$ Elimination of the Generalizing Assertion

061 $\vdash (\vdash b(Px)) \to (\vdash b(px))$ Replacement of $P\cdot$ by $p\circ$

062 $px \leftrightharpoons p$ Superfluous Variable

063 $\Delta xp \leftrightharpoons \Delta xpx$ Emptiness of the Bound Assertion

064 $\nabla xp \leftrightharpoons \neg\Delta x\neg p$ Resolution of the Bound Assertion

065 $\vdash p \to \Delta xp$ Emptiness of the Bound Assertion

101 $\vdash (\vdash b(p)) \to (\vdash b(Rxy))$ Replacement of p by Rxy

102 $\vdash (\vdash b(Rxy)) \to (\vdash b(d(x,y)))$ Replacement of $R\cdot\cdot$ by $d(\cdot,\cdot)$

103 $\vdash (\vdash b(p)) \to (\vdash b(P^n x_1...x_n))$ Replacement of p by $P^n x_1...x_n$

104 $\vdash (\vdash b(P^n x_1...x_n)) \to (\vdash b(d(x_1...x_n)))$ Replacement of $P^n\cdot...\cdot$ by $d(\cdot,...,\cdot)$

131 $x \neq y \leftrightharpoons \neg x = y$ Otherness

132 $\vdash x = y \to (Px \to Py)$ Interchange

133 $\vdash x = x$ Reflectivity

161 $\nabla !xPx \leftrightharpoons \nabla y\Delta x(Px \leftrightarrow y = x)$ Uniqueness

181 $\imath xPxQx \leftrightharpoons \nabla y(\Delta x(Px \leftrightarrow y = x) \wedge Qy$ Description

First Book – The Doctrine of being

First Part – Determination (Quality)

Chapter 1 – Being, Nothing, Becoming

I 1 1 - Introduction

Hegel's original text is extraordinarily concise and, for this reason, very difficult do understand. The initial thesis is the famous anacoluthon: "Being, pure being – without any further determination" (Hegel, 5, 82). What Hegel means by that in Hegelianese is that the thesis "The Absolute is Being, pure being, without any determination" is a false thesis. This is Parmenides' path of being that leads to nothing, except to the immobility of the sphere without any limit or determination. Why is the thesis false? Hegel does not explain why, so we are left with the burden of finding out what he really thinks. The best commentators[8] on this issue say that there is a performative contradiction between wanting to determine the Absolute and the proposition that determines it as something totally indeterminate.

The antithesis is "The Absolute is Nothing" (Hegel, 5, 83). The antithesis is false for the same reason the thesis is false: The category that should further determine the Absolute does not determine anything. That is why it is false.

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[8] Cf. W. Wieland, Bemerkungen zum Anfang von Hegels Logik (1973), in R. P. Hortsmann (Ed.), Seminar: Dialektik in der Philosophie Hegels (Frankfurt a. M.: Suhrkamp, 1978).

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It is only in the synthesis that Hegel offers the argumentative core: "Their truth is this movement of the direct disappearing of each one into its opposite: Becoming" (Hegel, 5, 83). First Hegel strongly stresses what he calls the identity between Being and Nothing: "Being and Nothing are one and the same" (Hegel, 5, 92), but then he emphasizes the difference between them: "Being and Nothing are not the same" (ibid., 93). What really matters to Hegel is the movement in which one becomes the other, but neither one loses completely its primitive identity.

If we translate this text from Hegelianese into English, we realize what Hegel means, viz., the movement in which the whole Universe is. What he means is, in Heraclitus' words: *panta rei*, everything is being transformed and nothing is in a state of rest.

If we translate from English into the language of Logic, what we have here is a Logic of Transformation. Everything becomes its opposite, iterating over and over again this endless and limitless transformation. From this results the formalization that follows and will then be commented on:

B) The transformation: movement and rest
B1) Refutation of the thesis '$\vdash x$ becomes everything'
B11) Theorem

$\vdash \neg\, x \neq x$	Negation of Otherness

Demonstration:

1	$\vdash x = x$	Reflectivity
2	$\vdash \neg\,\neg\, x = x$	1 Double Negation
3	$\vdash \neg\, x \neq x$	2 Otherness

B12) The Logic of Transformation

The Logic of Transformation is a First Order Logic that presupposes the Logic of Bound Assertion (with Identity), which, in turn, presupposes the Logic of Propositions. Therefore, additional postulates are added to the Logic of Bound Assertion.

B121) Additional primitive symbol
B1211) Constant
B12111) Dyadic predicative: T
        [Txy: x becomes y.]
B122) Additional axiom

Postulation:

1	$\vdash Txy \rightarrow x \neq y$	Elimination of Transformation

B13) Theorem

$\vdash \neg\, Txx$	Anti-reflectivity

Demonstration:

1	$\vdash Txy \rightarrow x \neq y$	Elimination of the Transformation
2	$\vdash Txx \rightarrow x \neq x$	1 Replacement of y by x
3	$\vdash \neg\, x \neq x$	Negation of the Otherness
4	$\vdash \neg\, Txx$	2,3 Separation

B14) Theorem

$\vdash \nabla y \,\neg\, Txy$	Non-Transformation

Demonstration:

1	$\vdash \neg\, Txx$	Anti-reflectivity
2	$\vdash \nabla y \,\neg\, Txy$	1 Intr. of the Particularizing Assertion

B15) The thesis

Refutation

1	$\vdash \nabla y \,\neg\, Txy$	Non-Transformation
⌈ 2	$\vdash \Delta y\, Txy$	Hypothetical Premise (**Thesis**)
│ 3	$\vdash \neg\, \nabla y \,\neg\, Txy$	2 Resolution of the Bound Assertion
│ 4	$\vdash \nabla y \,\neg\, Txy \wedge \neg\, \nabla y \,\neg\, Txy$	1,3 Logical Product
│ 5	$\vdash f$	4 Supplementation
⌊ 6	f	5 Elimination of the Assertion
7	$\vdash \neg\,(\vdash \Delta y\, Txy)$	2-6 Reduction to Absurdity

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B2) Refutation of the antithesis '⊢ x becomes nothing'

B22) Additional axiom

Postulation:

  1 ⊢ $\nabla y\, Txy$ Introduction of the Transformation

B23) The antithesis

Refutation

  1 ⊢ $\nabla y\, Txy$ Introduction of the Transformation

  ⌈ 2 ⊢ ¬ $\nabla y\, Txy$ Hypothetical Premise (**Antithesis**)

  │ 3 ⊢ $\nabla y\, Txy \wedge \neg\, \nabla y\, Txy$ 2,3 Logical Product

  │ 4 ⊢ f 3 Supplementation

  ⌊ 5 f 4 Elimination of the Assertion

  6 ⊢ ¬ (⊢ ¬ $\nabla y\, Txy$)   2-5 Reduction to Absurdity

B3) The synthesis of '⊢ x does not become something' and '⊢ x becomes something'

Thesis	⊢ $\Delta y\, Txy$	⊢ x (existent or inexistent) becomes everything (existent or inexistent).	⊢ x becomes everything.
Antithesis	⊢ ¬ $\nabla y\, Txy$	⊢ x (existent or inexistent) becomes nothing (existent or inexistent).	⊢ x becomes nothing.
Synthesis (−) (T)	⊢ ¬ (⊢ $\Delta y\, Txy$)	Non (⊢ x (existent or inexistent) becomes everything (existent or inexistent)).	⊢ Non (⊢ x becomes everything).
Synthesis (−) (A)	⊢ ¬ (⊢ ¬ $\nabla y\, Txy$)	Non (⊢ x (existent or inexistent) becomes nothing (existent or inexistent)).	⊢ Non (⊢ x becomes nothing).
Synthesis (+) (T)	⊢ ∇y ¬ Txy	x (existent or inexistent) does not become something (existent or inexistent).	⊢ x does not become something.
Synthesis (+) (A)	⊢ $\nabla y\, Txy$	⊢ x (existent or inexistent) becomes something (existent or inexistent).	⊢ x becomes something.

B4) Some apparently paradoxical developments of the synthesis

B411	⊢ ¬ Txx ⊢ x does not become x.		
B412	⊢ ∇y ¬ Txy ⊢ x does not become something.	B422	⊢ $\nabla y\, Txy$ ⊢x becomes something.
B413	⊢ $\Delta x\, \nabla y$ ¬ Txy ⊢ Everything does not become something.	B423	⊢ $\Delta x\, \nabla y\, Txy$ ⊢ Everything becomes something.
B414	⊢ $\nabla x\, \nabla y$ ¬ Txy ⊢ Something does not become something.	B424	⊢ $\nabla x\, \nabla y\, Txy$ ⊢ Something becomes something.
B415	⊢ ¬ $\nabla x\, \Delta y\, Txy$ ⊢ Nothing becomes everything.	B425	⊢ ¬ $\nabla x\, \Delta y$ ¬ Txy ⊢ Nothing does not become everything.
B416	⊢ ¬ $\Delta x\, \Delta y\, Txy$ ⊢ Not everything becomes everything.	B426	⊢ ¬ $\Delta x\, \Delta y$ ¬ Txy ⊢ Not everything does not become everything.

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I 1 1 A - The thesis '⊢ x becomes everything'

The thesis, which is refuted as being false, states that it applies to each *y* that *x* is transformed into *y*. This means, expressed in positive terms, that it is necessary that *x* (whatever it is) becomes everything. We observe right here that the set of symbols '∆*y* … … *y*' that appears in '∆*y Txy*' is translated as "everything". What the thesis says is that everything in the Universe always becomes everything. To someone who is used to Hegel's language, this seems to be correct, totally correct: Everything is transformed into everything. This seems to contain the hard core of Heraclitus' and Hegel's philosophy. But Logic demands a more careful examination. If we just said that *x* becomes *x*, we would not be saying anything, because if the two indispensable extremes are lacking (*terminus a quo* and *terminus ad quem*), the verb "to become" would become unthinkable. This is why two individual variables (*x* and *y*) are used, although both of them vary in the very same universe of reference, that is, in the very same Absolute. Having two terms and generalizing *x* due to the fact that the proposition is asserted (⊢), we can say, without logical-linguistic fallacy, that ∆*x ∆y Txy*, i. e., that for each *x* and for each *y*, *x* becomes *y*. The refutation is made precisely because formally there must be at least one *y* which *x* does not become (for at least one *y*, *x* does not become *y*).

I 1 1 B - The antithesis '⊢ x becomes nothing'

The antithesis, which is equally false, states, generalizing *x* due to the fact that the proposition is asserted (⊢), that for each *x* and for no *y*, *x* becomes *y*. In other words: Everything becomes nothing. – At first sight, again, this seems to be a Hegelian thesis. But it is logically poorly formulated for the same reason mentioned above: the word "become" demands a *terminus ad quem*, which here is nothing. Without a *terminus ad quem* it is not possible that something becomes. Hence the falsity of the antithesis.

I 1 1 C - The synthesis '⊢ *x* does not become something' and '⊢ *x* becomes something'

The synthesis negates and overcomes the false thesis and antithesis. But it preserves the true core that they contain. This is the meaning of *aufheben* in Hegel. In this case, the true core of the thesis is that *x* does not become something, viz., it does not become itself. The true core of the antithesis says that *x* becomes something, viz., something that it is not. If we recall that *x* and *y* are variables that vary within the same universe of reference, i. e., in the very same Absolute, we can now think and even imagine how the instances to which *x* and *y* refer are transformed into one another. Since both are constitutive of the Absolute, it is the Absolute itself that is in movement. The Absolute is Becoming, as Heraclitus and Hegel rightly claim.

The synthesis overcomes the falsity of the thesis and antithesis, but it preserves what was true in them, viz., movement.

I 1 1 Ca - Paradoxical developments

To go through the table that contains "Some apparently paradoxical developments of the synthesis" is an instigating intellectual exercise. These are paradoxes or, if you wish, what Hegel and the Hegelians call "contradictions". All

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assertions contained in this table are true and are derived from the Logic of Transformation. The most important ones are probably B413, where it is asserted that everything does not become something, for at least it does not become itself (B411), and B423, where it is asserted that everything becomes something, for at least it becomes something other than itself (B422).

To a staunch Hegelian it is a special pleasure to play the game of the opposites without ever violating Logic. To a logician it is an act of humbleness both toward dialectics and logic itself to acknowledge that their intuition may be misleading, that what they perceive as a contradiction or as a tautology is formally not always a contradiction or a tautology. Putnam's statement[9] is valid in this respect: "That we have self-contradictory intuitions about a certain number of basic notions of logic itself is in itself one of the great epistemological discoveries of the 20th century."

I 1 1 Cb - Identity and Otherness of the Universe of Becoming

Being, Nothing and Becoming constitute in Hegel the first dialectical triad. In our commentary in Formal Logic we have put the Logic of Transformation in the first place, that is the Logic that develops and explains the hard core of Becoming. We have shown that the whole Universe is a perpetual Becoming. However, the nature of that Universe has not been sufficiently developed, as was done by Heraclitus, Hegel, Schelling and many of the Neo-Platonists. Does the Universe we are talking about contain one single individual or a plurality of individuals? Or is it an empty Universe? In Logic, as we know, there is the possibility of something such as a Universe that is absolutely empty. Does this apply here? Hegel's answer is clear and sharp: There is one single full individual in the Universe. One might even say that for this reason the Universe is itself one single substance. The multiplicity and plurality of entities and individuals that we observe in the world we live in is constituted only by folds of the Universe. Everything is, exists and is the Universe, everything is the substance that is one and the same substance. The whole variegated plurality of entities and things, of what we call – and of what Logic calls – individuals are only folds that emerge when from the initial egg – which is the Universe – the multiple individuals un-fold and develop. These individuals, by the way, are not autonomous and self-sufficient substances that subsist in their being – this seems to be the doctrine of Aristotle and the Aristotelians – but folds of the one substance. In spite of that, the general use of the term leads us to use "individual" in the modern sense of the word, thereby affirming the plurality of individuals in the Universe. In this way, of course, we do not deny that – to put it in Hegelianese – these individuals are folds of the one substance.

I 1 1 Cd - The one and multiple substance

This aspect of the one substance is discussed by Hegel in the Logic of Essence. There he analyzes and comments on binomials such as essence and appearance, founding and founded foundation (*Grund*), form and matter and also substance and accident. There Hegel expounds on his doctrine that the so-called accidents are just folds of the substance that is one. But the doctrine of the one substance that

9 H. Putnam. Formalização. In: R. Romano (Dir.), Enciclopédia Einaudi. Volume 13. Lógica-Combinatória. S. I., Portugal: Imprensa Nacional – Casa da Moeda, 1988. 393 p. p. 147-165. p. 163.

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Hegel directly inherits from Spinoza is presupposed from this first beginning, from this first triad, and Hegel never explicitly deals with it at a later point. The one substance seems so obvious to him – and it was obvious at his time – that there is no dialectical triad in Hegel that deals with this issue in an explicit manner. Here, in this commentary in Formal Logic, this assumption cannot be made, since there are postulates that must be developed precisely at this point. Furthermore, in Logic the Universe can in principle be empty, that is, it may contain nothing, not even the one substance. Hence the need to introduce now the Logic of Otherness – the Same and the Other. Thus, for logical reasons we take up in advance a topic that Hegel discusses a little later.

C) Otherness: the same and the other
C1) Refutation of the thesis '$\vdash x$ is everything'
C12) Theorem

$\vdash \nabla y\, x \neq y$ Plurality

Demonstration

1 $\vdash Txy \rightarrow x \neq y$ Elimination of the Transformation
2 $\vdash \Delta y\,(Txy \rightarrow x \neq y)$ 1 Introduction of the Bound Assertion
3 $\vdash \nabla y\, Txy \rightarrow \nabla y\, x \neq y$ 2 Distribution of the Bound Assertion
4 $\vdash \nabla y\, Txy$ Introduction of the Transformation
5 $\vdash \nabla y\, x \neq y$ 3,4 Separation

C13) The thesis
Refutation

1 $\vdash \nabla y\, x \neq y$ Plurality
⌈ 2 $\vdash \Delta y\, x = y$ Hypothetical Premise (**Thesis**)
| 3 $\vdash \neg \nabla y \neg x = y$ 2 Resolution of the Bound Assertion
| 4 $\vdash \neg \nabla y\, x \neq y$ 3 Definition of Otherness
| 5 $\vdash \nabla y\, x \neq y \wedge \neg \nabla y\, x \neq y$ 1,4 Logical Product
| 6 $\vdash f$ 5 Supplementation
⌊ 7 f 6 Elimination of the Assertion
8 $\vdash \neg\,(\vdash \Delta y\, x = y)$ 2-7 Reduction to Absurdity

C2) Refutation of the antithesis '$\vdash x$ is nothing'
C21) Theorem

$\vdash \nabla y\, x = y$ Non-Vacuity

Demonstration

1 $\vdash x = x$ Reflectivity [of the LBA]
2 $\vdash \nabla y\, x = y$ 1 Intr. of the Particularizing Assertion

C22) The antithesis
Refutation

1 $\vdash \nabla y\, x = y$ Non-Vacuity
⌈ 2 $\vdash \neg \nabla y\, x = y$ Hypothetical Premise (**Antithesis**)
| 3 $\vdash \nabla y\, x = y \wedge \neg \nabla y\, x = y$ 1,2 Logical Product
| 4 $\vdash f$ 3 Supplementation
⌊ 5 f 4 Elimination of the Assertion
6 $\vdash \neg\,(\vdash \neg \nabla y\, x = y)$ 2-5 Reduction to Absurdity

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C3) The synthesis of '⊢ x is not something' and '⊢ x is something'

Thesis	⊢ $\Delta y\, x = y$	⊢ x (existent or inexistent) equals everything (existent or inexistent).	⊢ x is everything.
Antithesis	⊢ ¬ $\nabla y\, x = y$	⊢ x (existent or inexistent) equals nothing (existent or inexistent).	⊢ x is nothing.
Synthesis (−) (T)	¬ (⊢ $\Delta y\, x = y$)	Non (⊢ x (existent or inexistent) equals everything (existent or inexistent)).	Non (⊢ x is everything).
Synthesis (−) (A)	¬ (⊢ ¬ $\nabla y\, x = y$)	Non (⊢ x (existent or inexistent) equals nothing (existent or inexistent)).	Non (⊢ x is nothing).
Synthesis (+) (T)	⊢ $\nabla y\, x \neq y$	⊢ x (existent or inexistent) is different from something (existent or inexistent).	⊢ x is not something.
Synthesis (+) (A)	⊢ $\nabla y\, x = y$	⊢ x (existent or inexistent) equals something (existent or inexistent).	⊢ x is something.

C4) Some apparently paradoxical developments of the synthesis

		C421	⊢ $x = x$ ⊢ x equals itself.
C412	⊢ $\nabla y\, x \neq y$ ⊢ x is different from something.	C422	⊢ $\nabla y\, x = y$ ⊢ x equals something.
C413	⊢ $\Delta x\, \nabla y\, x \neq y$ ⊢ Everything is different from something.	C423	⊢ $\Delta x\, \nabla y\, x = y$ ⊢ Everything equals something.
C414	⊢ $\nabla x\, \nabla y\, x \neq y$ ⊢ Something is different from something. (Plurality)	C424	⊢ $\nabla x\, \nabla y\, x = y$ ⊢ Something equals something. (Non-Vacuity)
C415	⊢ ¬ $\nabla x\, \Delta y\, x = y$ ⊢ Nothing equals everything.	C425	⊢ ¬ $\nabla x\, \Delta y\, x \neq y$ ⊢ Nothing is different from everything.
C416	⊢ ¬ $\Delta x\, \Delta y\, x = y$ ⊢ Not everything equals everything.	C426	⊢ ¬ $\Delta x\, \Delta y\, x \neq y$ ⊢ Not everything is different from everything.

I 1 1 A - The thesis '⊢ x is everything'

In view of the relevance of the subject and mainly in view of the double sense of the word "individual" that was mentioned and defined above, it is appropriate to discuss this triad more extensively. Here in Logic we take the term "individual" in its modern sense; in this sense there is, according to Hegel, a plurality of individuals in the Universe. The one substance, in this case, is the Universe itself, which is always presupposed, although never directly focused on. If we approached it directly as something determinate, we would have to make a cutout (determination) from

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a larger and more encompassing horizon. And the Universe would not be the cutout made by us, but the horizon that is never focused on directly. That is why in philosophy the discourse on the Universe can only be an indirect one. If we focus on it, cut it out and determine it, we will always miss it.

The thesis, that is false, asserts that x is everything. That is:

$$\vdash \Delta y \; x = y$$

It could have the following translations, among others:

$\vdash$ Every existent or inexistent instance equals x.

For every existent or inexistent instance of x,
every existent or inexistent instance equals x.

For each and every existent or inexistent instance of x,
and to each and every existent or inexistent instance of y,
x equals y.

As we can see, nothing is directly and explicitly said about the universe of existent or inexistent individuals. On the contrary, an existent or inexistent individual x (in the logical and modern sense of the word) is spoken of. But by asserting that this x, whatever it is, equals any existent or inexistent instance, one indirectly and implicitly asserts that this universe is singular: there is one and only one instance for x, whatever it is, and if there were another one, it would be absolutely identical to the former one. By asserting this thesis, one asserts the singularity of the existent or inexistent individuals in this universe. Actually this universe is the universe of the single (existent or inexistent) individual.

If every existent or inexistent instance equals x, then (1) there is *one* existent or inexistent instance to which every existent or inexistent instance is equal and (2) there are *no two* existent or inexistent instances to which every existent or inexistent instance is equal. Thus, if every existent or inexistent instance equals x, there is *one single* existent or inexistent instance to which every existent or inexistent instance is equal. In other words, the totality of all existent or inexistent individuals is one single individual. The (existent or inexistent) individual is one and only one. The universe of individuals is not only of one individual (singular), but it is also of one and only one individual (non-empty and non-plural). One speaks explicitly of this individual and, because it is only one, one speaks implicitly of the universe.

This hypothetical thesis is unacceptable because what one wants is that there are individuals (in the logical and modern sense of the term) in this universe of existent or inexistent individuals.

I 1 1 B - The antithesis '$\vdash x$ is nothing'

The antithesis was logically formulated in the following manner:

$$\vdash \neg \; \nabla y \; x = y$$

It could have the following translations, among others:

$\vdash$ No existent or inexistent instance equals x.

For each and every existent or inexistent instance of x,
no existent or inexistent instance equals x.

For each and every existent or inexistent instance of x,

and to no existent or inexistent instance of *y*,
x equals *y*.

Again, nothing is explicitly said about the universe of existent or inexistent individuals. One speaks of *x*, an existent or inexistent thing that can be anyone. But by asserting that this *x*, whatever it is, equals no existent or inexistent instance, one implicitly asserts that this universe is empty: whatever this *x* is, it is nothing. By asserting that this *x*, whatever it is, is nothing, one also asserts that the universe of these instances of *x* is itself empty. This universe is the universe of no (existent or inexistent) individual.

This hypothetical antithesis is unacceptable because what one wants – and there is empirical evidence for that – is that there are individuals in this universe of existent or inexistent individuals (in the modern sense of the term).

I 1 1 C - The synthesis '⊢ *x* is not something' and '⊢ *x* is something'

The synthesis vigorously denies the thesis

$$\vdash \neg \ (\vdash \Delta y \ x = y)$$

and the antithesis

$$\vdash \neg \ (\vdash \neg \ \nabla y \ x = y)$$

and affirms the plurality of the existent or inexistent individuals in the universe of individuals.

What is "preserved" (*aufgehoben*) in the synthesis? The affirmation of otherness and of difference:

$$\vdash \nabla y \ x \neq y$$

The latter assertion can have the following translations, among others:

⊢ At least one existent or inexistent instance
is different from *x*.

For each and every existent or inexistent instance of *x*,
some existent or inexistent instance is different from *x*.

For each and every existent or inexistent instance of *x*,
and to at least one existent or inexistent instance of *y*,
x is different from *y*.

Again, nothing is explicitly and directly said about the universe of existent or inexistent individuals. One speaks again of *x*, existent or inexistent. But by asserting that this *x*, whatever it is, is different from *some* existent or inexistent instance, one implicitly asserts that this universe is plural.

Is there, then, a single substance in spite of the plurality of individuals (in the modern sense)? Yes, it is always being assumed as the Universe within which the cutouts (determinations) are made and within which the individuals subsist.

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I 1 1 Ca - Final observations

Contrary to Parmenides' view, there is no mere unity without any multiplicity and without movement. What we have is a Universe of the *panta rei*. The multiplicity of possible and existent individuals in this Universe constitutes the dialectical conciliation of the One and the Many. There is no unity – single substance – without multiplicity, there is no multiplicity without unity. The dialectical interplay between the One and the Many was expounded on and formalized above in the view of a Universe that does not have one single individual as its content, but that is not empty either, that is, that does not contain no individual. The Universe, the only one that is philosophically acceptable – at least to most thinkers –, is the one that conciliates the One and the Many, thus doing justice to the unity of the Cosmos and the variety of its aspects.

Chapter 2: *Dasein*, Finitude and Infinitude

I 1 2 - Introduction

"*Dasein* emerges from Becoming. *Dasein* is the simple oneness of Being and Nothing" (Hegel, 5, 116). From the etymological point of view, adds Hegel, "*Dasein* means to be in a certain place" (to be here, to be there), but then he writes: "This representation of space does not apply here." What then is *Dasein*? Hegel clearly answers: "*Dasein* corresponds to the Being of the previous sphere; Being, however, is indeterminate, so that there are no determinations in it. But *Dasein* is a determinate being, a concrete one; therefore, several determinations, different relations of its constitutive moments appear in it" (Hegel, 5, 117).

Thus *Dasein* means the determinate becoming, with the inner constitution of space and time. It is inserted into its contingent history, but it always has a provisional character, it is something that is about to disappear. *Dasein* is being as a provisional unity of Being and Nothing. To us it means more than just "to be there".

In the dialectical triad proposed by Hegel in the second chapter of the Logic of Being, the thesis is *Dasein*, the antithesis is Finitude and the synthesis is Infinitude.

I 1 2 A - *Dasein*

Dasein as such emerges from Becoming. "*Dasein* is the simple oneness of Being and Nothing" (Hegel, 5, 116). To repeat it: "*Dasein* corresponds to the Being of the previous sphere; Being, however, is indeterminate, so that there are no determinations in it. But *Dasein* is a determinate being, a concrete one; therefore, several determinations, different relations of its constitutive moments appear in it" (ibid., 117).

As something determinate *Dasein* possesses "Quality" and is determined as being "Something" (2. A. c.). – The categories that Hegel introduces here (2. B. a.), Quality and Something, have in fact already been present since the first

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dialectical triad, but in an implicit manner. Here Hegel brings them to the light of reflection and gives them their logical dignity. Without Quality and Something, which are categories that are already contained in the Logic of Transformation and the Logic of Otherness, discursive thinking is strictly impossible. What Hegel does here is to clearly express, as categories, what he himself had already dealt with implicitly.

In Hegel *Dasein* is the thesis, Finitude is the antithesis and Infinitude is the synthesis. How can we reconstruct *Dasein* as thesis in English? It is not very easy. We would have to say that by considering the Absolute as *Dasein* and only as such, we are raising a false thesis. We could raise such a thesis and then refute it. But what is missing here is an argumentative link that Hegel uses a little later (2. B. b.): limit (*Grenze*) and limitation. For Becoming is completely unlimited and thus without any determination. In order to move from Becoming to *Dasein* we must introduce and critically discuss the concept of limit and limitation, so that we are able to make the transition from unlimited Becoming to limited and determinate *Dasein*. That is why we present here the Logic of Limitation, which in turn is unfolded in the Logic of Active Limitation and the Logic of Passive Limitation. Without these concepts the transition from Becoming to *Dasein* would have no foundation.

I 1 2 B - Finitude

Here Hegel introduces first the concepts of Something and Other (2. B. a), then the concepts of determination, determinateness and limit (2. B. b) and finally the category of finitude (2. B. c). The latter is unfolded in immediate finitude, limitation and transition from finite to infinite. – The concepts of Something and Other (2. B. a) received a formal logical treatment in the first chapter, since without them it is not possible to construct the Logic of Bound Assertion, without which we cannot study Becoming. That is why we anticipated and dealt with the categories of Something and Other in the first chapter. We now proceed to treat the categories of determination, determinateness and limit, which are very close to each other, through the logical-formal analysis of the concept of active and passive limitation. By giving the concept of limit the adequate logical-formal treatment we are already defining the other categories used by Hegel in this second part of the second chapter. For Limit (*Grenze, Schranke*) is the logical-philosophical foundation of Determination and Determinateness; both refer to something that is delimited.

D) Active limitation
D1) Refutation of the thesis '⊢ *x* limits everything'
D11) Additional definition
Postulation

$Lxy \leftrightharpoons x \neq y$ Active Limitation
    (Lxy: *x* limits *y*.)

D12) Theorem

$\vdash \neg Lxx$ Anti-reflectivity
Demonstration

1	$\vdash \neg x \neq x$	Negation of Otherness
2	$Lxy \leftrightharpoons x \neq y$	Active Limitation
3	$\vdash Lxy \leftrightarrow x \neq y$	2 Elimination of the Definition
4	$\vdash Lxx \leftrightarrow x \neq x$	3 Replacement of *y* by *x*
5	$\vdash \neg Lxx$	4,1 Separation

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D13) Refutation of the thesis

Refutation

  1 $\vdash \neg\, Lxx$ Anti-reflectivity

    ⌈ 2 $\vdash \Delta y\, Lxy$ Hypothetical Premise (**Thesis**)

    │ 3 $\vdash Lxx$ 2 Elim. of the Generalizing Assertion

    │ 4 $\vdash Lxx \wedge \neg\, Lxx$ 3,1 Logical Product

    │ 5 $\vdash f$ 4 Supplementation

    ⌊ 6 f 5 Elimination of the Assertion

  7 $\vdash \neg\,(\vdash \Delta y\, Lxy)$ 2-6 Reduction to Absurdity

D2) Refutation of the antithesis '$\vdash x$ limits nothing'

D21) Theorem

  $\vdash \nabla y\, Lxy$ Introduction of the Active Limitation

Demonstration

  1 $\vdash \nabla y\; x \neq y$ Plurality

  2 $Lxy \leftrightharpoons x \neq y$ Active Limitation

  3 $\vdash Lxy \leftrightarrow x \neq y$ 2 Elimination of the Definition

  4 $\vdash \Delta y\,(Lxy \leftrightarrow x \neq y)$ 3 Introduction of the Bound Assertion

  5 $\vdash \nabla y\, Lxy \leftrightarrow \nabla y\; x \neq y$ 4 Distribution of the Assertion

  6 $\vdash \nabla y\, Lxy$ 5,1 Separation

D22) Refutation of the antithesis

Refutation

  1 $\vdash \nabla y\, Lxy$ Introduction of the Active Limitation

    ⌈ 2 $\vdash \neg\, \nabla y\, Lxy$ Hypothetical Premise (**Antithesis**)

    │ 3 $\vdash \nabla y\, Lxy \wedge \neg\, \nabla y\, Lxy$ 1,2 Logical Product

    │ 4 $\vdash f$ 3 Supplementation

    ⌊ 5 f 4 Elimination of the Assertion

  6 $\vdash \neg\,(\vdash \neg\, \nabla y\, Lxy)$ 2-6 Reduction to Absurdity

D3) The synthesis of '$\vdash x$ does not limit something' and '$\vdash x$ limits something'

Thesis	$\vdash \Delta y\, Lxy$	$\vdash x$ (existent or inexistent) limits everything (existent or inexistent).	$\vdash x$ limits everything
Antithesis	$\vdash \neg\, \nabla y\, Lxy$	$\vdash x$ (existent or inexistent) limits nothing (existent or inexistent).	$\vdash x$ limits nothing.
Synthesis (−) (T)	$\neg\,(\vdash \Delta y\, Lxy)$	Non ($\vdash x$ (existent or inexistent) limits everything (existent or inexistent)).	Non ($\vdash x$ limits everything).
Synthesis (−) (A)	$\neg\,(\vdash \neg\, \nabla y\, Lxy)$	Non ($\vdash x$ (existent or inexistent) limits nothing (existent or inexistent)).	Non ($\vdash x$ limits nothing).
Synthesis (+) (T)	$\vdash \nabla y\, \neg\, Lxy$	$\vdash x$ (existent or inexistent) does not limit something (existent or inexistent).	$\vdash x$ does not limit something.
Synthesis (+) (A)	$\vdash \nabla y\, Lxy$	$\vdash x$ (existent or inexistent) limits something (existent or inexistent).	$\vdash x$ limits something.

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D4) Some apparently paradoxical consequences of the synthesis

D411	$\vdash \neg\, Lxx$ $\vdash x$ does not limit x.		
D412	$\vdash \nabla y \neg\, Lxy$ $\vdash x$ does not limit something.	D422	$\vdash \nabla y\, Lxy$ $\vdash x$ limits something.
D413	$\vdash \Delta x\, \nabla y\, Lxy$ $\vdash$ Everything does not limit something.	D423	$\vdash \Delta x\, \nabla y\, Lxy$ $\vdash$ Everything limits something.
D414	$\vdash \nabla x\, \nabla y \neg\, Lxy$ $\vdash$ Something does not limit something.	D424	$\vdash \nabla x\, \nabla y\, Lxy$ $\vdash$ Something limits something.
D415	$\vdash \neg\, \nabla x\, \Delta y\, Lxy$ $\vdash$ Nothing limits everything.	D425	$\vdash \neg\, \nabla x\, \Delta y \neg\, Lxy$ $\vdash$ Nothing does not limit everything.
D416	$\vdash \neg\, \Delta x\, \Delta y\, Lxy$ $\vdash$ Not everything limits everything.	D426	$\vdash \neg\, \Delta x\, \Delta y \neg\, Lxy$ $\vdash$ Not everything does not limit everything.

E) Passive limitation
E1) Refutation of the thesis '$\vdash x$ is limited by everything'
E11) Additional definition
Postulation

$\Gamma xy \Leftrightarrow Lyx$ Passive Limitation

    (Γxy: x is limited by y.)

E12) Theorem

$\vdash \neg\, \Gamma xx$ Anti-reflectivity

Demonstration

1	$\vdash \neg\, Lxx$	Anti-reflectivity
2	$\Gamma xy \Leftrightarrow Lyx$	Passive Limitation
3	$\vdash \Gamma xy \leftrightarrow Lyx$	2 Elimination of the Definition
4	$\vdash \Gamma xx \leftrightarrow Lxx$	3 Replacement of y by x
5	$\vdash \neg\, \Gamma xx$	4,1 Separation

E13) Refutation of the thesis
Refutation

1	$\vdash \neg\, \Gamma xx$	Anti-reflectivity
⌈ 2	$\vdash \Delta y\, \Gamma xy$	Hypothetical Premise (**Thesis**)
│ 3	$\vdash \Gamma xx$	2 Elim. of the Generalizing Assertion
│ 4	$\vdash \Gamma xx \wedge \neg\, \Gamma xx$	3,1 Logical Product
│ 5	$\vdash f$	4 Supplementation
⌊ 6	f	5 Elimination of the Assertion
7	$\vdash \neg\, (\vdash \Delta y\, \Gamma xy)$	2-6 Reduction to Absurdity

E2) Refutation of the antithesis '$\vdash x$ is limited by nothing'

E21) Theorem

$\vdash \nabla y\, \Gamma xy$ Introduction of the Passive Limitation

Demonstration

1	$\vdash \nabla y\, Lxy$	Introduction of the Active Limitation
2	$\Gamma xy \Leftrightarrow Lyx$	Passive Limitation
3	$\vdash \Gamma xy \leftrightarrow Lyx$	2 Elimination of the Definition
4	$\vdash \Delta y\, (\Gamma xy \leftrightarrow Lyx)$	3 Intr. of the Generalizing Assertion
5	$\vdash \nabla y\, \Gamma xy \leftrightarrow \nabla y\, Lxy$	4 Distribution of the Bound Assertion
6	$\vdash \nabla y\, \Gamma xy$	5,1 Separation

E22) Refutation of the antithesis
Refutation

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1 $\vdash \nabla y\, \Gamma xy$ Introduction of the Passive Limitation

   ⌈ **2** $\vdash \neg\, \nabla y\, \Gamma xy$ Hypothetical Premise (**Antithesis**)

   | **3** $\vdash \nabla y\, \Gamma xy \wedge \neg\, \nabla y\, \Gamma xy$ 1,2 Logical Product

   | **4** $\vdash f$ 3 Supplementation

   ⌊ **5** f 4 Elimination of the Assertion

  6 $\vdash \neg\, (\vdash \neg\, \nabla y\, \Gamma xy)$ 2-5 Reduction to Absurdity

E3) The synthesis of '$\vdash x$ is not limited by something' and '$\vdash x$ is limited by something'

Thesis	$\vdash \Delta y\, \Gamma xy$	$\vdash x$ (existent or inexistent) is limited by everything (existent or inexistent).	$\vdash x$ is limited by everything.
Antithesis	$\vdash \neg\, \nabla y\, \Gamma xy$	$\vdash x$ (existent or inexistent) is limited by nothing (existent or inexistent).	$\vdash x$ is limited by nothing.
Synthesis (–) (T)	$\neg\, (\vdash \Delta y\, \Gamma xy)$	Non ($\vdash x$ (existent or inexistent) is limited by everything (existent or inexistent)).	Non ($\vdash x$ is limited by everything).
Synthesis (–) (A)	$\neg\, (\vdash \neg\, \nabla y\, \Gamma xy)$	Non ($\vdash x$ (existent or inexistent) is limited by nothing (existent or inexistent)).	Non ($\vdash x$ is limited by nothing).
Synthesis (+) (T)	$\vdash \nabla y \neg\, \Gamma xy$	$\vdash x$ (existent or inexistent) is not limited by something (existent or inexistent).	$\vdash x$ is not limited by something.
Synthesis (+) (A)	$\vdash \nabla y\, \Gamma xy$	$\vdash x$ (existent or inexistent) is limited by something (existent or inexistent).	$\vdash x$ is limited by something.

E4) Some apparently paradoxical consequences of the synthesis

E411	$\vdash \neg\, \Gamma xx$ $\vdash x$ is not limited by x.		
E412	$\vdash \nabla y \neg\, \Gamma xy$ $\vdash x$ is not limited by something.	E422	$\vdash \nabla y\, \Gamma xy$ $\vdash x$ s limited by something.
E413	$\vdash \Delta x\, \nabla y \neg\, \Gamma xy$ $\vdash$ Everything is not limited by something.	E423	$\vdash \Delta x\, \nabla y\, \Gamma xy$ $\vdash$ Everything is limited by something.
E414	$\vdash \nabla x\, \nabla y \neg\, \Gamma xy$ $\vdash$ Something is not limited by something.	E424	$\vdash \nabla x\, \nabla y\, \Gamma xy$ $\vdash$ Something is limited by something.
E415	$\vdash \neg\, \nabla x\, \Delta y\, \Gamma xy$ $\vdash$ Nothing is limited by everything.	E425	$\vdash \neg\, \nabla x\, \Delta y \neg\, \Gamma xy$ $\vdash$ Nothing is not limited by everything.
E416	$\vdash \neg\, \Delta x\, \Delta y\, \Gamma xy$ $\vdash$ Not everything is limited by everything.	E426	$\vdash \neg\, \Delta x\, \Delta y \neg\, \Gamma xy$ $\vdash$ Not everything is not limited by everything.

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I 1 2 Ba - Observations on the theses
of active and passive limitation

Omnis determinatio est negatio, every determination is a negation, used to teach Spinoza. Becoming is unlimited just as Being and Nothing and in this respect it is unlimited. Since it is unlimited, it is indeterminate. Now it has to be determined. Indeterminate Becoming has to be transformed into a determinate *Dasein*. This can only occur through the introduction of a limiting negation. Hence the Logic of Active and Passive Limitation.

The thesis, which are false, state that for each and every existent or inexistent instance of *x* and for each and every existent or inexistent instance of *y*, *x* limits *y* and *x* is limited by *y*. – It is very clear here that the theses are utterly universal propositions that claim to apply to each and every being or entity.

The hard core of the refutation of these theses is that any being or entity cannot limit itself; that is, to each and every existent or inexistent instance of *x*, *x* cannot limit *x* and it cannot be limited by *x*. – The Hegel scholars will here immediately raise the thesis that according to Hegel there is a reflexive process that allows and even demands reflection. In view of that, nothing could be more normal than to say that a being or entity limits itself, just as consciousness is aware of itself. The reflexive voice of the verbs seems to be one of the central aspects of the Hegelian doctrine, which is essentially a philosophy of reflection. The answer to this question is obviously positive: Hegel is a philosopher of reflection and the reflexive voice of the verbs constitutes one of the cores of the Hegelian system. This is already present in the Logic of Identity and then in the Logic of Measure, and it comes to full expression in the Logic of Essence and the Logic of the Concept. The Logic of Essence is characterized precisely as a Logic of Reflection, of flection over oneself, of the reflexive voice of the verbs. Why, then, must one now say that a being or entity cannot limit itself? Because limitation has been defined through otherness and otherness is not reflexive. In the Logic of the Concept other reflexive relations will be used: the cause causes itself and becomes *causa sui*, the mover moves itself and becomes self-moving, consciousness is consciousness of itself and becomes self-consciousness.

Therefore, our hypothetical premise is incorrect, that is, the theses that each and every entity limits everything and is limited by everything are false theses, for at least this entity cannot limit itself. In this way it is demonstrated that nothing limits everything and nothing is limited by everything in the Universe.

I 1 2 Bb - Observations on the antitheses
of active and passive limitation

The antitheses, which are also false propositions, state that for each and every existent or inexistent instance of *x* and for each and every existent or inexistent instance of *y*, *x* limits *y* and *x* is limited by *y*.

Here the Universe that *x* and *y* have to traverse is well – although indirectly – expressed. It is that Totality in Movement that is the center of Hegel's system and of what we are proposing here; it is the Absolute. – The antitheses, which are false, state that for each and every instance of *x*, *x* limits nothing and *x* is limited by nothing. The antitheses are false because there are limited beings and entities. The entities' mutual limitation depends exclusively on the plurality of entities; this is what Hegel calls *Dasein*.

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I 1 2 Bc - Observations on the syntheses of active and passive limitation

The syntheses state the falseness of the theses and antitheses; this is what they overcome and leave behind them. What do they preserve and raise to a higher level? The syntheses say that for each and every instance of *x, x* does not limit something and *x* is not limited by something, and they also say that for each and every instance of *x, x* limits something and *x* is limited by something. We do not have here – yet – the circular movement of self-determination, which will be introduced as the last category of the Logic of Essence and will pervade the whole Logic of the Concept, but has already been introduced in the concept of identity and will, still here, be introduced in the concept of measure. Here we have the limitation of each being or entity by another being or entity that constitutes its limit.

I 1 2 C - Infinitude

I 1 2 C - Introduction

Dasein is the realm of the determinate and limited beings and entities and, therefore, the realm of Finitude. For Hegel, here, *Dasein* is the thesis (A), Finitude is the antithesis (B) and Infinitude is the synthesis (C). The division that we find in the *Science of Logic* is this: 2. C. a – The infinite in general; 2. C. b – The mutual determination of the finite and the infinite; 2. C. c – The affirmative infinitude. – In this context Hegel discusses the *processus ad infinitum* and idealism under the title "Übergang".

If Hegel had only the problem of the Limited and the Unlimited, of the Determinate and the Indeterminate in mind, we would have nothing more to do here in terms of Formal Logic. For the Logic of Limitation would answer all the questions that might be raised. At first sight the logic of the Limited and the Unlimited, of the Determinate and the Indeterminate, of the Finite and the Infinite are the same thing, being only expressed in different terms. As we have already dealt with the logical triad of Limitation, we could then skip the concepts of Limited and Unlimited, Determinate and Indeterminate, Finite and Infinite, because, from the point of view of Formal Logic, we would add nothing new to what has already been discussed. And Hegel in fact repeats here earlier arguments using other words.

But there is actually something completely new that we have to deal with now. The Hegelian tradition distinguishes here – and rightly so – Good Infinitude and Bad infinitude. What does this "good" and "bad" mean in a purely logical context? What is "Good Infinitude" and what distinguishes it from bad infinitude? Is there also a "Good Finitude" and a "Bad Finitude"?

I 1 2 B and C - Good Infinitude and Bad Infinitude

Although in this chapter we are dealing with Finitude and Infinitude in the literal sense as used by Hegel, we will grasp the author's thinking in a more precise way if we also analyze the usual concepts of Good and Bad Infinitude in the Hegelian tradition and interpretation. Bad Infinitude is firstly the negation – affirmed as being

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something positive – of the corresponding Finite (cf. Hegel, 5, 149). Thus, when we say that someone is wise and then that God is infinitely wise, we are using this first concept of Infinitude. Socrates is wise, finitely wise; then we simply negate the finitude of Socrates' wisdom and posit this merely negative concept (the non-wise) as something positive, saying that God is infinitely wise. This infinite wisdom of God is Socrates' finite wisdom as negated in its limitation and affirmatively posited as unlimited.

The second form of Bad Infinitude consists of the overcoming of the limits of Finitude through the *ad infinitum* iteration of what is finite (cf. Hegel, 5, 149). Let us imagine a chicken that lays an egg, from which a chicken is born, and this chicken lays an egg, and so forth *ad infinitum*.

The third form of Bad Infinitude is that in which, in each and every process, as we bump against a limit, we skip over it and continue the series according to the same principle that constitutes it. There is an interaction between the Finite and the Infinite here, because the Infinite is infinite through the constant overcoming of its limit and the constant repetition of its finite determination. After each limit the finite overcomes, it reestablishes itself as the same finite as before. Here the Finite determines the Infinite and the latter, in turn, determines the Finite because it allows its *ad infinitum* iteration. This is, according to Hegel, the core of the *progressus ad infinitum* and the *regressus ad infinitum* in their varied forms. The classical example for this is the series of natural numbers, in which each number, because it is part of the series that goes *ad infinitum*, is at the same time finite and infinite.

In Logic this is called recursivity. If "*n*" is any one natural number, if the apostrophe that is put after a natural number – for instance, *n'* – means "the successor of this number" and if "*P*" is a property, then the following rule is valid:

$$\vdash P0$$
$$\frac{\vdash Pn \rightarrow Pn'}{\vdash Pn}$$

That is:

$$\frac{\vdash \text{Zero is } P.}{\vdash \text{If } n \text{ is } P, \text{ then the successor of } n \text{ is } P.}$$
$$\vdash n \text{ is } P.$$

Or – using the generalized variable '*n*' –

$$\vdash P0$$
$$\frac{\vdash \Lambda n\,(Pn \rightarrow Pn')}{\vdash \Lambda n\,Pn}$$

That is:

$$\vdash \text{Zero is } P.$$
$$\frac{\vdash \text{For each } n, \text{ if } n \text{ is } P, \text{ then the successor of } n \text{ is } P.}{\vdash \text{For each } n, n \text{ is } P.}$$

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When we become aware of this, however, we are already outside of the *ad infinitum* series and we understand how the infinitude of the series is constituted,

that is, we are already in the Good Infinitude (and the Good Finitude). We are outside of the series because we know how it is constituted. We thus make the transition from the Bad Infinitude to the Good Infinitude.

What, then, is Good Infinitude? Good Infinitude is the unity of two relationships: of Finitude with Infinitude and of Infinitude with Finitude (cf. Hegel, 5, 152-166). As to the first relationship: It was said above, in the third form of Bad infinitude, that every being, when it encounters its limit, tends to overcome it and move ahead. Where to? To Infinitude, because if the tendency were toward another finite, and another finite, the process would continue without ever coming to an end. The finite, precisely because it is finite and limited, has the tendency to overcome its limits and move toward the Infinite; thus Infinitude is a constitutive element of Finitude. As to the second relationship: The Infinite tends to unfold, to go out of itself and to constitute the finite beings. Without this tendency the Infinite would stay by itself, unmoving and motionless. But we have already seen and demonstrated that our Universe is a Universe of constant Becoming, with more than one individual, a Universe in which the One and the Many are conciliated. Without this inner tendency to constitute the plurality of finite beings, the Infinite would become like the sphere of Parmenides: one, single and unmoving. But it was demonstrated that this is impossible. Thus we conclude that there are two relationships that cross and constitute each other: the relationship of the Finite with the Infinite and the relationship of the Infinite with the Finite. This is the Good Infinitude.

In the Good Infinitude the Finite and the Infinite constitute each other. Without the Infinite, the Finite would not have that inner dynamics that drives it to always overcome its limits; without the Finite, the Infinite, viz. the Universe, would become the sphere of Parmenides: one, single, without movement, without life, without knowledge.

I 1 2 B and Ca - Observations on Good and Bad Finitude, Good and Bad Infinitude

In order to explain in an understandable manner what is Finitude, we were forced to cover a long path through Infinitude, Good and Bad infinitude. Having done this, there is little left to explain about the theses and antitheses that will be discussed in Formal Logic. We have added the concept of Bad Finitude to Hegel's categories. For just as Infinitude can be good or poor, so Finitude can also be good or bad. As we have seen, each one is the counterpart of the other. It is not necessary to make a logic of finitude as such because it would be identical to the logic of limitation. The finite and the limited are identical. Here we are going to deal with the good and the bad finitude, the good and the bad infinitude.

F) Finitude: the finite and the infinite
F1) Refutation of the thesis '$\vdash x$ is of Bad infinitude'
F11) Additional definitions
Postulation

$BFin\ x \leftrightharpoons \nabla y\ \Gamma xy$	Good Finitude
	($BFin\ x$: x is of good finitude.)
$BInf\ x \leftrightharpoons \nabla y \neg \Gamma xy$	Good Infinitude
	($BInf\ x$: x is of good infinitude.)
$MFin\ x \leftrightharpoons \neg BFin\ x$	Bad Finitude
	($MFin\ x$: x is of bad finitude.)

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$MInf\,x \leftrightarrows \neg\,BInf\,x$ Bad infinitude

                                (*MInf x*: *x* is of Bad infinitude.)

F12) Conceptual Correspondences

Development

Thesis	$MInf\,x$	$\neg\,BInf\,x$	$\neg\,\nabla y\,\neg\,\Gamma xy$	$\Delta y\,\Gamma xy$
Antithesis	$MFin\,x$	$\neg\,BFin\,x$	$\neg\,\nabla y\,\Gamma xy$	$\Delta y\,\neg\,\Gamma xy$
Synthesis (T)	$BInf\,x$	$\neg\,MInf\,x$	$\nabla y\,\neg\,\Gamma xy$	$\neg\,\Delta y\,\Gamma xy$
Synthesis (A)	$BFin\,x$	$\neg\,MFin\,x$	$\nabla y\,\Gamma xy$	$\neg\,\Delta y\,\neg\,\Gamma xy$

F13) Theorem

$\vdash BInf\,x$ Good Infinitude

Demonstration

1 $\vdash \nabla y\,\neg\,\Gamma xy$ Non-Limitation

2 $\vdash BInf\,x$ 1 Good Infinitude

F14) The thesis

Refutation

1 $\vdash BInf\,x$ Good Infinitude

⌈ 2 $\vdash MInf\,x$ Hypothetical Premise (**Thesis**)

| 3 $\vdash \neg\,BInf\,x$ 1 Bad infinitude

| 4 $\vdash BInf\,x \wedge \neg\,BInf\,x$ 1,3 Logical Product

| 5 $\vdash f$ 4 Supplementation

⌊ 6 f 5 Elimination of the Assertion

7 $\vdash \neg\,(\vdash MInf\,x)$ 1-6 Reduction to Absurdity

F2) Refutation of the antithesis '$\vdash x$ is of bad finitude'

F21) Theorem

$\vdash BFin\,x$ Good Finitude

Demonstration

1 $\vdash \nabla y\,\Gamma xy$ Introduction of the Passive Limitation

2 $\vdash BFin\,x$ 1 Good Finitude

F22) The antithesis

Refutation

1 $\vdash BFin\,x$ Good Finitude

⌈ 2 $\vdash MFin\,x$ Hypothetical Premise (**Antithesis**)

| 3 $\vdash \neg\,BFin\,x$ 2 Bad Finitude

| 4 $\vdash BFin\,x \wedge \neg\,BFin\,x$ 1,3 Logical Product

| 5 $\vdash f$ 4 Supplementation

⌊ 6 f 5 Elimination of the Assertion

7 $\vdash \neg\,(\vdash MFin\,x)$ 2-6 Reduction to Absurdity

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F3) The synthesis of '⊢ x is of good infinitude' and '⊢ x is of good finitude'

Thesis	⊢ *MInf x*	⊢ x (existent or inexistent) is of Bad infinitude.	⊢ x is of Bad infinitude.
Antithesis	⊢ *MFin x*	⊢ x (existent or inexistent) is of bad finitude.	⊢ x is of bad finitude.
Synthesis (−) (T)	⊢ ¬ (⊢ *MInf x*)	Non (⊢ x (existent or inexistent) is of Bad infinitude).	⊢ Non (⊢ x is of Bad infinitude).
Synthesis (−) (A)	⊢ ¬ (⊢ *MFin x*)	Non (⊢ x (existent or inexistent) is of bad finitude).	⊢ Non (⊢ x is of bad finitude).
Synthesis (+) (T)	⊢ *BInf x*	⊢ x (existent or inexistent) is of good infinitude.	⊢ x is of good infinitude.
Synthesis (+) (A)	⊢ *BFin x*	⊢ x (existent or inexistent) is of good finitude.	⊢ x is of good finitude.

F4) Some apparently paradoxical developments of the synthesis

F411	⊢ *BInf x* ⊢ is of good infinitude.	F421	⊢ *BFin x* ⊢ x is of good finitude.
F412	⊢ Δx *BInf x* ⊢ Everything is of good infinitude.	F422	⊢ Δx *BFin x* ⊢ Everything is of good finitude.
F413	⊢ ∇x *BInf x* ⊢ Something is of good infinitude.	F423	⊢ ∇x *BFin x* ⊢ Something is of good finitude.
F414	⊢ ¬ ∇x *MInf x* ⊢ Nothing is of Bad infinitude.	F424	⊢ ¬ ∇x *MFin x* ⊢ Nothing is of bad finitude.
F415	⊢ ¬ Δx *MInf x* ⊢ Not everything is of Bad infinitude.	F425	⊢ ¬ Δx *MFin x* ⊢ Not everything is of bad finitude.

I 1 2. B and Cb - Observations on the thesis '⊢ x is of Bad Infinitude'

The thesis, which is false, asserts that x is of Bad infinitude, that is, that x is limited by everything, even by itself. The argumentative core asserts that x is of good finitude, that is, that x is limited by something, but not by itself. This is the profound reason why nothing is of Bad infinitude. Each being is limited by all other beings of the Universe, except by itself. Therefore, all of them have good finitude. – In other words, and with less phrases in Logicese, the Universe is a web of relations in which each relation determines all the other ones, except itself. It is in this relational Universe that we live, and our philosophy must express this web of relations in the form of a net, rather than in the form of substances that are autonomous and separated from each other.

Let us express the same thing in the language of contemporary Logic: If there are at least two substances, nobody can claim that each one of them has nothing to do with the other(s). If there are at least two substances, nobody can claim that they do not have a relation (or relations) with each other. The affirmation

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of the plurality of substances implies the affirmation of the mutual relationship between these substances. If there is only one substance, there will be at least the relation of identity of that substance with itself. Isolated individuals do not make sense. Individuals only make sense in propositions, and these propositions contain, besides the individuals, also properties (monadic predicates) and relations (polyadic predicates).

I 1 2 B and Cc - Observations on the antithesis '⊢ x is of bad finitude'

The antithesis, which is also false, asserts that x is of bad finitude, that is, that x is limited by nothing. Bad finitude is, as seen above, the view that takes from the finite its relation with the infinite. The bad finite is the finite that is conceived as something limited, as something that has no tendency to overcome its limits. The bad finite is static and remains bound within its limits. Now, to assert that x is of bad finitude is precisely to deny the dynamics that pervade the Universe and that we have already discussed under the names of Becoming and Being. There are in fact finite beings in the Universe, but they always have within themselves the tendency toward the infinite. In the net of relations that constitutes the Universe each relation, albeit finite, is always also the net that it constitutes and without which it does not exist.

I 1 B and Cd - Observations on the synthesis '⊢ x is of good infinitude' and '⊢ x is of good finitude'

The synthesis asserts the unity of the finite and the infinite, that constitute each other and form the net of relations that is the Universe. Bad finitude and Bad infinitude are overcome here. We do not get lost in a *progressus* or *regressus ad infinitum* because we know that each finite has, as a moment within itself, the infinitude of the net that it is part of. Thus the infinite is within the finite; the finite, on the other hand, always knows it is infinite. In this mutual constitution the Good Finitude is always also the Good Infinitude.

To be continued in the next issue of *Filosofia Unisinos*.

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