

LIFE COMES FROM LIFE, PART II: CONSCIOUSNESS, LIFE, AND THE VALIDITY OF THE BHAGVAD GITA ONTOLOGY

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This article is the second in a series of articles on this topic by the author, to appear in this journal. These articles come under the author's general theory (denoted by TK) of the Foundations of Reality, encompassing both Science and Spirituality. In part I, a summary of TK was presented. The author believes that TK is probably the most comprehensive theory available yet concerning Reality, and Science and Spirituality. In this article, we provide a definition of "Consciousness" in the logical-mathematical (log-mat) set-up. We define an entity E to have 'life' if it has the capability of 'being conscious' (or, in a sense, of being 'self-cognizant'). We heuristically show that the presence of consciousness is related to the involvement of the (totally) 'Empty Set' V occurring in TK, and introduced in Part I. From this, we heuristically derive the abstract mathematical form of a living entity. We then examine connections with Spirituality. It is seen that the concept of 'Intelligent Design' is well supported by TK. To further prepare for the main topic of this series of articles, a brief digression is presented on the Bhagvad Geeta ontology.

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1. INTRODUCTION

1.1 For the convenience of the reader (and to make the paper self-contained without repeating most of part I), the content of part I of the paper that we partially need here will be briefly recalled in the next section. *However, it is emphasized that a good grasp of material in part I would be very helpful in understanding part II.*

1.2 Indeed, it must be realized that this series of articles should be considered to be much more 'scientific' rather than 'philosophical'. We may say that the articles are at the 'edge' of science, with relatively little of philosophy. Our attempted goal is "to bring the subject to a point where a scientific formalism can begin", keeping unproven philosophical assertions to the bare minimum. *We claim that we have essentially achieved the above goal here. Whatever (philosophical) assumptions we make, will be clearly and unambiguously stated in the paper,*

and emphasized.

1.3 As the title suggests, the basic objective of this series of articles is to establish the assertion “Life comes from life” (LCFL). To do this, we proceed as follows.

1.4 Firstly, in this paper, in section 2, we recall some of the mathematical definitions and other concepts. As stated in part I, the level of mathematics is deliberately kept low enough so as to make the paper accessible to graduates in all fields. It still does have the feature of abstractness. However, this is because of the inherent profoundness of the subject matter field. The author believes that any reader with a graduate-level education can grasp the contents after reading it carefully a couple of times.

1.5 In section 2, we recall some mathematical preliminaries. In section 3, in order to be able to work with a “logical universe“, we define and exemplify the concepts of a “logical-system” (and introduce various synonyms of the same).

1.6 In section 4, we introduce the concepts of “cognizance” and “consciousness” in the context of a logical system. In section 5, we define ‘life’ and study consciousness in more detail, heuristically establishing some very important basic results. In section 6, we discuss The Divine and The Nature, and in section 7 the Bhagvad Geeta ontology (*BGO*). Section 8 presents references to articles referred to in this paper, and also to certain related articles by the author. The BG ontology is taken as a useful example of the application of the theory to real questions; it also partly prepares the reader for the assault on the question as to whether ‘Life comes from life’. Like the BG, the spiritual basics of other scriptures of mankind are also supported by TK, but a discussion of that is outside the purview of this series of papers.

1.7 The next article will discuss TK in relation to existing theories in the foundations of Physics and Quantum Reality. The final article in this series will connect TK with psychic phenomena, and heuristically establish the basic assertion that ‘Life Comes from Life’.

2. RECALLING NEEDED CONCEPTS FROM PART I

2.1 Recall that if A and B are two sets, then $(A.B)$ denotes their intersection, and contains all elements which are both in A and B . For example, if A denotes the students (in a certain school) who are in grades 7, 8, 9 or 10, and B denotes the male students (in the same school) who are in grades 9, 10, or 11, then $(A.B)$ will denote the male students in that school who are in grades 9 or 10. Also $(A + B)$ will denote the union of sets A and B , which means that $(A + B)$ contains all elements which are in A but not in B , and also those which are not in A but are in B , and also those which are both in A and in B . In our example, $(A + B)$ will be the set of all students who are in grades 7, 8, 9, or 10, and all male students in grade 11.

2.2 The words ‘set’, ‘class’, ‘universe’, ‘system’, ‘field’, ‘space’ are synonymous to a certain extent. Loosely speaking, an “empty” set is a set that contains no elements under consideration. Let U denote a universe, it being the set of all students in the school in the above example. Then, the “empty set” in U is the set containing no students. Also, the sets A , B , $(A + B)$, $(A.B)$, as also the ‘empty set’ in U , are all in U ; because of this, they are called ‘subsets’ of

U. Note that if either A or B is empty, then so is (A.B), but (A.B) could be empty even when neither A nor B is empty. We denote by V the set, which is the “totally empty set” (TES). The set V has the properties: (i). It is a subset of each and every possible universe, and (ii) in each and every universe, it is an empty set. Thus, we can also say that V is the intersection of all possible empty sets.

2.3 If q is a set in a universe U, then $(q \sim)$ (called, the ‘complement’ of q in U) will denote the set in U that contains all elements in U that are not in q.

2.4 We now examine V in more detail. Goedel once said: “Mathematics is the study of sets derived from V by using the operation ‘set of.’ ”. (See Wang (1988), page 194.) We elaborate this below. Note that since V is the TES, any subset of V must also be V. We also note that $V = V.V = V+V = (V + V) + V = V + V + V = V + V + V + V + \dots$. This means that V can infinitely reproduce itself, and yet remain V. In other words, V is the same as an infinite number of reproductions of V. Thus, using the operation ‘set of’, we get various collections of V leading to various structures, all of which amount to just V! (Notice that the ‘repeatability of V is contained in the nature of V, it simply being a property of V.) But V, taken 0 times, once, twice, thrice, etc, ‘creates’ the (concept of the) natural numbers 0, 1, 2, 3....., also called ‘whole numbers’ or ‘integers’. The integers give rise to the concepts of addition (and hence, also subtraction, multiplication, and division). This gives rise to fractions, and more generally, to what is called the real line. This, in turn, gives rise to axes, and hence to lines, planes, and spaces of three and higher dimensions. All such spaces and other mathematical objects give rise to various simple or complicated sets and subsets and sub-subsets etc., of various kinds, and also to various kinds of curves and surfaces in various dimensions. These give rise to different kinds of associations and relationships between the different mathematical objects. All this leads to an infinite variety of ‘structures’ (for want of a better word), which we call ‘Mathematics’ (Math). We know only a tiny bit of Math. The Rest is Unknown. For the lay reader, I should make the remark that what is commonly called Math (some arithmetic, algebra, geometry, etc.) gives a somewhat misleading picture. Generally speaking, Math is the study of (conceptual) structures of various kinds. The set $(V \sim)$ is the set of all subsets of V and all collections of such subsets, their inter-relationships, and their properties, and everything else that relates to them. Thus, the set $(V \sim)$ embodies all of Math. Mathematics is in the realm of ideas. For example, the number ‘4’ is an idea. The number ‘4’ is not made of any substance such as iron, gold, or sodium, or any other solid, liquid, or gas.

2.5 The set $(V \sim)$ shall also be denoted by the symbol N, where N stands for what is called ‘Nature’ in the common language. In sec. 6, a more in depth discussion of V and N is presented. Here, we present the fundamental axioms of TMFFR (Theory of the Mathematical Formulation of the Foundations of Reality) and TLC (Theory of Life and Consciousness) respectively, concerning N.

AXIOM A1: What is called ‘Nature’ in common language is, indeed, identical to $(V \sim)$ (or N), and consists of log-mat objects alone; all possible log-mat objects along with all their interrelationships and all objects evolving out of them are included in N.

AXIOM A2: Certain objects in N have an attribute called ‘Consciousness’; such objects are said to have ‘life’ and are called ‘animate’. If E is animate, the consciousness of E is denoted by $C(E)$. *This axiom says that for an animate object E , $C(E)$ gives to E the experience of the ‘physicality’ of certain parts of N .* In other words, there is an intrinsic, deterministic, Reality (which we denote by $(V\sim)$, and also by N), and It is the only Reality that there is; this Reality consists of log-mat objects only, and nothing else. For a living entity E , the experience of ‘matter’ and ‘physicality’ arises because of $C(E)$ only. Usually, depending upon the nature of E , $C(E)$ is limited to only relatively ‘small’ sectors of N .

3 SOME LOGIC-MATHEMATICS PRELIMINARIES

3.1 It is clear that under TMFFR, logic and mathematics play a very important role. Here, we present a brief discussion of some basic ideas that we need for later use. From the layman’s viewpoint, we can say that ‘logic’ deals with the correct usage of the words ‘and’, ‘or’, and ‘not’. Of course, we all know what these words mean, and how to use them. However, even though these words are simple, complicated situations arise rather rapidly as one proceeds to use them. To deal with this, ‘symbolic logic’ has been introduced, which is briefly explained now. Firstly, a ‘proposition’ is any assertion that we make. For example, [John is taller than Joe], and [Joe is shorter than Jim, and is taller than Jane] are two propositions that we shall respectively denote by A and B . Then, “not- A ” (written $(A \sim)$) is the negative of the proposition A , and stands for the assertion: “It is not true (i.e., it is false) that ‘John is taller than Joe’”. Also $(A.B)$ (read, “ A and B ”) would then be the proposition “Both A and B are true”. Similarly, (A, B) (read, “ A or B ”) would be the proposition “Either [A is true and B is false], or [A is false and B is true], or [A is true, and B is true]”. In other words, (A, B) says “At least one of the propositions A and B is true”. Now, let $C = (A, B)$. Then clearly, $(C \sim)$ says “neither A nor B is true”. Equivalently, $(C \sim)$ says “ $(A \sim)$ is true, and $(B \sim)$ is true”. Thus, we find that $(C \sim) = [(A \sim). (B \sim)]$. Clearly, $C = [(C \sim) \sim] = \{[(A \sim). (B \sim)] \sim\} = [((A \sim) \sim), ((B \sim) \sim)] = (A, B)$. For any three propositions, (say D, E, F) the following two assertions (called ‘distributive’ laws) are important:

(i) [At least one of D and E is true, and also F is true] = $[(D, E). F] = [(D.F), (E. F)] =$ [At least one of the propositions $(D$ and $F)$ and $(E$ and $F)$ is true]

(ii) [At least one of the propositions $(D$ and $E)$, and F is true] = $[(D.E), F] = [(D, F). (E, F)] =$ [the propositions $(D$ or $F)$ and $(E$ or $F)$ are both true].

One can construct logics where some of these laws (for example, the distributive laws) do not hold. However, for humans it is not a common situation yet, and we need not go into that here.

3.2 Let A and B be two propositions. If, whenever A is true, then B is also true, we say that “ A implies B ” (written: “ $A \rightarrow B$ ”). In the example in sec.3.1, let G be the proposition. “John is taller than Jane”. Then, clearly, we find that the proposition “ $(A.B) \rightarrow G$ ” is true. Let H be the proposition “John is taller than Jim”. Clearly “ $(A.B) \rightarrow H$ ” is false, because from the fact that John is taller than Joe, and Joe is shorter than Jim, we only find that Joe is shorter than both John and Jim, but we can’t say who is taller between John and Jim.

3.3 The subject of mathematics largely obeys the above laws of logic (except in rare situations where we start a sub-discipline, in which one or more rules are deliberately

abandoned). Now “logic” deals with the truth and falsity of propositions. Thus, in order to have a play of logic, we need some propositions. However, we cannot have propositions unless there are some objects about which the propositions are asserted. We shall loosely use the term, “logic-field” (synonymously, ‘logic-system’, ‘logic-space’, or ‘logic-universe’) for such a system. (There is no hard and fast rule for selecting one of these terms. Whatever term the context seems to be suggestive of, may be used.) Thus, a ‘logic-field’ (*LF*) consists of some objects, and some assertions about these objects, and one is interested in the truth or falsity of these assertions. Looked at from this angle, all the various branches and sub-branches of mathematics are logic-fields only.

3.4 An “axiom” in a LF is any assertion concerning the objects in the said LF, whose truth we wish to believe in. Let *Q* be a LF, and let *a1* and *a2* be two assertions in *Q*. If, by using the rules of logic, we can show that “*a1* \rightarrow *a2*”, then we say that “*a2* is deducible from *a1*”, or “*a2* is dependent on *a1*”. If, on the other hand, we can show that “*a1* \rightarrow [(*a2*) \sim]”, then we say that “*a1* implies the negative of *a2*” or “*a1* contradicts *a2*”. A set *S* of axioms is said to be “consistent”, if no subset of axioms in *S* contradicts an axiom in *S*. (An axiom is self-consistent if it does not contradict itself. For example, the assertion “I speak lies only” is not self-consistent; because if it is true then it implies that it is false.). Finally, a set of axioms is said to be “independent”, if no axiom in the set can be deduced from the others. Note that a set of axioms may be consistent but may not be independent. Note also that if two assertions are contradictory, then there can be no sub-LF in which both assertions are valid.

3.5 We consider a simple example of a LF, to be denoted as LF1. Suppose there are 10 men (*m0*, ..., *m9*), and 5 clubs (*C0*, ..., *C4*); these are the “objects” in LF1. Next, these objects have “relationships” with each other. Relationship R1 means ‘is a member’, and R2 means ‘is a partner’. A man can be a ‘member’ of one or more clubs; if a man is a member of a club, he has the relation R1 with the club. Also, two men are called ‘partners’ if there is a club of which both are members: two men who are partners have the relation R2 with each other. Consider the assertions: *b1* (each man is a member of exactly 2 clubs), and *b2* (each club has exactly four members). It can be checked that *b1* and *b2* are consistent (because they do not contradict each other), and are also independent. Now, consider the assertion *b3*: “each man has at most 6 partners”. Note that *b3* is ‘implied by’ (and, hence, is ‘dependent on’) the set {*b1*, *b2*}. Consider *b4*: “No two men go to the same two clubs”, and *b5*: “Each man has exactly 6 partners”. Note that “(*b5*) \rightarrow (*b3*)”, and “{(b1). (b2). (b4)} \rightarrow (*b5*)”. One example of an LF1 in which all these assertions are satisfied is given by the configuration *C0* (*m0*, *m1*, *m5*, *m9*), *C1* (*m1*, *m2*, *m7*, *m8*), *C2* (*m2*, *m3*, *m5*, *m6*), *C3* (*m3*, *m4*, *m8*, *m9*), and *C4* (*m0*, *m4*, *m6*, *m7*), where the members in a club are indicated after the club’s name. Note that the above is not the only configuration that exemplifies LF1. There are a very large number of such possibilities, obtainable by permuting the names (*m0*, *m1*, ..., *m9*) in different ways. Consider the assertion *b6*: “The above configuration for LF1 is the only one possible, except for a permutation of the names of men”. It can be shown that (*b6*) is dependent on the set {(b1), (b2), (b4)}.

4. COGNIZANCE AND CONSCIOUSNESS IN A LOGICAL SYSTEM

4.1 Let *Q* be a logical-system, and *g* and *h* be two objects in *Q*. Then, we shall say that “*g* is cognizant of *h*”, if *g* has access to *h*, i.e., if *g* can ‘interact’ with *h* directly. More precisely,

it means that if $f(g, h)$ is any computable function of g and h , then f is computable as soon as g and h are known. In simple language, it means that, in the context of interest, g and h are well defined and known; we shall call such g and h as ‘*well determined*’. Here, the word ‘cognizant’ is not being used in any deep psychological sense. For example, suppose I say that I spent a dollars on oranges, b on apples, and c on peaches, and $a+b=7$, without telling the value of a . Then, a and b are not well determined. If we know c , then c cannot interact with b because b is not known. So, we shall say that c is not cognizant of b . But, clearly c shall be cognizant of $(a+b)$. The meaning of ‘well-determined’ is more clearly explained in the subsequent sections.

4.2 Since, by definition, V is defined in each universe, and occurs there as a subset of its empty set, V is also defined in any logical system that we consider. Let Q be a logical system, with empty set denoted by QV . (Note that QV is just a symbol; it does not mean ‘ Q multiplied by V ’) Then, V occurs in Q as a subset of QV . Note that QV is well defined in Q , whereas V really refers to all possible universes. Thus, if Q denotes the system $LF1$, then QV is the set in Q , which does not contain any object of Q . Thus, the statement “In Q , QV is cognizant of g ” is a meaningful statement having two “logical values” (i.e., two “answers”) ‘true’ and ‘false’. We shall say that, “In Q , QV is cognizant of g ” if and only if it is true that “In Q , the object g is well determined”, i.e., “There is no object k , such that k is irremovably tied to g .” For example, in sec. 3.5, let us change the system $LF1$ to $LF2$, where $LF2$ does not have the ten men individually, but only collections of them in the form of the clubs $C0, \dots, C4$. Then, in $LF2$, the assertion “In ($LF2$), ($LF2$) V is cognizant of $m0$ ” is not true, because $m0$ is not a separate object in $LF2$. However, clearly, in $LF1$, the statement “In ($LF1$), ($LF1$) V is cognizant of $m0$ ” is true. The reason is that the individual $m0$ occurs in $LF1$ by itself, whereas in $LF2$, his club partners are tied together in an irremovable way. Thus, we see that in ($LF2$), $m0$ is not ‘well determined’, but it is so in ($LF1$). Here, we are implicitly assuming that the ‘context of interest’ is merely the ability to talk about $m0, \dots, m9$ separately as individuals, rather than only as five groups. The words ‘context of interest’ and ‘well determined’ are very loaded, but the above elaboration should suffice for this series of articles.

4.3 We say that “In Q , V is conscious of g ”, if the assertion “In ($V \sim$), V is cognizant of ‘In Q , QV is cognizant of g ’”, is true.

4.4 All though this series of articles, the notation “*HTh*” will stand for “Heuristic Theorem”. An *HTh* is an assertion, which is at the edge of science. It would be science if the assertion (and the whole context in which it is made) is formulated sufficiently precisely, to be at the current standards of the relevant branch of science. It is an assertion that is very likely true but whose proof is not deemed to be sufficiently ‘rigorous’. The purpose of an *HTh* is to help the readers to discover the broad truths of the subject matter field.

4.5 Henceforth, the assertion “In Q , V is conscious of g ” will also be alternatively stated as: “ V is conscious of g (which is in Q)”. When Q is clear from the context, the last assertion will be written: “ V is conscious of g ”.

4.6 Recall the statement in sec. 4.2: “In Q , the object g occurs by itself, i.e., there is no object f such that f is irremovably tied to g ”. Henceforth, this statement shall be considered equivalent to the statement “In Q , g is a ‘well determined object’ ”. From the above discussion, it

follows that if it is true that “In Q, g is a ‘well determined object’”, then it is also true that “In Q, QV is cognizant of g”, and “V is conscious of g”. Following the same arguments, it is also clear that if g is not a ‘well determined object’ in Q, then QV is not cognizant of g, and V is not conscious of g. In the example in sec. 4.2, under LF1, V is conscious of m_0, m_1, \dots , etc, but not under LF2.

4.7 Consider the assertion: “V is conscious of g”. From sec 4.3, 4.5, and 4.6, it is clear that this last assertion is true if, in $(V\sim)$, the statement “In Q, QV is cognizant of g” is a ‘well determined object’. Now, suppose that in $(V\sim)$, Q is a ‘well determined object’. Suppose also that in Q, g is a ‘well determined object’. It is clear that this assumption concerning Q and g being ‘well determined objects’ can be made without loss of generality. Otherwise, we cannot really deal with Q and g as individual objects. On the other hand, if Q and g are ‘well determined objects’, then the statement “In Q, QV is cognizant of g” is a true statement, and its truth does not depend on anything else; this implies that this statement is a ‘well determined object’. We have heuristically established

HTh1: Let Q be a logic-system, and let g be an object in Q. Suppose that both Q and g are ‘well determined objects’. Then, the assertion “V is conscious of g (which is in Q)” is true.

5 DEFINITION OF LIFE

5.1 Consider $(V\sim)$, also denoted by N, commonly called ‘Nature’. From sec. 2.6, N consists of log-mat entities only. Let U be a universe inside N. Then, U is a log-mat entity. Objects in U are thus in the realm of ideas only, because so is all of mathematics. Let E be an entity in U. We shall say that “The entity E has life’, or “E is a living entity” or “E is inside AN”, if and only if the assertion “E has the capacity to be conscious of E” is true. The last assertion can, equivalently, be expressed as “E has the capacity to be self-conscious”, or, in common language “E is self-conscious”. Now, the question arises: “What is meant by saying that ‘E is conscious of E’?” Notice that in the last section, we have talked about V being conscious of an object g (which is in some universe Q). Here, V and g are both replaced by E.

5.2 To explore the possible meaning of “E is conscious of E”, we continue in the spirit of sec. 4. Firstly, notice that in HTh1, there is no condition that Q and g need to satisfy (except that both are ‘well determined objects’). In other words, whatever (‘well determined objects’) Q and g may be, HTh1 says: “V is conscious of g”. Thus, HTh1 implies that V is conscious of all ‘well determined objects’ in $(V\sim)$, or equivalently, that “V is omniscient”.

5.3 From sec. 4.3, recall that “V is conscious of g (which is in Q)” is equivalent to “In $(V\sim)$, V is cognizant of ‘In Q, QV is cognizant of g’ ”. Now, this statement has two parts (i) “In Q, QV ...”, and (ii) “In $(V\sim)$, V is ...”. In the spirit of this statement, the sentence “E is self-conscious”, or equivalently, “E (which is in U) is cognizant of E (which is in U)” is expressible as “E (in U) is cognizant of ‘E (in U) is cognizant of E (in U)’ “. Furthermore, this last sentence can be broken up in two parts (i) “E (in U) is cognizant of ‘....’”, and (ii) ‘E (in U) is cognizant of E (in U)’, which we now explore.

5.4 Recall sec. 4.6. For simplicity, assume that E is a ‘well determined object’ in U (Otherwise, essentially, we cannot talk about it). Then, (ii) (of the last sentence of sec. 5.3) follows. So, we need to consider (i), which states: “In U, E is cognizant of ‘E (in U) is cognizant of E (in U)’”. *Notice that, here, we need E to be cognizant of an assertion concerning U itself (inside which E is an object).* Now, in order to be able to talk about an assertion concerning U, we need to go outside U. Let $U = U_0$. We need to be in a universe (say, U_1) where we can talk about U_0 . The universe U_1 can be called the ‘meta-universe’ of U_0 ; this fact will be expressed symbolically as “ $U_1 = M(U_0)$ ”, where M denotes ‘meta’. (We should remark here that a given universe could have many meta-universes. In other words, given U_0 , its meta-universe is not necessarily unique. But, this point is not important to the discussion that follows.) Continuing the argument of sec. 5.4, the above means that we should now consider E to be an object in U_1 , since U_0 is contained in U_1 .

5.5 Thus, the assertion (i) (in sec. 5.4, 5.3) reduces to “In U_1 , E is cognizant of ‘E (in U_1) is cognizant of E (in U_1)’”. However, we are now in the same situation as before; we need a meta-universe of U_1 . Let $U_2 = M(U_1)$. Now, (i) becomes “In U_2 , E is cognizant of ‘E (in U_2) is cognizant of E (in U_2)’”. It is clear that the above argument will generate an infinite sequence (say, Z) of universes $\{U_0, U_1, U_2, U_3, \dots\}$, such that each of U_1, U_2 etc. is the meta-universe of the previous universe in the sequence. It follows that E will have to be considered as an object in all of the universes in the sequence Z. Now, suppose E is such an object. (We, loosely, express this by saying ‘E is in Z’.) Can we now say: “E is self-conscious”? To answer this, consider a particular universe in Z, say U_5 . Now, before U_6 is considered, the assertion (i) is “In U_5 , E is cognizant of ‘E (in U_5) is cognizant of E (in U_5)’”. But, recall sec. 4.6. In the light of sec. 4.6, we now need that the assertion “E (in U_5) is cognizant of E (in U_5)” be a ‘well determined object’ in U_5 . *However, this assertion is not valid because it talks about U_5 , which cannot be talked about in U_5 . Indeed, this assertion is not an object in U_5 . This assertion is about an object in U_5 , but all of U_5 itself is irremovably attached to it.*

5.6 It is clear that the statements in the last section are true not only about U_5 , but also about any other universe in Z. In other words, every universe U^* which is in Z is irremovably attached to the statement “E (in U^*) is cognizant of E (in U^*)”. But, what is the relevance of the universes of the type U^* ? The answer is clear. The universes such as U^* are relevant because they help us determine where E is. In other words, ‘ U^* is relevant’ means that ‘ U^* helps us to identify E’. The above discussion clearly amounts to saying that “The identity of E is irremovably attached to the attachment ‘E (in Z) is cognizant of E (in Z)’”. It is thus clear that in order that “E be self-conscious”, we somehow need E to be such that its ‘identity is not irremovably attached’ to the statement ‘E (in Z) is cognizant of E (in Z)’.

5.7 Now, let ZV be a set that is defined in, and is empty in all U^* in Z. Without loss of generality, we assume that Z is a ‘well determined object’ in $(V\sim)$; otherwise, we cannot talk about it independently of other objects. Notice that, under the assertion in the last sentence, the identity of ZV is clear: ZV is a set in $(V\sim)$ that is empty in all U^* in Z. When we consider Z by itself, ZV is well defined; it is the intersection of all the empty sets obtained by taking the empty set from each of the universes U_0, U_1, U_2, \dots in Z. Consider taking $E = ZV$ in the last section. Then, it is clear that it is not true that the identity of ZV is irremovably attached to the statement ‘ZV (in Z) is cognizant of ZV (in Z)’, the reason being that ZV is well defined independently of

all other objects in Z . Thus, we can say: “ ZV (in Z) is self-conscious”. From the preceding discussion, it is also clear that E (in Z) cannot be self-conscious unless $E=ZV$. In future, we shall call ZV the ‘extension of V in Z ’. Clearly, V is self-conscious. We have heuristically proved

HTh2 If E (in Z) is self-conscious, then $E=ZV$. Also, V is self-conscious. Thus, V and ZV are both self-conscious.

5.8 Now, suppose g is a ‘well determined object’ in a universe $U(=U_0)$. Then, we explore the truth of the statement “ ZV is conscious of g (in U)”. In view of the previous discussion, this statement is equivalent to the assertion: “ ZV is cognizant of G ”, where G is the assertion ‘ ZV is cognizant of g (in U)’. Now, g is a ‘well determined object’ in U , and hence g is also a ‘well determined object’ in Z . Also, ZV is a ‘well determined object’ in Z . Hence, it follows that the assertion G is true. Furthermore, G is a ‘well determined object’ in Z because it basically says that ‘ ZV and g are both ‘well determined objects’ in Z ’. Thus, ZV and G are both ‘well determined objects’ in Z , from which it follows that “ ZV is cognizant of G ”. We have established

HTh3 If g , Z , and ZV are defined as above, then ZV is conscious of g .

5.9 Recall that an entity E in N is said to have ‘life’, if E has the capacity to be self-conscious. From HTh2, we note that if we have $E=ZV$, then E would have ‘life’. So, it is clear that having ‘life’ or being ‘animate’ is an attribute that is coming from ZV . Now, ZV is a set that satisfies the two conditions (fcc1) and (fcc2), where (fcc1) says that “ ZV is defined in each universe in Z ”, and (fcc2) says that “ ZV is contained in the empty set of each universe in Z ”. (Here, ‘fcc’ stands for ‘Fundamental Conditions for Consciousness’.) So, from HTh3, the fact that ZV is conscious of every ‘well determined object’ g (where g could be in any universe in Z) is ‘rooted’ in the fact that ZV satisfies conditions (fcc1) and (fcc2). However, we also note that all universes in Z , or even in N , are log-mat universes, and all objects including g and E and ZV are log-mat objects. Thus, the above can be simply stated as: ‘ ZV is a log-mat system which is rooted in, and is a subset of, the empty set of each universe in Z ’, and ‘ ZV is conscious of every ‘well determined object’ in Z ’. The last statement can be worded as: ‘The consciousness of ZV , in Z , is “unrestricted”’. Recalling from sec. 2.6 the notation $C(E)$ for the ‘consciousness of E ’, the statement in quotes becomes: ‘ $C(ZV)$, in Z , is unrestricted’. Similarly, the consciousness of V , i.e., $C(V)$, is unrestricted universally because (one can informally say that) V has access to all objects in all universes.

5.10 Continuing the above discussion we see that while, in Z , $C(ZV)$ is unrestricted, there could be entities E whose consciousness is restricted. We may denote such an entity by $E=E(ZV, W)$; this means that E is an entity which is not ZV , but which is a function of ZV and W , where W is a class of restrictions on the objects in Z which may come under the purview of $C(ZV)$. Note that W is not coming from Z in any sense; W is simply a set of restrictions on $C(ZV)$ because of which certain ‘well determined objects’ in Z are to be excluded from $C(ZV)$. Thus, unless W is empty, $C(E)$ is different from $C(ZV)$, and $C(E)$ includes consciousness of only some ‘well determined objects’ in Z and not others. However, since E does have consciousness of some objects in Z , we say that E too has ‘life’ and is ‘animate’.

5.11 (a) We now examine how Z and hence ZV came into picture. Originally, we had started with an E that is a ‘well determined object’ in some universe U_0 in N . Then, the universe U_0 was enveloped by U_1 , U_1 by U_2 , and so on, producing the sequence $\{U_0, U_1, U_2, \dots\}$, which is Z . Now, let X denote the ‘definition’ of E in U_0 . Then, clearly, Z is a function (in the mathematical sense) of X . Since, from sec. 5.10, we have $E = E(ZV, W)$, and since ZV is a function of Z and V , it follows that E is a function of V , W , and X , and we can write $E = E(V, W, X)$. From the above discussion, it is clear that E is an animate object in N , and all animate objects E in N must have the abstract log-mat form $E = E(V, W, X)$. We have heuristically established the following result:

HTh4 Let E be an animate entity in N ; then E must have the abstract mathematical form $E = E(V, W, X)$, where W and X are defined as above.

5.11 (b) We now elaborate the above in the common language, and introduce the concept of the ‘Individual Soul’ (to be denoted by v) called ‘Jeevaatmaa’ in Sanskrit. (Incidentally, what we have been referring to as ‘The Supreme Divine’ (which corresponds to V) is called ‘Parmaatmaa’ in Sanskrit.). Part of N corresponds to what is commonly called ‘The Nature’. The universe we live in is fully in the realm of ideas only; it is a purely mathematical object. N consists of all possible log-mat universes and all possible other mathematical objects. The universe we live in is only one such universe.

5.11 (c) Consider ZV , first defined in sec.5.7; it denotes the intersection of the empty sets of all universes U^* in the sequence Z . Since V is the totally empty set, being empty in all universes in $(V\sim)$, the notation ZV is suggestive (of what it represents), because it signifies emptiness in Z . It also signifies that the set ZV is dependent on Z , and could change as Z changes. From this fact too, it is clear that the notation ZV is suggestive, since Z occurs in the symbol ZV . However, it is to be emphasized that ZV is purely a symbol in which Z and V are not separate.

5.11 (d) Notice also that Z is not unique. Why? To answer that, notice that Z is an increasing sequence of sets starting with U_0 . Now, instead of U_0 being contained in U_1 , we could consider it being contained in a different universe $U'1$, which, in turn, could be contained in a universe $U'2$, and so on giving rise to a different sequence Z' , say. Then, we could intersect the empty sets in the universes in Z' , obtaining a new set $Z'V$, say. Then, $Z'V$ would also lead to consciousness, just as ZV does. Thus, the sequence Z is not the only one that could give rise to consciousness. Thus, from this angle too, the symbol ZV is appropriate, since it emphasizes dependence on Z . In a sense, we can think of ZV or $Z'V$ as ‘minimal’ systems which create self-consciousness in E .

5.11 (e) Objects in N are of two forms; those that do not involve V , and those that do involve V . The collection of objects which do not involve V is denoted by IN (for ‘Inanimate Nature’). The totality of objects in N which do involve V is denoted by AN (for ‘Animate Nature’). Objects in IN are of the form X , whereas the objects in AN are of the form $E(V, W, X)$, as shown in HTh 4.. We now proceed to explain what v is, how it arises, and how it is involved with every entity in AN . To do this, we briefly explain the components of E ; more elaboration will be made later. Firstly, X (called ‘the physical body’ or just ‘the body’) is a log-

mat object in a universe U inside IN . Note that N , and hence IN , U , and X are all log-mat objects, and hence are ‘ideas’ or ‘concepts’ only. Also, as mentioned above, V is defined in all universes, in each of which V is a subset of the empty set. Thus, E (which is an object in AN) is also, in a sense, defined in all universes. Because of V , the entity E is conscious of many objects in N (which would ‘mostly’ be objects in Z). What objects E is conscious of, is dictated by X and W . Here, W may (in the common language) be called “the psychic body” of E . W acts as a class of restrictions on $C(E)$. Saying that “ W is empty” means that “the class of restrictions on $C(E)$ is ‘empty’”; in other words, E has full consciousness of everything in Z . If $E=V$, then $Z=N$, and $C(E)$ includes all ‘well determined objects’ in N . However, W is a restriction on the consciousness, and the symbol (V, W) would thus be used to denote ‘restricted consciousness’, in the sense that while V corresponds to the situation where “the set of restrictions on the log-mat systems (in $(V\sim)$) under consideration is empty”, the symbol (V,W) stands for “the set of log-mat systems under consideration (in $(V\sim)$) is restricted by W ”. Similarly, (ZV,W) stands for “the set of log-mat systems under consideration (in Z) is restricted by W ”.

5.11 (f) In the common language, V may be called the “Super-soul”. Also, we shall use the symbol v , or $v(ZV, W)$, to denote an “individual soul”. The consciousness of V covers all of $(V\sim)$, while the ‘consciousness of v ’ refers to “the ‘consciousness of ZV ’ that includes the parts of Z not blocked by W , plus the consciousness of parts of W ”. The individual soul v ($ZV, W1$) may have a ‘body’ X , where X is in a universe (say, U); in this case v is said to be ‘embodied’, and may be represented as an entity $E = E(v, W2, X)$, where v is called the ‘soul’ of the individual E in AN . Here, $W1$ are log-mat systems ‘intrinsically’ linked to v , while $W2$ are systems ‘extrinsically’ linked to v . When v has no body X , it may be said to ‘disembodied’, in which case it remains as v ($ZV, W1$). Thus, E can be written $E(ZV, W1, W2, X)$. Note that, in the customary language, $W2$ shall correspond to the conscious mind of the person E , while $W1$ may be a result of the ‘past lives’ of E , and Z is the ‘larger universe’ in which E ever appeared. However, at the end of a body X , the entity E (depending upon $W1$ and $W2$) could take birth in a universe outside Z . In this case, v shall be affected intrinsically as well.

5.11 (g) From (5.11a), recall that E does involve V , and hence we can write $E = E(V, ZV, W1, W2, X)$. However, since, informally speaking, everything is evolving from V alone, we shall know that E involves V , but write E only as $E(v, W, X)$, where for simplicity, $W2$ is now called W . As $W1$ varies, the soul $(ZV, W1)$ varies. If $W1$ is not identical to $W1$, then the souls represented by v ($ZV, W1$) and v ($ZV, W1$) are distinct. Also two souls, one involving Z and the other involving Z shall generally be distinct.

5.11 (h) However, irrespective of what universes and Z ’s the soul v gets involved with, V is always there alongside v . Because of this, since V is defined independently of the concepts of time and space, v too is eternal. Also, since, clearly, the concept of ‘individuality’ must be a part of $W1$, if we can talk about v , then v must be different from V . Thus, in our plane of reference, v and V are ‘always’ separate. Note that ‘individuality’ could include, among other things, the past history of v . Even when $E (= E(v, W, X))$ is not embodied (i.e., has no X) and has shed away W (which may be thought of as an ‘acquired temporary identity’), and is so purified that it is unaffected by the events in its past lives, E is still “indexed” by (though not “affected” by) its past history. Thus, $W1$ is ‘always’ non-empty. (The word ‘always’ is in quotation marks, because

we are implicitly assuming that E (which, now, is just the soul v) is in a universe U where time is defined.) Hence, $W1$ is indeed always non-empty, and v and V always remain distinct.

5.12 (a) The purpose of this section is to give further insight into the concept of the Jeevaatmaa, denoted above by v . There are many philosophies concerning this, but the development in this section supports a certain basic tenet of what is known as the Gauria Vaishnava Ontology (GVO).

5.12 (b) Recall sec.5.11 (d). Suppose, we are constructing a sequence Z^{\sim} for an entity E . Note that Z^{\sim} is an increasing sequence of universes $U^{\sim}1, U^{\sim}2, \dots$, etc, starting with $U0$. Notice that, at any stage we like, we can choose a sequence (in the series $U0, U^{\sim}1, U^{\sim}2, U^{\sim}3, \dots$) to be equal to (V^{\sim}) . Notice that this is always possible, since V^{\sim} is the largest system. Since there is no bigger universe than V^{\sim} (indeed, all universes are contained in it), the sequence Z^{\sim} would now end, and will be a finite sequence. Since $Z^{\sim}V$ is the intersection of the empty sets of all sequences in Z^{\sim} , it follows that $Z^{\sim}V$ is a subset of the empty set of V^{\sim} . But, the empty set of V^{\sim} is nothing but V . On the other hand, V is the intersection of the empty sets of all possible log-mat systems. Hence, it follows that $Z^{\sim}V = V$. Thus, when a sequence Z (like Z^{\sim} above) is constructed, then, we shall get $v = v(V, W1)$, and $E = E(v, W, X) = E(V, W1, W, X)$.

5.12 (c) As we found in 5.11(d), Z is not unique. However, each Z leads to self-consciousness in E . Thus, E has many sources that possibly create self-consciousness in it. However, its consciousness is influenced by the various Z 's with which it is involved, besides being restricted by the W 's. Now, in section 5.11 (a), we had shown that somehow V is involved in E , and that was through ZV , which was an indirect involvement. But, the last subsection shows that E is always involved with at least one Z such that $ZV = V$. Thus, here we have firmly established that each v (in AN) involves V in a direct manner. In sec 5.11 (h), because of 5.11 (a), we had said that v carries V 'alongside'. In 5.11 (h), we further showed that v and V are separate in our frame of reference. The facts in the last two sentences constitute a very important tenet of GVO.

6 THE DIVINE, THE NATURE, AND SPIRITUALITY

6.1 In sec. 2.4, we discussed how (in a sense), (V^{\sim}) 'evolves' or 'evolved' out of V . Indeed, it is clear that in the existence of V , and of (V^{\sim}) out of V , there is no concept of 'time' involved. The concept of V is obviously independent of the notion of 'time', and so is the consequent concept of (V^{\sim}) . Thus, the word 'evolves' or 'evolved' are chosen only because of the lack of better words. Both of these words give a picture that has its existence in time, whereas the concepts of V and (V^{\sim}) are timeless. Thus, V and (V^{\sim}) are both co-existent independently of time.

6.2 Also, for want of a better word for V , we shall use the pronoun "It" to refer to V ; this is so although V is 'live', indeed, the most conscious and so (in a sense) the 'most live'. Also, since V is the subset of all empty sets, we can comprehend It, and hence we can refer to It. But, on the other hand, in a sense, V remains undefined because we cannot exhaustively enumerate ALL sets and thus, we cannot specify all sets of which V is a subset. Thus, in a sense, we can say that V is 'beyond concepts'.

6.3 Now, from part I, sec 4.2, recall the ‘Theory of the Fundamental Spiritual Correspondence’ (TFSC). This theory sets up correspondence between objects in the above mathematical development on the one hand, and objects in human spirituality on the other. If we take the attitude that we can comprehend V and can refer to It, then (under TFSC) we assert: “‘V’ corresponds to the ‘Supreme Divine’ “; this assertion will be denoted by C1. Furthermore, since there is nothing except V and N, and since (in a sense) N extends out of V, one can say that “everything is pervaded by V”. Thus, V can also be called ‘The All Pervading One’ (often termed ‘Brahman’ in the Vedic literature). Combining the last sentence with the last sentences of the last two subsections, it follows that ‘Brahman is beginning-less and beyond all concepts’, which is exactly what *Krishna* said in BG 13.12 (Bhagvad Gita, chapter 13, line 12).

6.4 Now, unlike sec. 6.3 where we take the attitude that ‘V exists’ (since we can refer to It), one can take the opposite attitude that since V is the totally empty set (TES), V should be considered to be nowhere and hence ‘non-existent’. This is supported by BG13.12: “‘Brahman’ cannot be called ‘existent’ (or ‘real’ or ‘true’) or nonexistent (or ‘unreal’ or ‘untrue’)”.

6.5 Math is the Reality (which we also denote by N), but the form in which an entity $E(v, W, X)$ perceives N depends on the ‘consciousness’ of E. This consciousness, in turn, exists because E is ‘associated with’ v. Furthermore, it is influenced by the psychic body W and the physical body X of E. Also, W itself is partly influenced by X (which is defined in some universe U). Science is the study of our U, i.e., the universe in which our physical bodies are defined. On the other hand, since ‘the consciousness that E has of N’ is increased by ‘decreasing’ W, the spiritual path (i.e., the path that is “Rational” for E (see, Srivastava (2001a)) is to ‘decrease’ W. This implies that it is possibly true that when W ‘decreases’ in a certain ‘direction’, extra consciousness arises in that ‘direction’; this assertion corresponds to what is experienced as ‘intuition’ in that ‘direction’. Such intuition forms a large part of scientific work. (See, for example, Srivastava (2001a).) That is one reason why, in a sense, we can say (in agreement with Pribram (2002)): “Science is a part of Spirituality”.

6.6 We now discuss W in more detail. Recall that in sec. 6.3, a correspondence C1 is set up (by TFSC) between V and ‘The Divine’. Now, under TFSC, we set up the correspondence C2: “W corresponds to each and everything that reduces consciousness (of the individual living entity); for humans, this includes for example, attachments, aversions, desires, the nature of X, how is ‘information’ processed, etc”. The three attributes of ‘sattwa’ (goodness), ‘rajas’ (passion), and ‘tamas’ (ignorance), much discussed in the traditions from India, are also features of W. In log-mat terms, ‘attachment’ may correspond to the situation where there is a tendency to be contained in certain parts of U, or be related to certain members of AN. (If $E(v, W, X)$ and $E(v', W', X')$ are two animate entities, then the fact that a certain important part of W is contained in W' may be experienced by E as a feeling of ‘love’ for E' . This same feeling may be called ‘attachment’, if E also expects material gain from E' .) Similarly, ‘aversions’ may refer to being not contained in certain parts of U or being unrelated to some members of AN. ‘Desires’ may refer to the tendency to have special relationships with certain objects in N. An example involving X would be the administration of anesthesia to a person. The ‘analysis of information’ in W may refer to what is commonly called the ‘psychology’ of the person $E(v, W, X)$. Note also that W influences W_1 (in the notation introduced in (5.9g).

6.7 Why does ‘Spirituality’ correspond to ‘decrease’ in W? Thus, we read that Jesus said: ‘It is easier for a camel to go through the eye of a needle, than for a rich man to enter the Kingdom of God’ (Mathew 19.24). Indeed, it is well known that gurus, ministers, mullahs, and rabbis often take a vow of poverty, and generally live a life of relative renunciation. This tradition is also strongly shared by Buddhist and Jain traditions. Thus, from all traditions, the experience of man is that a decrease in worldly attachments (and other traits that correspond to W under C2) leads to spiritual advancement. *Thus, the theory TK corresponds very well to facts in this sector as well.*

6.8 Since V is conscious of all there is, V is also conscious of not only all the relationships and associations within N, but also the cause of these relationships and associations. Hence, V may be said to be ‘Intelligent’. Clearly, in every universe U in which a notion of ‘time’ exists, V ‘precedes’ everything because V is primordial. This supports the assertion “Intelligence Came First” (which is also the title of a book [Smith (1975)]). Furthermore, since (V~) (which is all there is, besides V) arises from V, V can be called ‘The Designer’. Also, as we just concluded, V can be called ‘Intelligent’. Thus, V can be called “The Intelligent Designer”. Again, all of Math can be looked upon as ‘The Machinery of Mathematics’. Clearly, since Math is precise, the ‘machinery of Math’ can be called ‘well designed’. Thus, there is an ‘Intelligent Designer’ who has ‘well designed’ ‘everything’ (because (V~) is ‘everything’). Thus, the idea of “Intelligent Design’ is a consequence of the theistic approach which is an approach that is ‘plausible’ under TK (as shown in sec. 6.4), and hence which (under TK) is *not* ‘incorrect’.

6.9 Notice that, under TFSC, only one entity (namely, V) is put into correspondence with ‘The Divine’. Thus TK strongly supports the concept of ‘monotheism’, which is emphasized to varying degrees in Christianity, Islam, and Judaism, and which is also propounded in Hinduism and Sikhism, although Hinduism does allow that ‘The One Truth may be spoken of in different ways by the learned’ (which is a fact that is supported by human experience). Thus, Hinduism is also monotheistic, but it does allow for different names and approaches for The Divine.

6.10 We emphasize that the assertion C1 is, in a sense, equivalent to the first couplet of Isha Upanishad: “The Divine is Complete there, and Complete here. / From The Complete only The Complete emerges. / If, from The Complete, The Complete is taken out, / Then, The Complete still remains.” As was pointed out in part I, sec. 4.8, only V satisfies the 2nd, 3rd, and 4th parts of this couplet. Also, since there is nothing except V and N, and N comes out of V, we can say that ‘V is Complete’, thus supporting the 1st part. Clearly, in a log-mat system, one cannot imagine anything other than V to have the above properties.

6.11 The above shows how one can work with TK to explain some basic spiritual tenets. In the next section, we do one example in a little more detail, namely the ontology of the Bhagvad Geeta. Of course, for lack of space, we shall necessarily limit ourselves to only a very small subset of the basic assertions, since a full-fledged discussion will need a separate book.

7. THE BHAGVAD GEETA ONTOLOGY

7.1 The Bhagvad Geeta is basically a purely spiritual text. Recall Huxley (See, Prabhavananda and Isherwood (1951)): “This ‘focus of Indian religion’ is also one of the clearest and most comprehensive summaries of the Perennial Philosophy ever to have been made. Hence, its enduring value, not only for Indians, but for all mankind.” The purpose of the discussion in this section is multifold. Firstly, the topic of this series of papers, namely: ‘Life comes from life’, is close to the BGO, and so a discussion of the BGO would help prepare for the same. Secondly, it would be a good exercise to show how a completely mathematical theory corresponds to the basic tenets of the ‘perennial philosophy’, if we simply assume axioms A1 and A2 and make the correspondences C1 and C2 concerning V, v, and W. In this concluding section, we will examine how TK brings the teachings of Bhagvad Geeta to a stage of scientific formalism. This exercise would give insight into the nature of this whole field, since now we essentially have a mathematical model of what previously was pure philosophy.

7.2 The Bhagvad Geeta consists of couplets, called ‘shlokas’ in Sanskrit. For brevity, sometimes, we shall not quote a complete shloka; in such cases, we shall indicate by putting a few dots that there is a missing part. Also, for each shloka under discussion, a translation by Swami Prabhupada (1984) is presented. Furthermore, as mentioned earlier, we shall illustrate by taking only a few central concepts of BGO. These concern The Supreme Divine, the individual soul, Nature, and the Cosmic Tree.

7.3 Some aspects (occurring in BG13.13), of The Supreme Divine denoted here by V, have been discussed in sec.6.1-6.4. We now discuss a few more aspects: BG13. 15-17

The Supersoul is the original source of all senses, yet He is without senses. He is unattached, although He is the maintainer of all living beings. He transcends the modes of nature, and at the same time, He is the master of all the modes of material nature.

The Supreme exists outside and inside of all living beings, the moving and the nonmoving. Because He is subtle, He is beyond the power of the material senses to see or to know. Although far, far away, He is also near to all.

Although the Supreme appears to be divided among all beings, He is never divided. He is situated as one....

To see how these assertions can be arrived at from TK, we first recall the log-mat nature of TK. Under TK, Nature N has evolved from V. Hence, since V is the absolutely empty set, we can say that V is ‘without senses’, and ‘transcends N’. Yet, because N evolves from V (i.e., since V is the Origin of both IN and AN), we can informally say that V ‘maintains all’, and controls all, i.e., ‘V is the master of N’. Since V and V (~) (which comes from V) constitute ‘everything’, we can say that V is ‘both inside and outside of all beings’. Obviously, V is very ‘subtle’. Since V is not definable, V is ‘beyond comprehension’ (and, hence, ‘very ‘far’). Since each entity has its consciousness arising out of V only, V is ‘very near’. Obviously, V is ‘Indivisible’, because it is the absolutely empty set. Also, since N is an outcome of V, V and N together really amount to V alone. Thus, we can say that V stands ‘undivided’ and as ‘One’ On the other hand, if one focuses attention on different parts of N and takes them as separate entities, then N appears to be as if it is divided into separate objects.

7.4 Recall that V is in all empty sets, and the word ‘all’ is really undefinable. This gives rise to the feeling that V cannot be (totally) comprehended by any entity E. Below, we formally prove a related result.

HTh5: Let $E (= E (v, W, X))$ be an entity in AN, which is conscious of V. (Here, v is as explained in section 5.11.) Then, we have: $E = V$. In other words, if E is distinct from V, then E cannot be totally conscious of V.

Proof: Recall HTh3. Take $g=V$. Then, HTh3 says that ZV is conscious of V. But, Z is derived from U, which has as elements both E and $g (=V)$. Thus, it is easy to verify that Z will have to be The Whole, namely $(V+N)$, and ZV must then be equal to V. Thus, $E=V$, and the result is proved.

This derivation illustrates the power of the theory TK.

7.5 Consider BG2.20, 22, 23:

For the soul, there is neither birth nor death at any time. He has not come into being, does not come into being, and will not come into being. He is unborn, eternal, ever-existing and primeval. He is not slain when the body is slain.

As a person puts on new garments, giving up old ones, the soul similarly accepts new material bodies, giving up the old and useless ones....

The soul can never be cut to pieces by any weapons, nor burned by fire, nor moistened by water, nor withered by the wind.

Now, recall that in sec. 6.1, we had concluded that both V and N are independent of the concept of time. From sec (5.12), recall that v involves V. Hence, we can say that v is ‘unborn’, ‘primeval’, and ‘perennial’, and ‘did not, does not, will not, come into being’, and It cannot ‘die’ and is ‘eternal’. An entity E (v, W, X) keeps changing in time because X and W change, and W influences W1. When the log-mat system X is unable to have the property of self-consciousness, it is called ‘the death of X’; if W^*1 is the value of W1 when X dies, then after the death of X, what used to be the soul $v(ZV, W1)$ of E continues now as a soul $v(ZV, W^*1)$. Eventually, this soul may enter a new body X^* . Thus, when X has changed so much that it is unable to sustain self-consciousness, one can say that it is ‘worn out’ and hence discarded, and that v (The Embodied One) enters ‘a new body’ X^* . Clearly, since v carries V along (sec 5.12), we can say that v is ‘immutable’ and that It cannot be ‘pierced’, ‘wetted’, ‘burnt’, or ‘dried’.

7.6 We consider two Shlokas concerning Nature, respectively, BG13.30, and 9:10:

One who sees that all activities are performed by the body which is created of material nature, and sees that the self does nothing, actually sees.

This material nature, which is one of my energies, is working under my direction, O son of Kunti, producing all moving and nonmoving beings. Under its rule, this manifestation is annihilated again and again.

From the preceding discussion, it follows that (V~) is the collection of all possible log-mat systems. Thus, all processes occur in each log-mat system, according to the rules of the system. Hence, it would be valid to say that 'all actions are performed by Nature only'. (It is remarkable that this last assertion appears to agree with the viewpoint of the majority of scientists today.) Also, clearly, in our formulation, neither V nor v 'intentionally directs' the way mathematics develops in any log-mat system. Hence, in this sense, it would be proper to say that the self does nothing.

7.7 We close this paper with a discussion of 'The Cosmic Tree' appearing in BG15. 1-3:

The Supreme Personality of Godhead said: It is said that there is an imperishable banyan tree that has its roots upwards and its branches down and whose leaves are the Vedic hymns. One who knows this tree is the knower of the Vedas.

The branches of this tree extend downward and upward, nourished by the three modes of material nature. The twigs are the objects of the senses. This tree also has roots going down, and these are bound to the fruitive actions of the human society.

The real form of this tree cannot be perceived in this world. No one can understand where it ends, where it begins and where its foundation is....

(Incidentally, an 'ashwattha' tree is a tree that is changing constantly; literally, it means a tree that can not endure (in its present state) till tomorrow. Often, the word 'ashwattha' is translated as 'banyan'.) Consider our universe (say, U) that, of course, is inside N. Now, by our experience, we know that U is endowed with the notion of 'time'; we shall not go here into the mathematical reasoning that would lead to the existence of a notion of 'time' within a given universe. Thus, it is proper to say that 'U develops with time'. But, U is a log-mat system. Thus, U has an exact analogy with a computer program. However, from the angle of combinatorial mathematics, it is well known that a computer program resembles a 'tree'; the word 'tree' here is used in an exact mathematical sense, but this mathematical meaning has a total resemblance with the ordinary notion of a tree. Thus, we can conclude that U is a 'tree' in the usual sense. Now, because processes go on in Nature incessantly, it would be proper to say that this tree is an ashwattha tree. This tree is in (V~) that, in turn, originates from V (that is termed here as being 'above'). Since processes in N depend upon the log-mat properties of the objects involved, we can call these properties as 'attributes'. Then, it would be proper to say that this tree is 'nourished by attributes'. We can also say that the roots of this tree are 'stretched forth in the world of humans', because V is involved in all animate objects and hence in humans as well. Finally, this tree is 'imperceptible' because of our very limited consciousness.

7.8 CONCLUDING REMARKS

As stated in section 7.1, the above discussion of the Bhagvad Geeta ontology is presented with a limited purpose in mind, namely, to create a base from which the main thesis of this series

of papers (Life comes from life) could be discussed, and also to provide an example for the application of the mathematics developed in earlier sections. However, the above discussion immediately brings up various questions like, for example, 'where' does one 'reach' as W is 'decreased', questions concerning personal and impersonal God, and so on. Examination of such questions requires further mathematical machinery, which is beyond the scope of this series of papers, and shall be taken up elsewhere. Because of the subtlety of this subject matter field, the reader should be cautioned against jumping to conclusions. However to satisfy the curiosity of many readers, it may be stated here that in everything examined thus far, the results obtained from this theory are very close to the statements in the Geeta.

For example, concerning 'personal' and 'impersonal' God, the theory supports the assertions in BG 12. 2-7 of the Geeta, which says that the personal approach is better, since the path of the 'impersonal' is more difficult for the embodied souls.

Similarly, as W becomes empty, E approaches V. But what does this mean? At a superficial level, this seems to say that "E gets closer and closer to having the experience of the 'Void'", which is what "Shoonyavaad" (or, "Void-ism") is supposed to say. However, a closer look reveals that the implication of the above theory is precisely contrary to this, because in our set up the phrase "E approaches V" corresponds to the statement: "the set of restrictions on the consciousness of E approaches the state of being totally empty", which, in turn, corresponds to the statement "E. approaches the state of 'total and unlimited consciousness'". Thus, informally speaking, our theory is saying: "As W becomes empty, E develops consciousness of ALL OF REALITY", whereas Void-ism is supposed to be saying: "As W becomes empty, E experiences the state of TOTAL EMPTINESS". Since 'All of Reality' is the opposite of 'Total Emptiness', the results of our theory are contrary to what 'Void-ism' is supposed to be.

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THE END

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JSK