just for humans with limited transductive syntaxes, but for all conceivable automata. This implies a diagnostic regress beyond all mere compositional forms of indeterminacy. But this "ultimate indeterminacy" can do no more than replace "omniscience" in the above italicized expression: ultimate indeterminacy is the province of this agency. This amounts to the hypothesis that whatever possesses "free will" can choose the shape and/or evolution of the universe. This statement resembles one which might be made concerning the "Will of God". It can also be seen as affirming the final "randomness" of the universe.

It is proposed that randomness over God. Then one denies the potential to define an automaton (computative agency) in which this randomness is synonymous with systemic volition. This is not justifiable: no reason for such a denial can be derived within our logical syntax. So, in the absence of logical restriction, let us regard "randomness" as just such an "indefiniteness". The "randomness" can either to loosen the definition of "volition", or to define a syntax around this randomness that would justify its volitive or cognitively interpretive. That is the issue on which the debate between them and atheism finally rests.

Fortunately, this issue is resolvable. Consider what we mean when we say "mind". The mind is that which computes in the widest possible sense relative to an individual entity. It is purposive in the sense that it responds to the needs and desires of that localistic entity. It thus possesses an algorithmic structure. In alliance with a material brain, it takes the form of an algorithm running in a concrete device. By \( \Gamma \)-extension, it may be "hyper-deterministic" relative to the device, controlling or modifying it through mechanisms not intrinsic to the device itself.

Being algorithmic, the mind can be described as a hierarchy of conspiratorial roles. Conversely, in the absence of Cartesian distinguish mind from algorithm, any computative control hierarchy can be characterized as mental. \( \Gamma \) is such a hierarchy. So \( \Gamma \) is mental, and may be defined as (part of) the "Mind of God". You may regard this definition as that of personal honesty; it is unsurprising that many of us are less than perfectly honest in our mathematical reasoning. In this, it is possible to know whether the limits on human induction double as limits on their personal honesty; it is unsurprising that many of us are less than perfectly honest when the point arrives at which holding the line against them cannot be done without sacrificing our ability to explain actual phenomena like correlations of quantum polarization, it is time to stop learning against the doors of perception. If a fraud or two slip through, we can at least ensure that "undecidable" phenomena remain within the light of logical analysis, and thus in the hands of responsible interpreters.

As members are aware, we have been led into quantum theory by way of a study in "scientific demonology": the logical analysis of hypothetical creatures able to manifest paranormal and nonlocal effects within the physical world. The field of demonology has a long, if less than distinguished, history. This is not surprising: in Noesis 46, we constructed a headhunter/explorer analogy to show that the formulation of inexplicable phenomena often begins on a metaphysical level, particularly among primitive and prescientific observers (natural phenomena, such as comets, eclipses, plagues, droughts, and crop failures, have often served in place of strange visitors). While the demon concept may have a phenomenal aspect - given its basis in the computative limitations of its adherents - it has been colorfully embellished by virtually all of the various cultures in which it has arisen. Some of these embellishments are well documented, including those in the western Judeo-Christian tradition.

Among western demonologists, it was once fashionable - indeed, \textit{de rigueur} - to name and rank demons in hellish hierarchies defining a kind of supernatural "pecking order". This, presumably, was to allow sorcerers and magicians to call on the demons appropriate...
Noesis 48

Let us simplify Russell's paradox by considering the set of all sets, especially the set of all non-self-members. This is a mathematical object, but it can be apprehended only as a temporal process: as soon as Russell's set becomes self-inclusive by some appropriate convolutive mechanism, we must reiterate the autology. Thus, the notion that Cantor's proof relied on the "completion" of nonterminating decimals and the process of counting or listing them. By this very reasoning, we can consider the omniscience process to be completed as an act of construction.

In keeping with this long tradition, Ron Hoeflin proposes that demonic conflict be subjected to logical analysis in the CTMU context. The apposite portion of the first of Mr. Hoeflin's two letters reads as follows: "I do have one new argument that I'd like to pose. No doubt this scenario has already been covered in principle by your theories, but I believe my previous ones are covered. But just for the sake of argument, suppose that there are two or more demons who each appear to be able to predict my choices infallibly. What would happen if we add a third demon to the mix? Would they each be able to infallibly predict the other's choices, or is it possible for one of them to be a higher, more infallible demon than the other? It seems to me there may be a paradox here, but it is difficult for me to formulate it any better than by the foregoing question." 

In fact, there are at least two paradoxes here. One arises from the supposition that two predictor-controller demons can infallibly predict each other's (purely independent) choices without being in collusion. The other is that if one demon D has offered the second demon D', a Newcomb wager, or that each has offered the other a separate wager, the supposition in question generates a metagame scenario like that described in Noesis 45. This forces collectivization of utility, implying formation of mutual deterministic behavioral programming.
part of Grim's argument.

Notice also the similarity of the relationship between completeness and consistency, as implicitly derived by Cantor, to that later derived explicitly by the Austrian logician Karl Godel. The logicians described methods for constructing the logical negation of a system. But whereas Cantor used this negation merely to distinguish kinds of sets, Godel went on to describe a method whereby to project this negation in a stronger system. This method, called arithmetization or Godelization, is remarkably evocative of the coded relationship between the programmatic and output levels of automated computational systems. And, as we now recall, this simplicity has been used to model both the observational and theoretical aspects of science in terms of an ultimate computational system called the CTMU.

In the context of Cantorian transfinite arithmetic, note the interplay between "individuality" and "cardinality". These two ways of looking at integers reflect a numeric duality by which every positive integer is both a temporal or sequential marker in a linear "ordertype" and an autonomous predicate describing a class of sets by their number of elements. In the latter case, the number may be considered a descriptive "space" in which only certain sets are included. This spatiotemporal duality is a logical property of the numerical concept. Cantor relied implicitly on this duality when he translated "unbounded process", a compact expression of ordinal infinity, into its dual concept, the infinite cardinality of the transcendently "completed set" generated by the infinite sequence between processes are thus mapped to correspondences between sets. Cantor's proof that no set can contain a complete enumeration of all subsets of a set bears on procedural as well as arithmetical distinctions; the standard inequality corresponds to a difference between the denumerative and nondenumerative ordertypes (although not as usual cited; the standard denial of "one-to-one correspondence" is the denumerable in terms of a set of relative assumptions). Godel used this duality when he applied his proof, which superficially deals with "arithmetical predicates" of cardinal numbers, to any system which evolves according to the principle of transfinite induction. The successive states of such a system can be given ordinal labels corresponding to their moments in time; they are "predicates" of the "cardinal" steps at which they occur.

Where we consider arrays of facts instead of numbers, these facts being syntactically formulated in some kind of linguistic format, "completeness" is equivalent to an exhaustive tabulation of facts. This approximates Godel's conception of an "automatic" system; because of the compressive nature of theorization, diagonalization can be effectuated by statements about "indemonstrability" in the opposite format. Godel created a "fact" not implicit in the initial "array" and projected it into the array itself, implying that the assumption of completeness is inconsistent with the diagonalist prerogative. Observe, however, that the Cantorian tableau, which does not allow for any syntax more sophisticated than that which can be mapped on to the denumerable, is insufficient to Godel's argument. This implies that Grol is trying to prove Godel's theorem by extending the Cantorian tableau with Russell's paradox. One possible use of the paradox is to consider only syntactically correct and meaningful formulations, rather than indiscriminate strings of words or symbols analogous to Cantor's "binary decimals" (this is not an oxymoron, but refers to the decimal point initiating the binary string).

Their purposes thus fused, both emerge victorious - provided that the subjective utility of each rationally self-interested demon is served by that which the other is offering. Of course, if one or both of the demons is destructive or insincere, the game-theoretic scenario becomes degenerate.

It may happen that one demon is dominant. Dominance implies containment of the spatiotemporal range of control of the weaker demon. And if the lesser's algorithm can be simulated and dominated by that of the greater, while power and accessibility can be defined within strict, transfinite ordinal infinity, into its dual concept, the infinite cardinality. Their purposes thus fused, both emerge victorious - provided that the subjective utility of each rationally self-interested demon is served by that which the other is offering. Of course, if one or both of the demons is destructive or insincere, the game-theoretic scenario becomes degenerate.
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Simon's claims to refute Grims' thesis, and thus redeem the concept of definiteness by invalidating the two-stage model of Grims' argument. The first stage, which we are to refuting from Cantor's proof infers that there is no set of all truths, is answered with the liar's paradox. The second stage, which involves the assertion that Russell's paradox is unresolved, is deemed unassailably true. Russell's paradox concerns the set of all sets which do not include themselves as elements: does this set include itself, or not? If it does, then it doesn't; and if it doesn't, then it must. The resolution of this paradox was undertaken by Russell and Whitehead in their monumental encyclopedic of logicism, Principia Mathematica (to be distinguished from Isaac Newton's Tome of the same name). This intended reduction of mathematics to logic treated Russell's paradox the only way we can fathom it, is a reasonable (syntactic) negation. When Gödel effectively demonstrated this in the context of the theory of types, it is considered a fixed point in the history of the development of type theory. It was discovered with a monopoly on the meaning of Gödel's theorems, but was chosen precisely for its generality (as well as its direct applicability to certain questions of current notoriety, e.g., whether there exist universal patterns or fixed points in the game of life) - Russell became discouraged. This, after all, was poetic justice. Russell himself had used his own paradox to destroy the masterwork of Frege, his predecessor as claimant to the title of "champion", on the eve of publication of its second volume, and "Gödel's paradox" could not have made him feel any worse than Russell's paradox had made Frege feel!

Russell was discouraged in part by the work of the Austrian logician Kurt Gödel, who showed that any attempt to formulate a complete method of paradox resolution invites inconsistency, or further paradoxes. Yet, it can be shown that Gödel's method, which resembles the diagonal method by which Cantor proved the theorem mentioned above, leads to a reduction essentially identical to that postulated by type theory. That is, the typic reduction of logical functions corresponds to the inferential and truthwise regression of theorems, which themselves consist of functions of functions of functions, and so on. So Gödel's theorem amounts to a mere reformulation of the antinomies that type theory was designed to avoid, and an extended version of type theory can thus be applied to its supposed nemesis.

Therefore, logicism and intuitionism are complementary, though often characterized as antithetical, both of them along with their joint complement, intuitionism - are parts of the same unified program for understanding the nature and objectives of cognition. They are but different perspectives on the single comprehensive model we have been exploring. On the other hand, those lack a monopoly on the meaning of Gödel's theorems, and thus do not be neatly resolvable by a little common sense.

Conclusively, Cantor's theorem ($\aleph_0 < \aleph_1$) can be cast as a resolution of certain notorious paradoxes (e.g., those of Zeno) involving the unbounded process of counting - a subject which must be somewhere in the "completed" list. "Diagonalize" it by applying logical negation to each of its digits, changing each digit (1 or 0) into its complement (0 or 1). The number so-formed (0.1000... or 1.01100...) will differ in at least one digit (the digit at its intersection with the main diagonal), and is thus not in the list. But this contradicts the assumption that the list is complete. In other words, the assumption of completeness leads to inconsistency by way of logical negation on a global argument (in this case, the main diagonal of the array).

Cantor, who invented this proof, took it to mean that the denumerable (countable) infinity describing the size of the array is a lower kind of infinity than the indenumerable "continuum", which describes the unit line segment of the array. The procedural nature of the resolution should be noted, for it bears strongly on the other
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Simmons claims to refute Grim's thesis, and thus redeem the concept of inconsistency by invalidating the two main moves of Grim's argument. The first stage, which from Cantor's proof infers that there is no set of all truths, is answered with the liar's paradox. The second stage, which involves the assertion that Russell's paradox is unresolvable, is deemed unresolved as Russell's paradox concerns the set of all sets which do not include themselves as elements: does this set include itself, or not? If it does, then it doesn't; and if it doesn't, then it must. The resolution of this paradox was undertaken by Russell and Whitehead in their monumental encryption of logicism, *Principia Mathematica* (to be distinguished from Isaac Newton's tome of the same name). This intended reduction of mathematics to logic trnated Russell's claim to the supremacy of the human (propositional) logical syntax and establish its freedom from paradox. He was the champion of human reason, a quixotic white knight who vowed to bring all of reality under the dominion of intellects. Unfortunately, it becomes more than a nuisance; it is a necessary characteristic of any system expressively powerful enough to formulate its own global (syntactic) negation. When Gödel effectively demonstrated this in the context of arithmetic - a context, we should add, that in no way resembles the context of Cantor's theory of the alephs, known as the theory of types. One effect of this theory on the paradoxa is to limit the universal quantifier "all", which can let a function negate itself. Apparently, Grim has opposed himself to the Titanic Russell by denying the validity of type theory... an opposition in which he may have been encouraged by Russell's own eventual part in the negative consensus on its efficacy.

Russell was motivated by the imperative for absolute certainty and total consistency in mathematics. He was driven to prove the ultimacy of the human (propositional) logical syntax and establish its freedom from paradox. He was the champion of human reason, a quixotic white knight who vowed to bring all of reality under the dominion of intellects. Unfortunately, it becomes more than a nuisance; it is a necessary characteristic of any system expressively powerful enough to formulate its own global (syntactic) negation. When Gödel effectively demonstrated this in the context of arithmetic - a context, we should add, that in no way resembles the context of Cantor's theory of the alephs, known as the theory of types. One effect of this theory on the paradoxa is to limit the universal quantifier "all", which can let a function negate itself. Apparently, Grim has opposed himself to the Titanic Russell by denying the validity of type theory... an opposition in which he may have been encouraged by Russell's own eventual part in the negative consensus on its efficacy.

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Notice also the similarity of the relationship between completeness and consistency, as implicitly derived by Cantor, to that later derived explicitly by the Austrian logician, Kurt Gödel. Other logicians, including the Russian logician, A. N. Kolmogorov, have described methods for constructing the logical negation of a system. But whereas Cantor used this negation merely to distinguish various kinds of sets, Gödel went on to describe a method whereby to project this negation in the framework of axiomatic systems. This method, called arithmetization or Gödelization, is remarkably evocative of the coded relationship between the programmatic and output levels of automated computational systems. And, as we now recall, this similarity has been used to model the observational and theoretical aspects of science in terms of an ultimate computational system called the CTMU.

In the context of Cantorian transfinite arithmetic, note the interplay between "indeterminacy" and "cardinality". These two ways of looking at integers reflect a numeric duality by which every positive integer is both a temporal or sequential marker in a linear "ordertype" and an autonomous predicate describing a class of sets by their number of elements. In the latter case, the number may be considered a descriptive "space" in which only certain sets are included. This spatiotemporal duality is a logical property of the usual set concept. Cantor relied implicitly on this duality when he translated "unbounded process", a compact expression of ordinal infinity, into its dual concept, the infinite cardinality of the transcendentally "completed set" generated by the infinite process. The two ways of looking at integers reflect a numeric duality by which every positive integer is both a temporal or sequential marker in a linear "ordertype" and an autonomous predicate describing a class of sets by their number of elements. In the latter case, the number may be considered a descriptive "space" in which only certain sets are included. This spatiotemporal duality is a logical property of the usual set concept. Cantor relied implicitly on this duality when he translated "unbounded process", a compact expression of ordinal infinity, into its dual concept, the infinite cardinality of the transcendentally "completed set" generated by the infinite process.

Between processes are thus mapped to correspondences between sets. Cantor's proof that n+1 is greater than n bears on procedural as well as arithmetical distinctions; the standard inequality corresponds to a difference between the denumerative and nonenumerative ordertypes (although not as usually cited; the standard denial of "one-to-one correspondence" is usually stated in terms of a set of relative assumptions). Gödel used this duality when he applied his proof, which superficially deals with "arithmetical predicates" of cardinal numbers, to any system which evolves according to the principle of transfinite induction. The successive states of such a system can be given ordinal labels corresponding to their moments in time; they are "predicates" of the "ordertypes" of the "numbers" at which they occur.

Where we consider arrays of facts instead of numbers, these facts being syntactically formulated in some kind of linguistic format, "completeness" is equivalent to an exhaustive tabulation of facts. This approximates Gödel's conception of an axiomatic system, because of the compressive nature of theorization, diagonalization can be effected by statements about "indemonstrability" in the opposite format. Gödel created a "fact" not implicit in the initial "array" and projected it into the array itself, implying that the assumption of completeness is inconsistent with the diagonalistic prerogative. Observe, however, that the Cantorian tableau, which does not allow for any syntax more sophisticated than that used to count from one to denumerable infinity, is insufficient to Gödel's argument. This implies that Grimm is trying to prove Gödel's theorem by extending the Cantorian tableau with Russell's paradox. One possible use of the paradox is to consider only correct and meaningful formulations, rather than indiscriminate strings of words or symbols analogous to Cantor's "binary decimals" (this is not an oxymoron, but refers to the decimal point initiating the binary string).
Noesis 48

Let us simplify Russell's paradox by considering the set of all sets, regardless of the non-self-inclusive status of mathematical objects, but can be apprehended only as a temporal process: as soon as Russell's set becomes self-inclusive by some appropriate convolutive mechanism, we must reiterate the autology. Thus, as Peterson Field Guides describe, Demonologie, by King David, et al., later to become James I of England - was published in support of witch hunting, and became a best seller of its day.

The bibliography of a demonic handicapper might easily contain titles such as the ancient Hebrew Testament of the Twelve Patriarchs, The War of the Sons of Light and the Sons of Darkness (one of the Dead Sea Scrolls), the Testament of Solomon (from the early Christian era), a long list of magical texts with titles like Ars Magica, Grimorium Verum, Lesegaton, and Grand Grimoire, and even Paradise Lost. A typical hierarchy might go something like: "Lucifer, Satan, Beelzebub, Astaroth, Beherith, AsMODEUS, BeLIAL..." Each demon had his own cornermen, and the pecking order could to some extent change by author. The demons themselves were also subject to evolution: e.g., the first three just listed have come to be regarded as one predominant evil entity. And Astaroth, a male demon, seems to have evolved from Ashartt, identified with  Ishtar as a Middle Eastern mother goddess, by way of Astarte, once identified with the Greek love goddess Aphrodite.

In keeping with this long tradition, Ron Hoeeflin proposes that demonic conflict be subjected to logical analysis in the CTMU context. We would doubt this at least in part, for rationally, it is possible that the matter of who can take whom, but - more importantly - it will weigh on the question of omniscience, which relates to r in a way similar to that of omnipotence. As we might therefore expect, criticisms based on omniscience fare no better against the CTMU ultimate depiction of reality.

The opposite portion of the first of Mr Hoeeflin’s two letters reads as follows. "I do have one new argument that I’d like to pose. No doubt this scenario has already been covered in principle by your theory, if you believe my previous arguments are covered. But just for the sake of argument, suppose that there are two or more demons who each appear to be able to predict my choices infallibly. What would happen if I ask two of these demons to play one another? Would they each be able to infallibly predict the other’s choices, or is it possible for one of them to be a higher, more infallible demon than the other? It seems to me there may be a paradox here, but it is difficult for me to formulate it any better than by the foregoing question."

In fact, there are at least two paradoxes here. One arises from the supposition that two predictor-controller demons can infallibly predict each other’s (purely independent) choices without being in collusion. This is impossible, as the first demon D, has offered the second demon D, a Newcomb wager, or that each has offered the other a separate wager, the supposition in question generates a metagame scenario like that described in Noesis 45. This forces collectivization of utility, implying formation of mutual deterministic behavioral programming.

page 2
just for humans with limited transductive syntaxes, but for all conceivable automata. This implies a diagnostic regress beyond all conceivable compositions of $\Gamma$, terminating at an ultimate form of indeterminacy. But all this "ultimate indeterminacy" can do is replace "omniscience" in the above italicized expression: ultimate indeterminacy is the province of this agency. This amounts to the hypothesis that any properties free from means to cognitive interpretation. This is the issue on which the debate has focused. If one chooses randomness over God. Then one denies the potential to define an automaton (computative agency) in which this randomness is synonymous with systemic volition. This is not justifiable; no reason for such a denial can be derived within our localistic algebra. So, in the absence of logical restriction, let us restrict the "omniscience" as just such an "aura" which must remain either to loosen the definition of "volition", or to define a syntax around this randomness that would justify its volitive or cognitive interpretation. This is the issue on which the debate between them and atheism finally rests.

Fortunately, this issue is resolvable. Consider what we mean when we say "mind". The mind is that which computes in the widest possible sense relative to an individual entity. It is purposive in the sense that it responds to the needs and desires of that localistic entity. It thus possesses an algorithmic structure. In alliance with a material brain, it takes the form of an algorithm running in a device. By $\Gamma$-extension, it may be "hyper-deterministic" relative to the device, controlling or modifying it through mechanisms not intrinsic to the device itself.

This Mind, of which $\Gamma$ is such a hierarchy. So $\Gamma$ is mental, and may be defined as (part of) the "Mind of God". You may regard this definition as that which is purposed rather than proxemistic. This Mind, of which $\Gamma$ is the humbly-describable part, is somewhat like the minds existing within it: either it has free will, or it does not. If it does not, then its own evolution inhereas entirely in $\Gamma$; $\Gamma$ is purely (inferrationally) conscious. It is the "omniscient". If it does, then it is even more powerful: it has the power of self-modification, and can creatively redirect itself according to $\Gamma$-nonrecursive functions with extraneous or random parameters. This, in fact, is a condition for the "free will" of human beings; without it, psychological causation regresses to deterministic closure. So those who attack theism with arguments against omniscience engage in a rather counterproductive pastime.

That living beings, and their "minds", are merely fragmental in the Mind defined above. Such beings may, in their hubris, attempt to cast this Mind in a form as close as possible to themselves; from this, they typically derive much comfort and self-esteem. But a little reflection reveals the fallacy of placing, locally-derived restrictions on global reality, a practice whose devotees resemble the tail that wags the dog...or the nice who demand that the elephant in whose shadow they play stand on a mousey-scale to prove that he meets the minimum weight requirement for heavy lifting. This is this very kind of absurdity that has enabled so many of us to deny, under cover of "logic", the wherewithal of our collective existence.

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Ron Hoeflin has forwarded an inquiry from one member about dues, and informed me in his own accompanying letter about an upcoming article by George Dicks concerning Newcomb's paradox. This piece will appear in the next issue. To whatever extent it bears on previous contributions, I will add commentary. I am assisted by those trained to guard the "purity" of science that no insight ever be pursued beyond the barrier that separates science from the paranormal. This insistence implies the untenable assumption that ultimate models of reality can be conceived in a way that can be formalized in a syntax, which presumes the ultimacy of the accepting syntax common to individual human beings. This, as we have seen, is the epistemological equivalent of the ancient doctrine which held that because men inhabit the earth, the earth must be the absolute center of the universe. This prehistoric viewpoint directly opposes the objectivity it is supposed to promote, rendering the intellects of its partisans highly suspect.

Yet, many of these partisans show every sign of being quite rational in their understanding of narrower concerns. This anomaly implies the involvement of emotions like fear and dislike, especially of those who exploit human gullibility on pretexts they know to be false, to name and rank demons in hellish hierarchies defin-

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