

GÖDEL,

ESCHER,

BACH:

an Eternal Golden Braid

Douglas R. Hofstadter



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Preface to the Twentieth-anniversary Edition
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. . . *Ant Fugue*

. . . then, one by one, the four voices of the fugue chime in.)

Achilles: I know the rest of you won't believe this, but the answer to the question is staring us all in the face, hidden in the picture. It is simply one word—but what an important one: "MU"!

CCrab: I know the rest of you won't believe this, but the answer to the question is staring us all in the face, hidden in the picture. It is simply one word—but what an important one: "HOLISM"!

Achilles: Now hold on a minute. You must be seeing things. It's plain as day that the message of this picture is "MU", not "HOLISM"!

Crab: I beg your pardon, but my eyesight is extremely good. Please look again, and then tell me if the the picture doesn't say what I said it says!

Anteater: I know the rest of you won't believe this, but the answer to the question is staring us all in the face, hidden in the picture. It is simply one word—but what an important one: "REDUCTIONISM"!

Crab: Now hold on a minute. You must be seeing things. It's plain as day that the message of this picture is "HOLISM", not "REDUCTIONISM"!

Achilles: Another deluded one! Not "HOLISM", not "REDUCTIONISM", but "MU" is the message of this picture, and that much is certain.

Anteater: I beg your pardon, but my eyesight is extremely clear. Please look again, and then see if the picture doesn't say what I said it says.

Achilles: Don't you see that the picture is composed of two pieces, and that each of them is a single letter?

Crab: You are right about the two pieces, but you are wrong in your identification of what they are. The piece on the left is entirely composed of three copies of one word: "HOLISM"; and the piece on the right is composed of many copies, in smaller letters, of the same word. Why the letters are of different sizes in the two parts, I don't know, but I know what I see, and what I see is "HOLISM", plain as day. How you see anything else is beyond me.

Anteater: You are right about the two pieces, but you are wrong in your identification of what they are. The piece on the left is entirely composed of many copies of one word: "REDUCTIONISM"; and the piece on the right is composed of one single copy, in larger letters, of the same word. Why the letters are of different sizes in the two parts, I don't know, but I know what I see, and what I see is "REDUCTIONISM", plain as day. How you see anything else is beyond me.

Achilles: I know what is going on here. Each of you has seen letters which compose, or are composed of, other letters. In the left-hand piece,

FIGURE 60. [Drawing by the author.]

there are indeed three “HOLISM”s, but each one of them is composed out of smaller copies of the word “REDUCTIONISM”. And in complementary fashion, in the right-hand piece, there is indeed one “REDUCTIONISM”, but it is composed out of smaller copies of the word “HOLISM”. Now this is all fine and good, but in your silly squabble, the two of you have actually missed the forest for the trees. You see, what good is it to argue about whether “HOLISM” or “REDUCTIONISM” is right, when the proper way to understand the matter is to transcend the question, by answering “MU”?

Crab: I now see the picture as you have described it, Achilles, but I have no idea of what you mean by the strange expression “transcending the question”.

Anteater: I now see the picture as you have described it, Achilles, but I have no idea of what you mean by the strange expression “MU”.

Achilles: I will be glad to indulge both of you, if you will first oblige me, by telling me the meaning of these strange expressions, “HOLISM” and “REDUCTIONISM”.

Crab: HOLISM is the most natural thing in the world to grasp. It’s simply the belief that “the whole is greater than the sum of its parts”. No one in his right mind could reject holism.

Anteater: REDUCTIONISM is the most natural thing in the world to grasp. It’s simply the belief that “a whole can be understood completely if you understand its parts, and the nature of their ‘sum’”. No one in her left brain could reject reductionism.

Crab: I reject reductionism. I challenge you to tell me, for instance, how to understand a brain reductionistically. Any reductionistic explanation of a brain will inevitably fall far short of explaining where the consciousness experienced by a brain arises from.

Anteater: I reject holism. I challenge you to tell me, for instance, how a holistic description of an ant colony sheds any more light on it than is shed by a description of the ants inside it, and their roles, and their interrelationships. Any holistic explanation of an ant colony will inevitably fall far short of explaining where the consciousness experienced by an ant colony arises from.

Achilles: Oh, no! The last thing which I wanted to do was to provoke another argument. Anyway, now that I understand the controversy, I believe that my explanation of “MU” will help greatly. You see, “MU” is an ancient Zen answer which, when given to a question, UNASKS the question. Here, the question seems to be, “Should the world be understood via holism, or via reductionism?” And the answer of “MU” here rejects the premises of the question, which are that one or the other must be chosen. By unasking the question, it reveals a wider truth: that there is a larger context into which both holistic and reductionistic explanations fit.

Anteater: Absurd! Your “MU” is as silly as a cow’s moo. I’ll have none of this Zen wishy-washiness.

Crab: Ridiculous! Your “MU” is as silly as a kitten’s mew. I’ll have none of this Zen washy-wishiness.

Achilles: Oh, dear! We’re getting nowhere fast. Why have you stayed so strangely silent, Mr. Tortoise? It makes me very uneasy. Surely you must somehow be capable of helping straighten out this mess?

Tortoise: I know the rest of you won’t believe this, but the answer to the question is staring us all in the face, hidden in the picture. It is simply one word—but what an important one: “MU”!

(Just as he says this, the fourth voice in the fugue being played enters, exactly one octave below the first entry.)

Achilles: Oh, Mr. T, for once you have let me down. I was sure that you, who always see the most deeply into things, would be able to resolve this dilemma—but apparently, you have seen no further than I myself saw. Oh, well, I guess I should feel pleased to have seen as far as Mr. Tortoise, for once.

Tortoise: I beg your pardon, but my eyesight is extremely fine. Please look again, and then tell me if the picture doesn’t say what I said it says.

Achilles: But of course it does! You have merely repeated my own original observation.

Tortoise: Perhaps “MU” exists in this picture on a deeper level than you imagine, Achilles—an octave lower (figuratively speaking). But for now I doubt that we can settle the dispute in the abstract. I would like to see both the holistic and reductionistic points of view laid out more explicitly; then there may be more of a basis for a decision. I would very much like to hear a reductionistic description of an ant colony, for instance.

Crab: Perhaps Dr. Anteater will tell you something of his experiences in that regard. After all, he is by profession something of an expert on that subject.

Tortoise: I am sure that we have much to learn from you, Dr. Anteater. Could you tell us more about ant colonies, from a reductionistic point of view?

Anteater: Gladly. As Mr. Crab mentioned to you, my profession has led me quite a long way into the understanding of ant colonies.

Achilles: I can imagine! The profession of anteater would seem to be synonymous with being an expert on ant colonies!

Anteater: I beg your pardon. “Anteater” is not my profession; it is my species. By profession, I am a colony surgeon. I specialize in correcting nervous disorders of the colony by the technique of surgical removal.

Achilles: Oh, I see. But what do you mean by “nervous disorders” of an ant colony?

Anteater: Most of my clients suffer from some sort of speech impairment. You know, colonies which have to grope for words in everyday situations. It can be quite tragic. I attempt to remedy the situation by, uhh—removing—the defective part of the colony. These operations

This is part 1 of a mini-series where we're aiming to go through the main themes of the "Gödel Escher Bach: An Eternal Golden Braid" by Douglas Hofstadter. The first part will concentrate on the main topic of the book and how it relates to Gödel's Incompleteness Theorem, as well as giving an insight into the relation to Escher's pictures and Bach's musical offerings. Published in 1979 what professor Hofstadter is trying to answer in his book is one primary question: how animate beings can come out of inanimate matter. In his show The eternal golden braid: Gödel Escher Bach at the Barbican in London Marcus Du Sautoy performed just such a test, using the audience as judges. The show is part of an on-going project called Strange loops which celebrates the 40th anniversary of the intellectual cult classic Gödel, Escher, Bach. The blurb of the show promised a computerised exploration of the music of Johann Sebastian Bach.