There are many problems and possibilities relevant to the new paradigm, especially in regard to the relation between formal systems and natural language, that must be investigated. I have already touched on some of them, but, since Hofstadter's ideas concerning meaning are obviously interlocked with his ideas concerning formal systems and natural language, those latter ideas should be addressed first, to preserve continuity, before I turn to the ideas of others.

The primary question with which Hofstadter is concerned is this: 'Do words and thoughts follow formal rules, or do they not?' His articulation of an answer entails lengthy preliminary considerations of the Epimenides paradox (it was Epimenides, a Cretan, who said, 'All Cretans are liars' – which rhetorical situation, as intriguing to Derrida as to Hofstadter, is characterized, like M. C. Escher's Print Gallery, by 'a one-step Strange Loop'), Gödel's critique of Whitehead and Russell's Principia Mathematica (which includes his famous Incompleteness Theorem, variously paraphrased but basically stating that 'All consistent axiomatic formulations of number theory include undecidable propositions', blind spots), and other paradoxes and problems of self-referentiality. He also considers the snarls in the interrelations of a metalanguage and its object language, Turing's discovery of 'the existence of ineluctable "holes" in even the most powerful computer imaginable' (which discovery, of the so-called halting problem, correlates necessarily with Gödel's Theorem), and 'the seemingly unbreachable gulf between the formal and the informal, the animate and the inanimate, the flexible and the inflexible' with which AI researchers must deal as they 'put together long sets of rules in strict formalisms which tell inflexible machines how to be flexible'.

By way of these considerations Hofstadter is confronted early on with another, larger question: 'Can all of reality be turned into
a formal system?' It is a question that echoes the concerns of Hjelmslev and the Linguistic Circle of Copenhagen and other formalists in their desire to define a system for describing any given phenomenon in terms of a finite number of premises and to construct a calculus by which those premises are combined, and to it Hofstadter replies that

In a very broad sense, the answer might appear to be yes. One could suggest, for instance, that reality is itself nothing but one very complicated formal system. Its symbols do not move around on paper, but rather in a three-dimensional vacuum (space); they are the elementary particles of which everything is composed. (Tacit assumption: that there is an end to the descending chain of matter, so that the expression 'elementary particles' makes sense.) The 'typographical rules' are the laws of physics, which tell how, given the positions and velocities of all particles at a given instant, to modify them, resulting in a new set of positions and velocities belonging to the 'next' instant. So the theorems of this grand formal system are the possible configurations of particles at different times in the history of the universe. The sole axiom is (or perhaps, was) the original configuration of all the particles at the 'beginning of time.' This is so grandiose a conception, however, that it has only the most theoretical interest; and besides, quantum mechanics (and other parts of physics) casts at least some doubt on even the theoretical worth of this idea. Basically, we are asking if the universe operates deterministically, which is an open question.²

His answer reveals both positivist interest in formal systems and poststructuralist misgivings about their ultimate validity. Its implications are difficult to array; perhaps the important point is that its possible bearing on his previous conclusions and on others that follow must not be forgotten.

At any rate, the question to which Hofstadter gives most of his attention is the more modest one of 'whether it is theoretically possible to attain the level of our thinking abilities, by using some formal system'. He is attracted especially to the property of recursivity (recursion is the process whereby complex elements of a system are derived from simpler ones in a rule-bound fashion) as suggesting a tentative answer. He discusses the power of