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COG 356 GEB Reading Assignment: Introduction + Three-Part Invention

Abstract: This is the first reading assignment from Douglas Hofstadter's "Godel, Escher, Bach" book. It is intended to provide an introduction to Hofstadter's writing style, and to set the stage for subsequent assignments associated with the book.

Ten Salient Ideas from "Introduction: A Musico-Logical Offering"

1. Bach was renowned for his extemporization, or improvisation, while playing the piano, some thought that his playing was merely "turgid and confused."
2. Bach wrote an overly formal letter, with a musical offering to King Frederick the Great, or Prussia.
3. Bach is cited as turning a chromatic fugue subject into a fugue of four parts, then a fugue of eight parts, on the spot.
4. A canon, in the musical sense, is when a single theme is played against itself. There are many variations of this that exist, where the theme might be played slower, faster, staggered in pitch, inverted, or even backwards.
5. Encapsulated in Bach's musical offering to the king of Prussia is a strange loop, wherein the key in which it is written changes almost perceptibly several times, until arriving back at the same key, only an octave higher.

6. This same concept of loops can be witnessed in the domain of art, where M. C. Escher brings to life many puzzling pictures, whose countably finite structures appear to bring forth infinity.
7. Goedel managed to demonstrate, through enumerating mathematical proofs already in existence, that no formal system will ever be capable of representing the natural numbers. This event demoralized many mathematicians of the time who had thought they were on the verge of developing a complete model of mathematics.
8. It was once thought that Euclid had laid down the complete foundation for geometry, a thought which was shattered by the appropriately named discovery of non-euclidean geometry.
9. Russel's paradox states that while all sets must either contain themselves or not contain themselves, there exists a set R which contains all sets which do not contain themselves. Interestingly, when probing R to determine if it does or does not contain itself, a paradox is stumbled upon.
10. A problem seems to arise when attempting to mechanically model intelligent behavior: intelligence requires a large degree of flexibility, but machines are characteristically inflexible.

A reaction to Three-Part Invention

This dialogue offers a paradox, conceived by the philosopher Zeno. In it, Achilles cannot pass the tortoise he is racing (who had a head start), since no matter how close he comes to the tortoise, he can always get closer, which can be repeated an infinite amount of times, and so Achilles will only come slightly closer to passing the tortoise for infinity. I think that this paradox is interesting because it is hard to find fault with the argument intuitively, even though it runs counter to what would obviously happen in the real world. I expect the resolution to this paradox deals with the fact that while the amount of space to cross can be infinitely precise, the amount of time that passes can be infinitely precise as well, and so a convergent sequence can be made. I'm not entirely sure what the dialogue adds; from my point of view the discussion about the flag seemed to be mostly fluff in the scope of the paradox presented.