

MATH 195: Gödel, Escher, and Bach (Spring 2001)
Study Questions for Thursday, February 15

Reading: *Little Harmonic Labyrinth* (pp. 103-126) and Figure 26 (p. 129)

Listening: *Little Harmonic Labyrinth*, by J.S. Bach (in Additional Material on web)

Notes: I find this dialog exhausting; it might help to watch for good resting spots along the way. Be sure to mark your place! Once again, Hofstadter creates complex relationships among the events of the story, technical terms and concepts he introduces to help us ascribe meaning to the events, and the structure of the dialog, which helps us to understand the meanings of the technical terms. Once again, I find it easiest to understand/discuss using a Figure that he provides. The most important terms to focus on are recursion, push, and pop.

- SQ1.** As you read, try and keep track of where Achilles and the Tortoise are and which Achilles and Tortoise you're reading about.
- SQ2.** Why is the Ferris wheel Tortoise's favorite ride?
- SQ3.** Does the Tortoise believe in fortune telling? Do you believe as the Tortoise does?
- SQ4.** What is the significance of the title "*Djinn and Tonic*"? What new ideas / terms introduced in "*Djinn and Tonic*" might be relevant to the subsequent chapter of GEB?
- SQ5.** Do inconsistent worlds exist? What is the optical illusion of *Convex and Concave*?
- SQ6.** Is "stuffing a lamp inside the folds of a robe which swirls out of the lamp" possible?
- SQ7.** Why is a wish for a hundred wishes a meta-wish? What types of wishes is the Meta-Genie prohibited from granting without permission from GOD?
- SQ8.** Why did the Meta-Genie need to remove the Meta-Meta-Lamp from her wispy robes "twice as quickly"?
- SQ9.** What fraction of a moment measures the time it took for the Genie to accomplish folding the Meta-Lamp into his robe and uttering "Your wish is granted, Achilles."?
- SQ10.** What Type of word is "Djinn"? Let's see, a Genie is an object, as is, I suppose, a Meta-Genie ... so a Djinn is a countable set of objects ... but wait, we were asked about the Type of the word "Djinn" not about a countable set of objects ... can Russell/*Principia Mathematica* help us?
- SQ11.** Can "GOD" be a word in its own acronym? If not, justify your answer. If so, make up another example and submit it to the discussion board.
- SQ12.** Is a Meta-Meta- ... Genie's concept of GOD relative?

- SQ13.** What happens at the moment when Achilles (which Achilles?) utters “I wish my wish would not be granted”. You see, the Genie transmitted, via his explanation, information which....
- SQ14.** Achilles and the Tortoise are afraid they might run into the dreaded Majotaur while in the labyrinth. You may have heard in Greek mythology about another dreaded creature that lived in a labyrinth. Theseus killed him and got out using Ariadne's thread. Do you remember the creature's name? What's the relationship between the first part of his name and Majotaur? How about the relationship of the first part of his name to the music surrounding them?
- SQ15.** Tortoise talks a lot about the tonic. Of these three melodies, which do you think begin(s) on the tonic? If you've never heard of the concept of the tonic, do what you can with the Tortoise's description of it.
- Twinkle, Twinkle, Little Star
 - Three Blind Mice
 - Star Spangled Banner

Listen to the beginning (at least) of Bach's *Little Harmonic Labyrinth* (in Additional Material). The piece begins on the tonic, the note that sounds like home. For the first bit, the piece sounds pretty conventional, and it seems that the melody will resolve peacefully on the tonic, but the trumpet holds the note longer than expected, and when it finally reaches the tonic,... it isn't the tonic anymore. From that point on, it is next to impossible to figure out what is the tonic, because the local perception of home is constantly changing.

- SQ16.** The piece *Little Harmonic Labyrinth* ends in the same key in which it begins, and the trumpet ends on the same note. But for a long time just before the end, the lowest part sits on a very long low note, NOT the tonic. Play through the end, focusing on the low notes. How does that note make you feel?
- SQ17.** The tonic plays a prominent role throughout this story. Compare the role of the tonic in the labyrinth with its role earlier in the story.
- SQ18.** There is at least one place in the dialog where one of the characters utters two lines in succession. Explain.
- SQ19.** Identify place(s) in the dialog where one of the characters utters two lines in succession.
- SQ20.** Relate the *Little Harmonic Labyrinth* (the piece by Bach) to *Little Harmonic Labyrinth* (the story by Hoffstadter). Did Hoffstadter's piece end up on the tonic? Figure 26 may be helpful. Does the ending leave you feeling a little tense?