CSPB 3702 - Reckwerdt - Cognitive Science

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Started on	Monday, 4 September 2023, 5:54 PM
State	Finished
Completed on	Monday, 4 September 2023, 5:57 PM
Time taken	3 mins 22 secs

Question **1**

Correct

Marked out of 1.00

The “vision problem” as discussed in lecture is impossible to solve because

Select one:

- a. Object in the world are typically moving about.
- b. The only way to solve the vision problem is to have a sense of touch (for feeling objects) in tandem with an eye (for seeing objects)
- c. It is impossible to recover 3D objects from 2D information (of the sort on the retina). ✔
- d. We do not see all frequencies of light (in particular, we do not see light in the infrared and ultraviolet ranges).

Your answer is correct.

Question 2

Correct

Marked out of 1.00

Why do the vision and language problems seem easy to us?

Select one:

- a. Everyone seems to learn how to see and how to speak by a relatively early age, so the problems seem easy, though they prove to be hard to represent in program form.
- b. Vision and language are easy problems for all organisms, and for computers as well.
- c. Vision is easy since just about all animals manage it; language, being a human capability alone, is uniquely hard.
- d. When we make mistakes in vision or language we are corrected by others around us, who effectively “teach” us how to see and speak.

Your answer is correct.

Question 3

Correct

Marked out of 1.00

Which of these facts is not especially relevant to making the conceptual connection between “She shook her piggy bank” and “It made no sound”?

Select one:

- a. Hollow ceramic objects with a few coins inside them make a noise when shaken.
- b. Piggy banks often contain coins (though needn’t always).
- c. Piggy banks are hollow ceramic objects.
- d. Piggy banks are shaped like pigs.

Your answer is correct.

Question **4**

Correct

Marked out of 1.00

“Type 1” problems, as discussed in lecture, are problems for which we don’t know where to start to answer them, or even (sometimes) whether they could be answered. Which of the following is an example of such a problem?

Select one:

- a. How far away is the moon from the earth?
- b. What’s the purpose (if any) of our existence as human beings?
- c. Why is the sky blue?
- d. Given a position of a chess game, and given that it’s our turn to move (say, as White), what move should we make?

Your answer is correct.

Question **5**

Correct

Marked out of 1.00

Suppose we have a “brute-force” technique for checking a 3-digit combination (like “048” or “311”). It would take 1000 guesses (at worst) to go through all the possibilities. Now we add three more digits to our combination, which means that it will take a million guesses to go through all the possibilities. Now we add three more digits, which means it will take a billion guesses. Which of the following expresses the time complexity of this technique, where N is the number of digits in the combination?

Select one:

- a. For an N-digit combination we need 10^N guesses.
- b. For an N-digit combination, we need 100 * N guesses.
- c. For an N-digit combination, we need 10 * N guesses.
- d. For an N-digit combination we need N^10 guesses.

Your answer is correct.

Question **6**

Correct

Marked out of 1.00

According the idea of 'hard problems' form the lectures, when we say of a particular problem, “This is a hard problem”, we might mean all sorts of things. Which of these very likely **isn’t** what we really are saying?

Select one:

- a. No one has ever stated this problem before. ✔
- b. Solving this problem has been proven to be impossible.
- c. We might be able to get an approximate working solution to this problem, but getting a perfect solution is impossible.
- d. I have no idea if this problem is approachable, or even well-defined.

Your answer is correct.

Question **7**

Correct

Marked out of 1.00

1. **Examine following photograph form Wikipedia: https://en.wikipedia.org/wiki/Penrose_triangle#/media/File:LargeTribarGotschuchenAustria.JPG**

What does this photograph suggest about the difficulty of the "vision" problem?

Select one:

- a. Vision is an easier problem for interpreting curved objects than interpreting objects with corners, like the "impossible triangle" in the photo.
- b. Vision is easy because we can always interpret retinal images unambiguously.
- c. We can never get the vision problem "right" so it's not even worth our while to attempt it.
- d. Vision, because it involves all sorts of guesswork and heuristics in interpreting three dimensions from a two-dimensional projection, is capable of being confused or misled by certain images ✔

Your answer is correct.

Question **8**

Correct

Marked out of 1.00

The scale of large numbers is hard to imagine.

Do the calculation to calculate about how long is a million seconds?

- a. about 119 hours
- b. about 53 hours
- c. about 5 days
- d. about ten days ✔
- e. about 3 years
- f. about 30 years

Your answer is correct.

Question **9**

Correct

Marked out of 1.00

The scale of large numbers is hard to imagine.

Do the calculation to calculate about how long is a billion seconds?

- a. about 53 days
- b. about 119 hours
- c. about 3 years
- d. about 30 years ✔
- e. about 53 years
- f. about ten days

Your answer is correct.

Question **10**

Correct

Marked out of 1.00

The scale of large numbers is hard to imagine.

Do the calculation to calculate about how long is a trillion seconds?

- a. About 30,000 years ✔
- b. about 300 years
- c. about 53 days
- d. about ten days
- e. about 30 years
- f. about 53 years
- g. about 119 years

Your answer is correct.

Question **11**

Complete

Marked out of 1.00

Your boss says the cost of a project just went from 53 million dollars to 1.5 billion and says,

"Well, knew this was going to be expensive - it's all big numbers."

Use the calculations from this quiz to give the boss some perspective on understanding the scale of the increase.

In the context of comparing the new cost to the old cost, it can seem misleading because it is roughly 30 times more expensive. When you make a comparison of how many years / days these costs are then they become a lot greater.

If we assume one dollar to be one minute of time, the original cost is around 100 years in time. If we make that same assumption for the new cost, it would be around 2,800 years.

When thinking about costs, the original cost is still pretty significant. But the new cost is beyond our scope of time as people (or very close to it).

Question **12**

Correct

Marked out of 1.00

Look up some videos or animations of people solving the Tower of Hanoi problem (e.g., on YouTube). These examples show an initial puzzle of (say) 6, or perhaps 7 or even 8 disks. Why doesn't anyone show the solution for a tower of 100 disks?

Select one:

- a. It is hard to afford 100 disks for a physical puzzle.
- b. The solution for a small number of disks is inapplicable to larger versions of the problem.
- c. The solution requires about 2^100 steps, and even if each of those steps takes only a microsecond, the resulting video would be impossibly long in human terms. ✔
- d. It is hard to stack up 100 disks for the initial puzzle.

Your answer is correct.

Question **13**

Complete

Marked out of 1.00

Use the very rough calculations we made in the quiz to help explain the answer to the Tower of Hanoi question in this quiz in more detail.

(Hint: about how many trillions is 2^100?)

Trying to solve the Tower of Hanoi problem where there are a hundred disks is very difficult. Executing the algorithm to solve the puzzle is not necessarily difficult, solving this problem in a reasonable amount of time is what is difficult.

In particular, the number of moves needed to solve this puzzle would require something like a trillion trillion moves. If you were to assume that one move could be done it a second, this would take longer than the age of the observable universe (this is understating the actual time) to complete. This would take around 40 quintillion years to complete. On an even faster assumption (1 move is one microsecond), this would still take around 440 billion years to complete. Both are far beyond the life of our universe.

For all intents and purposes, the Tower of Hanoi problem with 100 discs becomes feasibly impossible at this point because of the time that would be required to complete this task. Even if the solver was able to maximize the efficiency of the algorithm, it would just take too long to solve.

Question **14**

Correct

Marked out of 1.00

An algorithm is "the process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer."

There are often many ways to accomplish the same task by a computer. For example, in CoSpaces, if we want to make our Digital Automata walk back and forth 6 times we can write the instructions:

Walk back and forth

Walk back and forth

Walk back and forth

Walk back and forth

Walk back and forth

Walk back and forth

Or we can use a loop, (in CoSpaces a "repeat block.")

Do six times,

Walk back and forth

Algorithms are not code, but give us a direction for coding in any programming language.

Different or clever algorithms can shorten the actual runtime/processing time of a computer task.

Or sometimes they just make the code more readable.

For this question, answer true or false:

There is only ever one way to code an answer to a programming task. The processing time for such a task will always remain the same.

Select one:

- True
- False ✔

Question **15**

Correct

Marked out of 5.00

Scale, understanding functions and algorithms, and understanding large numbers are essential to understanding complexity in Computer Science.

Select one:

- True ✔
- False

Question **16**

Correct

Marked out of 5.00

Complexity Analysis is an important topic in computer science.

Let's simplify this idea a bit and imagine a large, but set number of computations a computer can do in one second - processing data, making transactions etc... Call this foo units.

The company has a software product that can do some amazing things, however, this algorithm takes x^2 seconds to run x number of foo units.

If the company need to run 1450 foo units, about how will does this product take to run?

- a. about 2 seconds
- b. about 2 years
- c. about 2 hours
- d. around 20 days ✔
- e. about 2 minutes

Your answer is correct.

Question **17**

Correct

Marked out of 5.00

Complexity Analysis is an important topic in Computer Science.

Let's simplify this idea a bit and imagine a large, but set number of computations a computer can do in one second - processing data, making transactions etc... Call this foo units.

The company has a software product that can do some amazing things, however, this algorithm takes x^2 , (O(x^2))seconds to run x number of foo units.

If the engineers cut this run time in half, (x^2) / 2, but still O(x^2), about how long does the algorithm now need to run 1450 foo units?

- a. around 10 days ✔
- b. about 2 minutes
- c. about 2 hours
- d. about 2 years
- e. about 2 seconds

Your answer is correct.

Question **18**

Correct

Marked out of 5.00

Complexity Analysis is an important topic in computer science.

Let's simplify this idea a bit and imagine a large but set number of computations a computer can do in one second - processing data, making transactions etc... Call this foo units.

The company has a software product that can do some amazing things, however, this algorithm takes x^2 , (O(x^2)) seconds to run x number of foo units.

If the engineers cut this run time to 3 x, which is O(x), about how long does the algorithm now need to run 1450 foo units?

- a. a little more than 1 hour.
- b. around 20 days
- c. about 2 seconds
- d. about 2 minutes
- e. a little more than 2 years

Your answer is correct.

Question **19**

Correct

Marked out of 5.00

Euclid had just a straightedge and a compass to construct angles, lines, and various shapes and, for him and those of his time, these were the foundations of mathematics.

They found they were able to complete many tasks with just these two instruments, such as constructing a perpendicular line, doubling a square, and bisecting an angle.

However, they were also unable to solve other problems, such as doubling a cube, squaring a circle, and trisecting an angle.

Euclid and the Ancient Greeks thought of these problems as obstinate, not impossible. Thousands of years were spent working on some of these problems before they were proven to be impossible by some extraordinary mathematics in the 19th century (Galois theory, which is used to show this, is often regarded a some of the most beautiful mathematics ever developed, unfortunately it is beyond the scope of this class).

Which of the following are true?

Select one or more:

- [ ] a. If you try to prove something at least 314 ways and it doesn't work, you know it is impossible.
- [ ] b. Proving something is impossible is easy, because if you can't do it, then it can't be done.
- [x] c. Proving that something is impossible to prove is challenging because you must show that there can be no method for solving - even if new techniques are invented in the future. ✔
- [ ] d. It is impossible to prove something is impossible to prove.
- [x] e. It is possible to trisect an angle, but not with the strict rules outlined by Euclid. ✔

Your answer is correct.