

Problem Solving Assignment

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1. Which problems did you work through?

Wolf, Sheep, Cabbage - Trio Match - Three Glass Puzzle. See notes for each in the pictures at the end of this document.

2. Which problem was the easiest to solve?

I found both the Wolf, Sheep, Cabbage and the Three Glass Puzzle easy to solve

3. Why was it easy to solve?

Wolf/Sheep/Cabbage was very clear on the instructions. I do have some vague recollection about this problem from when I was in high school math, but I did not have a recollection of the solution.

4. What type of problem was it (see Kirkley, 2003 article pg. 8)?

5. Explain.

I'll take both these questions together.

I think it is an example of a well-structured problem with some aspects of moderately structured problems. There is (I think) only one possible way to solve the problem and it is convergent. Some depth of declarative knowledge is required - you have to be able to make predictions for the system, based on the given information. And obviously you also need to be able to perform and understand the basic steps as explained in the instruction. Since there is some strategy that one has to develop and you also have to mentally model the impact of each action, I feel this problem has some aspects of moderately structured problems.

6. What strategy did you use to solve the problem?

Since the sheep is part of two relationships (W/S and S/C), the sheep should never be left alone with either the wolf or the cabbage. The wolf and the cabbage can be left together. I wrote the plan out on paper before I started solving the problem online. My steps and thoughts are outlined in the attached notes. So my strategy was to completely work through the problem before I actually attempted it online. This only works because it is such a convergent problem with only one possible way to solve it.

7. How did you develop this strategy?

I mostly developed the strategy by applying the given information. The one thing that was not clear from the information is that you can take the sheep back with the man on the boat. So you have to think outside the box of given information a little. The clue is to never leave the sheep alone with either the wolf or the cabbage. I kept that in mind as I wrote down the strategy.

8. What declarative knowledge was needed to solve this problem?

Facts: How to transport the wolf/sheep/cabbage and the boat; how to get items on and off the boat

Principles: When you leave the wolf and sheep alone, the wolf will eat the sheep. Ditto for the sheep and the cabbage. The wolf can be left with the cabbage. The sheep should never be left with either the wolf or the cabbage.

9. What procedural knowledge was needed to solve this problem?

The wolf can be left with the cabbage. The sheep should never be left with either the wolf or the cabbage. (I am not entirely clear where the 'principles' aspect (Kirkley, p. 6) of declarative knowledge ends and the procedural knowledge starts).

10. Which problem was the most challenging for you to solve?

The Trio Match

11. Why was it difficult to solve?

Because there were more options and possibilities than I could see through on paper. It took me a few rounds of playing before I realized that it is possible to have 4 or 5 pieces removed at the same time. It also took me a few rounds before I understood the order in which the future blocks will be deposited. There is a fine line between waiting and stacking in order to have lots of trios removed at once (with a good chance that you run out of blocks) and just focusing on removing 1 or 2 trios at the time (with less points and moving through the level much faster).

12. What type of problem was it (see Kirkley, 2003 article pg. 8)? Explain.

I think this was very much an example of an ill-structured problem. There is no one solution or even a 'best' solution. I assume that more points is better, so the more points the better the solution. But that is very open ended, which qualifies for the label 'multiple goals and solutions' (Kirkley, p. 8). As far as I could see (I only played the game 10 times or so) there are multiple ways to obtain lots of points and they will differ from one game to the other since the blocks appear random. Practice is divergent and each new game is unique and offers new possibilities. It's better (from a points perspective) to stay longer in one level and gain multiple bonus blocks, yet there is a limited number of moves in a level.

13. What strategy did you use to solve the problem?

I didn't really have a strategy. I just started playing and learning more about the game as I played.

14. How did you develop this strategy?

Through experience. For example, after playing a few games I realized that if you set up the bottom row with for example   (empty space)   and then drop a red square in that empty space, all 5 symbols will be removed and it will count as 2 trios. I am not able to recall

how many bonus blocks that gives you, but it's a good number. Once I realized that, I started aiming for situations like these.

I have a card game at home called 'Set!' and it has similar rules. That helped me in recognizing which trios were 'good' and should be aimed for.

15. What declarative knowledge was needed to solve this problem?

Knowing how to move the blocks; understanding the order in which the future blocks would be dropped, understanding which types of trios were more desirable than others and how to obtain those trios.

16. What procedural knowledge was needed to solve this problem?

The ability to build up stacks of blocks in a way that adding the next block will remove multiple trios at the same time, whilst staying away from the 500 points trio which also marks the end of the game. It requires a player to interpret the future blocks and create a mental design of a stack to build and aim for and then also understand how that stack will move down when the 'right' block is added in order to create a cascade of disappearing trios.

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Trio Match

!! No time constraints !!

Clear blocks from a well

Goal: play long,
hit multiple trios @
once to get bonus blocks

Match shapes & colors of blocks that are
dropped into a well.

2200 - 3000 - 4300 -

3900 (3) 7700 - 4000 @ 4600

4800 - 5600 - 5700

Use left - right arrows to move block,
down key to drop it. (declarative know
ledge)

(I was too focused on
creating trios of the same
color... Also - unsure
of the direction in which
blocks disappear (horizontal
& vertical))

3 blocks - Colors: R B G
Shape: C S T

Different shape / different color = 400

All same shape + same color = 500

Same C / different S = 200

Diff. C / same S = 200

Also: there is no one best, no-fail strategy

Challenge to think ahead to the extent that I can remove multiple rows
@ once.

Game 1 max Rows removed

1	1
2	2
3	2

4 (Can go at the same time (if
don't always?) or 5



I ran into challenges ~~can~~ related to procedural knowledge
Not sure about strategy b/c I miss dec. knowledge (how do
the next blocks move? I could take pics of it)

Ill-structured - there are multiple perspectives & ~~goals~~ solutions

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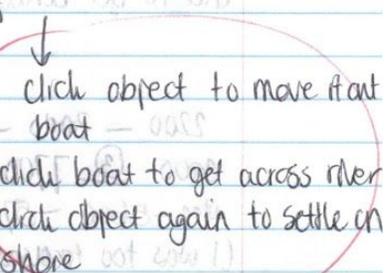
Wolf, sheep, cabbage

wolf will eat sheep, sheep will eat cabbage. Play as fast as possible. (that made me decide to plan before I start playing)

Plan

W, S, C

S is part of 2 relationships
→ should be taken out 1st & kept alone till end.



click sheep
W C

S

S

click boat to get across river

click object again to settle on shore

click C

C

take sheep back

declarative knowledge

ok b/c I'll be there

W S

C

take W

W, C

take S

S, W, C

⇒ Well-structured

→ only one solution / one right answer

→ all starting info is in the problem description

Some depth of knowledge; you have to make predictions & explain the behavior of the system; this shows through the choices you make

but although it's not immediately obvious that you can take things back ⇒ some creative thinking is needed.