Experiment design

June 2017

1 Running the experiment

At any point pressing ESCAPE will terminate the session without loosing the data.

Some subject take a while to understand how the maze opens up and how the character is seeing. Please draw their attention to how the rooms are opening up during demo.

2 Maze types

Informally, there are *lucky*, *fair*, *unlucky* and *non-scoring* mazes. Lucky mazes are such that will reveal the exist in the first place the subject looks if solved optimally. Non-scoring mazes are such that will reveal the exit before any decision has to be made (e.g. in a corridor). Unlucky mazes will reveal the exit in the last place the subject looks, if solved optimally. Fair mazes are such that will reveal the exit in the second or third room that opens up while there are still black squares remaining.

With a large number of mazes the subjects will expect more lucky than unlucky ones, otherwise they might disbelieve our claim of equal probability of exit per square. The purpose of non-scoring mazes is to show that the exit really can be anywhere. With a small number of mazes this was not as much a concern, but with more mazes subjects will get suspicious it is if the exit never occurs right next to them.

In terms of difficulty there are hard mazes, medium mazes and easy mazes. Easy mazes can be solved by one-step heuristic:

Rule 1: Close and Far Rooms of an equal size placed at unequal distance. A rational solution is to go to the closer room first. Measures the subject's sensitivity to cost. Can be solved optimally by always choosing a smaller cost.

Rule 2: Big and Small Rooms of an unequal size placed at equal distance. A rational solution is to go to the bigger room first. Measures the subject's sensitivity to reward. Can be solved optimally by always choosing a larger likelihood of reward.

Rule 3: Systematic Search is when the subject has to apply Rule 1 or Rule 2 successively, for example when rooms of equal size appear along a corridor. A guessing solution would be visiting other than the the closest room first.

Medium mazes require thinking two or more steps ahead or balancing cost and reward, and can be solved by a two step heuristic:

Rule 4: Early Advantage Since the subject might have to see the whole space, plan the route so as to reveal more squares early.

Rule 5: Minimizing the Worst Case In situations when there is a big space far away and a small space nearby, the optimal solution depends on the tendency to minimize the worst case.

Subjects are are expected to be more rational on easy mazes, unless they prefer to guess.

Hard mazes require thinking three or more steps ahead and can be solved by a combination of heuristics.

The **pipe** maze is a demonstration of how the character is seeing. Please draw their attention to how the rooms are opening up during demo.

Abbreviations:

- UL - unlucky
- L - unlucky
- F - fair
- N,S,E,W, NE, NW, SE, SW stand for directions

condition	map	heuristic	difficulty		exit location
practice	tunnel	1, 2	easy	L	E
practice	whichway	1	easy	L	S
practice	shortandlong	2	easy	NS	C
practice	pipe	3	easy	NS	NE
practice	bigandsmall29	2	easy	L	W
experiment	easycost12	1	easy	L	SW
experiment	easycost24	1	easy	UL	E
experiment	easycost34	1	easy	L	E
experiment	easycost46	1	easy	L	W
experiment	easyrw12	2	easy	L	E
experiment	easyrw24	2	easy	UL	SW
experiment	easyrw34	2	easy	L	SW
experiment	easyrw46	2	easy	UL	SE
experiment	easytwoh34	1+2	easy	L	W
experiment	easytwoh46	1+2	easy	UL	S
experiment	library	3	easy	L	SW
experiment	thetube	3	easy	F	N
experiment	bunker2	5 (also 2)	medium	UL	SE
experiment	worstcase	5 (also 2)	medium	F	W
experiment	courtyard	4 (also 1 and 5)	medium	L	C
experiment	labyrinth	2 then 1	medium	L	S
experiment	labyrinth3	3	medium	F	E
experiment	theloop	4	medium	F	N
experiment	roomG	2 then 2	medium	F	E
experiment	tworooms	2 then 1	medium	L	W
experiment	ikea2	5 then 1	hard	L	N
experiment	cathedral	1 then 5	hard	F	S
experiment	cubicles	4 then 2	hard	L	N
experiment	museum	1 then 1	hard	L	NE
experiment	garden	2 then 5	hard	L	S
experiment	bunker5	5 then 1	hard	UL	SE
experiment	lab	2 then 1 then 4	hard	UL	W
experiment	thewell	2 then 2	hard	UL	E
experiment	regretnoscoring		-	NS	C
experiment	bunkernoscoring		-	NS	C