Explore-and-predict task / SS’-SAS’ task

Verbal instructions

**Before the training**

"In this task, you will navigate an abstract environment composed of three possible states. Each state corresponds to a geometrical shape, a square, a triangle or a circle.

In each state, you will have to make an action in order to move to another state. Your action corresponds to the color you select on the screen. Indeed, in each state, you will see twice the same geometrical shape in two different colors. Remember that your action corresponds to the color you select using the left or right button.

After making a choice, you will see another state, and then you will select another action, see another state, etc.

The logics of the experiment is that there is always a rule which determines the next state that you will see. There are two types of rule which will alternate during the experiment.

Sometimes, it will be an actor rule, which means that every time you select a given color, for example blue, you see a given state, for example a square. So an actor rule can be something like: "I press blue, I see a square, I press yellow, I see a circle, etc.".

Sometimes, the rule will be a spectator rule instead. It means that in this case you can ignore the exact action you take, because now it is the state in which you are which determines the next state.

So, a spectator rule can be something like: after a circle, I see a square, after a square, I see a triangle, etc, etc. In other words, when you are in a spectator rule, the environment changes on its own independently from the colors you choose.

Understood?

Ok, so now, your goal will be to explore the environment in order to learn these rules progressively. And from time to time, you will be asked to say which state follows a given hypothetical choice. In other words, once you have learned the rule which is active, you must be able to use it to make prediction about the upcoming state, and we use these predictive trials to test your learning performance.

You will see during the training what it means exactly, but the principle is quite simple. You will explore the environment, and, from time to time, the computer will ask you what would be the next geometrical shape appearing on the screen after a given hypothetical choice, for example a yellow square.

Ok?

Now we will start the training. In this part, it will be simple because the computer will tell you which rule is active. You will just have to remember it and to feel what it means to be in each of the 4 rules. There are two different spectator and two different actor rules. You will also practice on the predictive trials. Then, I will answer your question and you'll be ready to do the main task."

**After the training**

“Ok, so, do you have question?

[answer questions]

Ok, so now, we are going to start the task.

The main difference between the training and the main task is that the computer will not tell you in which rule you are and it will also change the rule without warning. It means that you will have to learn the rule by exploring the environment and detect when it has changed to learn the new rule, etc, etc. The task will end by itself when you have reached a learning criterion, which means that the better and the faster you learn, the shorter the task.

There will also be a bit of noise in the rule, which means that, from time to time, the computer will not apply the rule, but it will go randomly to one of the three possible states. This means that sometimes you may be surprised by a transition while you were sure you learned the rule. It makes the learning a little bit more difficult, but not too much because the rule only changes after a pair of predictive trials, never in the middle of your exploration.

Finally, you will see that the computer only gives you half of the feedback, that is, for each pair of predictive trial, you see only one thumb, up or down, but not two. When it does not appear you just don't know whether you replied good or not.

Last but not least, do you have an idea why the computer always tests the two different colors of a given geometrical shape for each predictive trial?

The reason is that it enables us to know whether you think you are in an actor rule or a spectator rule. Indeed, if you think you are in a spectator rule, you should give the same answer for the two colors of the same shape, because it is the state in which you are which determines the next state. Oppositely, if you think you are in an actor rule, you should give different answers, because in this case it is the color that you chose which determines the next state you will see.

Do you get it?”

[reexplain if necessary]