**Background and Hypotheses**

This paradigm aims at exploring the relationship between prediction error and memory formation. Participants watch a truck that delivers some goods across the city. On every trial, the truck appears on a different locations, and in the end the delivered item appears. The third truck and the image both appear most of the time at roughly the same place, so that participants will learn over time to predict where the item will be delivered. However, some time the third position will differ to some extent, creating prediction errors of varying degrees: low, high, and medium prediction error. Thus, we manipulate the distance of the actual position of the target object from the most likely position.

After participants finish the previous task (encoding task), they will work on some distractor tasks, and finally on a surprise recognition task. In this last task, we

ask them to recognize old objects among distractors, asking also how confident they are in this decision. In addition, we ask them to report the location in which the item was shown to them in the encoding task.

Our hypothesis is that the degree of prediction error will affect the likelihood of remembering the objects and the location in which the objects were presented.

**Methods**

**stimuli**

286 trial-unique stimuli were selected from the O-MIND dataset (<https://github.com/DuncanLab/OMINDS>). half of them can be typically be found indoor, half outdoor. We matched memorability, nameability, and emotionality among categories (indoor/ outdoor) and encoding/recognition sets. To select the object, we set tmemorability to 100, nameability to 100, and emotionality to 0. 6 objects were the fillers.

A precise number of trials was selected to balance the number of object in every kind.In general, we have trials in which the trajectory of the truck can be predicted, and trials in which the trajectory is random. The trials that can be predicted always started from one precise location in the circle. While the second location of the track was always the opposite of the second one, the third location was probabilistic, in a way that it occurred with higher probability in a location distributed around a position that was a 90 degree rotation of the last location. The presentation of the last position of the truck in the most frequent location occurred around 65% of the predictable trials, while both the medium and the high occurred around 18% each. The singletons occurred on 15% if the trials. We also needed filler trials to keep the contingencies.

In total, we had 5 types of objects:

- Low PE trials - trials for which the location of the object shown is centered at the most frequent position;

- High PE trials - trials in which the location of the object shown is centered at the opposite side of the most frequent position;

- Med PE trials - trials in which the location of the object shown is centered at 90 degree rotation of the most frequent position. For half of these trials, the center was a clockwise rotation of the most frequent location, for the remaining trials, the center was a counterclockwise rotation;

- Singletons - trials in which the trajectory of the track was not predictable. For these trials, the first location of the truck was randomly chosen on each trial from the three positions that were not related to the location of the first truck for the predicted trials (the remaining three quadrants).

- Fillers - the fillers were trials in which the object was repeated several times. Memory for these object was not tested.

The number of objects by condition is shown in this table

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Encoding | Fillers | Targets |  |  |  |  |  |
|  |  | Low | Mid | High | Singletons | First trials | **Total** |
| instances | 6 | 30 | 30 | 30 | 30 | 20 | 140 |
| repetitions | 10 | 1 | 1 | 1 | 1 |  |  |
| trials | 60 | 30 | 30 | 30 | 30 | 20 | 140 |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Recognition | New | Targets |  |  |  |  |  |
|  |  | Low | Mid | High | Singletons | First Trials | **Total** |
| instances | 140 | 30 | 30 | 30 | 30 | 20 | 140 |

The sequence location is randomized for each participant, with the only constraint that the difference between the center of the location of the low PE trials in the first session and in the second session should differ of 90 degrees (rotation of 90 deg clockwise or counterclockwise).

**Procedure**

After participants received the instructions, they saw a fixation cross for 500 ms.   
The map image of the city then appeared. After 500 ms, the three truck appeared one after the other for 500 ms each. An interval of 500 ms occurred between the presentation of the first and the second, and the second and the third truck. Then, the target image appeared for 1500 ms.   
After the offset of the image, participants were asked whether the image that hey had just seen was more likely to appear outdoor or indoor. The response was self-paced.   
They were presented with 200 images in total. After the first 100, they were given the possibility to take a break.   
After the encoding task and the distractor tasks, participant were asked to recognize the images that they had just seen among new images. Only for the old images, they were asked to indicate the location in which the object appeared.

The recognition and location test were both self-paced.