*Referring trial category, level and outcome actualization property by number:*

There are 4 outcome categories (Image reward, Image punishment, Monetary reward, Monetary punishment), and 4 levels within each category. Each level of a specific category has 6 repetitions. Overall, there are 96 trials where 32 of them will be actualized (outcome trials), and 64 of them will not be actualized. To single out trial category, level and actualization property based on reference number (also called “StimuliRefNum” in data saving or **orderList[n]** in script):

1. Create a list of 1 to 96
2. Mark the first fourth of the list as “Image Reward”, the second as “Image Punishment”, the third as “Monetary Reward”, and the fourth as “Monetary Punishment”.
3. Within the list of a category (length = 24), the first quarter is marked as “level 1”, the second as “level 2”, the third as “level 3” and the fourth as “level 4”.
4. Within the list of a level under a category (length = 6), the first 2 numbers are actualized trials. The rest 4 numbers are non-actualized trials.

A graphic illustration:

|  |
| --- |
| 1,2,3…96 |

|  |  |  |  |
| --- | --- | --- | --- |
| Imaging Reward | Imaging Punishment | Monetary Reward | Monetary Punishment |
| 1,2,3…24 | 25,26,27…48 | 49,50,51,…72 | 73,74,75…96 |

(example)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Actualized | | Non-actualized | | | |
| 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 |

*Shuffle reference numbers and allocate them into four blocks:*

Based on rules above, two lists are created. One is the outcome list (length = 32), which is a collection of all the actualization trials: [1, 2, 7, 8, 13, 14, 19, 20, 25, 26, 31, 32, 37, 38, 43, 44, 49, 50, 55, 56, 61, 62, 67, 68, 73, 74, 79, 80, 85, 86, 91, 92]. The other (length = 64) is a collection of all the non-actualized trials: [3, 4, 5, 6, 9, 10, 11, 12, 15, 16, 17, 18, 21, 22, 23, 24, 27, 28, 29, 30, 33, 34, 35, 36, 39, 40, 41, 42, 45, 46, 47, 48, 51, 52, 53, 54, 57, 58, 59, 60, 63, 64, 65, 66, 69, 70, 71, 72, 75, 76, 77, 78, 81, 82, 83, 84, 87, 88, 89, 90, 93, 94, 95, 96]. The next step is to shuffle these numbers and allocate them into four blocks, each with four categories and without controlling for levels. Numbers from the same outcome category are shuffled (actualized and non-actualized numbers are shuffled independently). As an example, numbers under “image reward” category could be shuffled into:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Actualized | | | | | | | |
| 7 | 13 | 20 | 2 | 8 | 1 | 19 | 14 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Non-actualized | | | | | | | | | | | | | | | | |
| 6 | 17 | 3 | 21 | 5 | 22 | 12 | 23 | 15 | 9 | 16 | 11 | 10 | 4 | 24 | 18 |

Each quarter of the list will be allocated into a block. For example, according to the shuffle result from above, the first block will have “image reward” trials of these reference numbers: 7, 13, 6, 17, 3, 21. With the same rule, three other categories, each with a list of six reference numbers will be allocated into this block.

*Pseudo-randomization rules and applications:*

The randomizer.py file serves to pseudo-randomize reference numbers, so that there are no more than two consecutive trials coming from the same category. Each block has a list of 24 reference numbers. Each quarter of the list stores reference numbers of a category. For example:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Index | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Reference# | 7 | 13 | 6 | 17 | 3 | 21 | .. | .. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |