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/*
Object-Location Task

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%%%%%%% Version History %%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
- 06-10-2019; created by Chris Gill: created the backbone of the experiment
- 10-19-2019; edited by Alex He: changed the structure of the task, improved the iteration code block
- 11-09-2020; edited by Alex He: added triggers, added version history, added 22/23 start/end triggers, updated header parameters, enabled proper logfile saving
- 11-11-2020; edited by Alex He: changed pulse width from 10ms to 5ms, added more wait_delays since response_port_output is true
- 01-19-2021; edited by Alex He: updated logfile naming
- 10-05-2022; edited by Anthony Edgar: changed task to be compatible with c-pod.
- 03-05-2024; edited by Alex He: added fixation cross to the 8-s blank screen
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*Note: After each round of practice trials the experimenter will be asked to "Please press keys to continue."
In order to continue to the trial press 1, in order to repeat practice trials press 2.

*/
############################################################################################################
# Header
scenario = "Object_Location_Task";
active_buttons = 5;
button_codes = 11,12,13,14,15; # keys: 1 = spacebar, 2 = 'Y' (Yes), 3 = 'N' (No), 4 = #1 (continue), 5 = #2 (repeat practice)
default_font = "Helvetica";
default_background_color = 255,255,255;
default_text_color = 0,0,0;
write_codes = true;
response_port_output = true;
default_output_port = 1;
pulse_width = 5;
############################################################################################################
#SDL
begin;

#load image array
array {
LOOP $i 179;
$k = '$i+1';
bitmap { filename = "$k.jpg"; description = "Image$k"; width = 320; height = 225; }"image$k";
ENDLOOP;
} pictures;

array {
LOOP $i 79;
$k = '$i+180';
bitmap { filename = "$k.jpg"; description = "Image$k"; width = 225; height = 320; }"image$k";
ENDLOOP;
} pictures_b;

#circle object
bitmap { filename = "circle_obj.jpg"; description = "Circle"; width = 200; height = 200; }"circle";

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```
#Grid
line_graphic {   # x1,  y1,  x2,  y2
   coordinates = -500, -500, -500, 500;   #outer vert left
   coordinates = 500, -500, 500, 500;   #outer vert right
   coordinates = -500, 498, 500, 498;   #outer hor top
   coordinates = -500, -497, 500, -497;  #outer hor bottom
   coordinates = -166.66, -500, -166.66, 500;   #inner vert left
   coordinates = 166.66, -500, 166.66, 500;   #inner vert right
   coordinates = -500, 166.66, 500, 166.66;   #inner hor top
   coordinates = -500, -166.66, 500, -166.66;  #inner hor bottom
   line_width = 6;
   line_color = 0, 0, 0, 255;
}grid;

#Prompt screen
text {font_size = 60; font_color = 0,0,0; background_color = 255,255,255; caption = "Remember Object";} Obj_text;
text {font_size = 60; font_color = 0,0,0; background_color = 255,255,255; caption = "Remember Location";} Loc_text;
text {font_size = 60; font_color = 0,0,0; background_color = 255,255,255; caption = "Remember Object + Location";} Both_text;

#Blank screen
box {height = 1920; width = 1080; color = 255, 255,255; } blank_box;
text { caption = "+"; font_size = 96; font_color = 0,0,0; } Crosshair_text;

################################################################################################################
#Instructions + practice pics
picture {
   text {
   caption = "<u>INSTRUCTIONS:</u>";
   font_size = 44;
   formatted_text = true;
   };
   x = 0;y = 380;

   text { caption =
     "In this experiment you will see a grid with 9 squares.
      3 objects will appear one at a time at different locations
      within the grid. You will be asked to look at these objects,
      then after a short delay you will be tested on how well you
      can remember them.";
      font_size = 44;
      text_align = align_left;
   } Instruction1;
   x = 0;y = 10;

   text {
   caption = "Press any key to continue.";
   font_size = 36;
   };
   x = 0;y = -500;
} instructions1;


picture {
   text {
   caption = "<u>INSTRUCTIONS:</u>";
   font_size = 44;
   formatted_text = true;
   };
   x = 0;y = 380;

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```
114      text { caption =
115        "There will be two different types of trials for this part of the
116         experiment. The first type is called a <b>'Remember Object'</b>
117         trial. The second is called a <b>'Remember Location'</b> trial. We
118         will now explain each type of trial separately.
119
120         While we explain, you will be shown some pictures of the trials
121         and afterwards you will have a chance to do some practice trials.";
122         font_size = 44;
123         text_align = align_left;
124         formatted_text = true;
125      } Instruction2;
126      x = 0;y = 10;
127
128      text {
129      caption = "Press any key to continue.";
130      font_size = 36;
131      };
132      x = 0;y = -500;
133   } instructions2;
134
135
136   picture {
137      text { caption =
138         "<u><b>Remember Object trial:</b></u> In this type of trial you need to
      remember
139         the identity of the objects shown to you.
140
141         You will see 3 objects appearing one at a time followed by an
142         8 second delay. You will then be shown a prompt screen saying
143         <b>Remember Object</b>. This prompt screen will be followed by a test
144         object <u>in the center of the grid</u>.
145
146         'Remember Object' tells you that you need to decide whether this
147         test object was one of the 3-object sequence just shown to you. ";
148         font_size = 44;
149         text_align = align_left;
150         formatted_text = true;
151      } Instruction3;
152      x = 0;y = 0;
153
154      text {
155      caption = "Press any key to continue.";
156      font_size = 32;
157      };
158      x = 0;y = -500;
159   } instructions3;
160
161
162   picture {
163      text { caption =
164         "<u><b>Remember Object trial:</b></u>";
165         font_size = 44;
166         formatted_text = true;
167      };
168      x = 0;y = 450;
169
170      bitmap { filename = "Obj_trial_instructions_pic.jpg"; width = 1650; height =
      751; };
171      x = 0;y = -20;
172
173      text {
174      caption = "Press any key to continue.";
175      font_size = 32;
```

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176      };
177      x = 0;y = -500;
178   } instructions4;
179
180
181   picture {
182      bitmap { filename = "Obj_trial_instructions_pic.jpg"; width = 1581; height =
      720; };
183      x = 0;y = -160;
184
185      text { caption =
186         "<u><b>Remember Object trial:</b></u>
187         If you recognize the test object, press the <b>'Y'</b> key to indicate
      <b>YES</b> the test object was one of
188         the 3-object sequence.
189
190         If you do not recognize the test object, press <b>'N'</b> key to indicate
      <b>NO</b> the test object was
191         <u>NOT</u> one of the 3-object sequence.";
192         font_size = 34;
193         text_align = align_left;
194         formatted_text = true;
195      } Instruction5;
196      x = 0;y = 360;
197
198      text {
199      caption = "Press any key to continue.";
200      font_size = 32;
201      };
202      x = 0;y = -500;
203   } instructions5;
204
205
206   picture {
207      text { caption =
208         "<u><b>Remember Location trial:</b></u> In this type of trial you need to
      remember
209         the location of the objects shown to you.
210
211         You will see 3 objects appearing one at a time followed by an
212         8 second delay. You will then be shown a prompt screen saying
213         <b>Remember Location</b>. This prompt screen will be followed by a
214         dot in one of the squares of the grid.
215
216         'Remember Location' tells you that you need to decide whether
217         this square was previously occupied by <u>any object</u> in the
218         3-object sequence.";
219         font_size = 44;
220         text_align = align_left;
221         formatted_text = true;
222      } Instruction6;
223      x = 0;y = 0;
224
225      text {
226      caption = "Press any key to continue.";
227      font_size = 32;
228      };
229      x = 0;y = -500;
230   } instructions6;
231
232
233   picture {
234      text { caption =
235         "<u><b>Remember Location trial:</b></u>";
```

```
236         font_size = 44;
237         formatted_text = true;
238      };
239      x = 0;y = 450;
240
241      bitmap { filename = "Loc_trial_instructions_pic.jpg"; width = 1650; height =
    732; };
242      x = 0;y = -20;
243
244      text {
245      caption = "Press any key to continue.";
246      font_size = 32;
247      };
248      x = 0;y = -500;
249   } instructions7;
250
251
252   picture {
253      bitmap { filename = "Loc_trial_instructions_pic.jpg";  width = 1585; height =
    704; };
254      x = 0;y = -160;
255
256      text { caption =
257         "<u><b>Remember Location trial:</b></u>
258         If the square indicated by the dot was previously occupied, press the
    <b>'Y'</b> key to indicate <b>YES</b>
259         one of the objects in the 3-object sequence was in this square.
260
261         If the square indicated by the dot was <u>NOT</u> previously occupied,
    press <b>'N'</b> key to indicate <b>NO</b>
262         none of the objects in the 3-object sequence were in this square.";
263         font_size = 34;
264         text_align = align_left;
265         formatted_text = true;
266      } Instruction8;
267      x = 0;y = 360;
268
269      text {
270      caption = "Press any key to continue.";
271      font_size = 32;
272      };
273      x = 0;y = -500;
274   } instructions8;
275
276
277   picture {
278      text {
279      caption = "<u>INSTRUCTIONS:</u>";
280      font_size = 44;
281      formatted_text = true;
282      };
283      x = 0;y = 380;
284
285      text { caption =
286        "<u><b>Review:</b></u>
287         There are 2 types of trials in this part of the experiment:
288         <u><b>Remember Object</b></u> and <u><b>Remember Location</b></u>.
289
290
291         Note that Remember Object and Remember Location trials will
292         be intermixed throughout this part of the experiment. This
293         means that you will not know whether you need to respond to
294         the Object or the Location until you see the Prompt screen." ;
295         font_size = 44;
```

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296         text_align = align_left;
297         formatted_text = true;
298      } Instruction9;
299      x = 0;y = 10;
300
301      text {
302      caption = "Click the space bar to start the practice trials.";
303      font_size = 36;
304      };
305      x = 0;y = -500;
306   } instructions9;
307
308
309   picture {
310      text {
311      caption = "<u>INSTRUCTIONS:</u>";
312      font_size = 44;
313      formatted_text = true;
314      };
315      x = 0;y = 380;
316
317      text { caption =
318        "In this second part of the experiment you will again see a
319         grid with 9 squares. 3 objects will appear one at a time at
320         different locations within the grid. You will be asked to look
321         at these objects, and after a short delay, you will be tested
322         on how well you can remember <b>both Objects and their Locations</b>.";
323         font_size = 44;
324         text_align = align_left;
325         formatted_text = true;
326      } Instruction10;
327      x = 0;y = 10;
328
329      text {
330      caption = "Press any key to continue.";
331      font_size = 36;
332      };
333      x = 0;y = -500;
334   } instructions10;
335
336
337   picture {
338      text { caption =
339         "<u><b>Remember Object and Location trial:</b></u> In this type of trial
    you need
340         to remember both the identity of the objects and their locations.
341
342         As before, you will see 3 objects appearing one at a time followed by
343         an 8 second delay. You will then be shown a prompt screen saying
344         <b>Remember Object and Location</b>. This prompt screen will be
345         followed by a test object <u>in one of the squares of the grid</u>.
346
347         'Remember Object and Location' tells you that you need to decide
348         whether this object is in the right location. What this means is that
349         the test object is in the same square as it was in the 3-object sequence.";
350         font_size = 44;
351         text_align = align_left;
352         formatted_text = true;
353      } Instruction11;
354      x = 0;y = 0;
355
356      text {
357      caption = "Press any key to continue.";
358      font_size = 32;
```

```
359      };
360      x = 0;y = -500;
361   } instructions11;
362
363
364   picture {
365      text { caption =
366         "<u><b>Remember Object and Location trial:</b></u>";
367         font_size = 44;
368         formatted_text = true;
369         };
370         x = 0;y = 450;
371
372      bitmap { filename = "ObjLoc_trial_instructions_pic.jpg"; width = 1650; height =
       727; };
373      x = 0;y = -20;
374
375      text {
376      caption = "Press any key to continue.";
377      font_size = 32;
378      };
379      x = 0;y = -500;
380   } instructions12;
381
382
383   picture {
384      bitmap { filename = "ObjLoc_trial_instructions_pic.jpg"; width = 1358; height =
       599; };
385      x = 0;y = -220;
386
387      text { caption =
388         "<u><b>Remember Object and Location trial:</b></u>
389         If the test object is in the right location, press the <b>'Y'</b> key to
    indicate <b>YES</b> that the test object
390         is in the same square as it was in the 3-object sequence.
391
392         If the test object is <u>NOT</u> in the right location, press the
    <b>'N'</b> key to indicate <b>NO</b> the test object
393         is <u>NOT</u> in the same square as it was in the 3-object sequence.";
394         font_size = 34;
395         text_align = align_left;
396         formatted_text = true;
397      } Instruction13;
398      x = 0;y = 360;
399
400      text {
401      caption = "Click the space bar to start the practice trials.";
402      font_size = 32;
403      };
404      x = 0;y = -500;
405   } instructions13;
406
407   ##############################################################################
    ########################
408   #Trials List
409
410   #Instruction
411   trial {
412      trial_type = first_response;
413      trial_duration = forever;
414      stimulus_event {
415         picture instructions1;
416         code = "Instructions";
417      } Instructions_event;
```

```
}Instructions_trial;

#Blank grid
trial {
   trial_type = fixed;
   trial_duration = 500;
      picture {
         line_graphic grid;
         x = 0; y = 0;
      };
} blank_grid_trial;

#Blank screen for 8s delay
trial {
   trial_type = fixed;
   trial_duration = 8000;###############Change back to 8000 after testing
      picture {
         box blank_box;
         x = 0; y = 0;

         text Crosshair_text;
         x = 0; y = 0;
         };
      port_code = 2;
      code = "8s Blank";
} wait_delay;

#Remember Object prompt screen
trial {
   trial_type = fixed;
   trial_duration = 1000;
      picture {
         background_color = 255,255,255;
         text Obj_text;
         x = 0; y = 0;
      };
      port_code = 25;
      code = "Remember Object Prompt";
} Obj_Condition_Message;

#Remember Location prompt screen
trial {
   trial_type = fixed;
   trial_duration = 1000;
      picture {
         background_color = 255,255,255;
         text Loc_text;
         x = 0; y = 0;
      };
      port_code = 26;
      code = "Remember Location Prompt";
} Loc_Condition_Message;

#Remember Object and Location prompt screen
trial {
   trial_type = fixed;
   trial_duration = 1000;
      picture {
         background_color = 255,255,255;
         text Both_text;
         x = 0; y = 0;
      };
      port_code = 27;
      code = "Remember Obj+Loc Prompt";
```

```
} Conjunction_Condition_Message;

#Practice Encoding trial
trial {
   trial_type = fixed;
   trial_duration = 1000;
   stimulus_event {
      picture {
         background_color = 255,255,255;
         line_graphic grid;
         x = 0; y = 0;

         bitmap image1;
         x = 0; y = 0;
      } practice_pic;
      port_code = 7;
      code = "Practice Encoding";
   };
} practice_study_trial;

#Encoding trial
trial {
   trial_type = fixed;
   trial_duration = 1000;
   stimulus_event {
      picture {
         background_color = 255,255,255;
         line_graphic grid;
         x = 0; y = 0;

         bitmap image1;
         x = 0; y = 0;
      } pic;
      port_code = 3;
      code = "Encoding Trial";
   };
} study_trial;

#Practice Remember Object test trial
trial {
   trial_type = correct_response;
   trial_duration = forever;
   stimulus_event {
      picture {
         background_color = 255,255,255;
         line_graphic grid;
         x = 0; y = 0;

         bitmap image1;
         x = 0; y = 0;
      } practice_Obj_test_pic;
      target_button = 2,3;
      port_code = 8;
      code = "Practice Remember Object Test";
   };
} practice_Obj_test_trial;

#Remember Object test trial
trial {
   trial_type = correct_response;
   trial_duration = forever;
   stimulus_event {
      picture {
         background_color = 255,255,255;
```

```
            line_graphic grid;
            x = 0; y = 0;

            bitmap image1;
            x = 0; y = 0;
         } Obj_test_pic;
         target_button = 2,3;
         port_code = 4;
         code = "Remember Object Test";
      };
   } Obj_test_trial;

   #Practice Remember Location test trial
   trial {
      trial_type = correct_response;
      trial_duration = forever;
      stimulus_event {
         picture {
            background_color = 255,255,255;
            line_graphic grid;
            x = 0; y = 0;

            bitmap circle;
            x = 0; y = 0;
         } practice_Loc_test_pic;
         target_button = 2,3;
         port_code = 9;
         code = "Practice Remember Location Test";
      };
   } practice_Loc_test_trial;

   #Remember Location test trial
   trial {
      trial_type = correct_response;
      trial_duration = forever;
      stimulus_event {
         picture {
            background_color = 255,255,255;
            line_graphic grid;
            x = 0; y = 0;

            bitmap circle;
            x = 0; y = 0;
         } Loc_test_pic;
         target_button = 2,3;
         port_code = 5;
         code = "Remember Location Test";
      };
   } Loc_test_trial;

   #Practice Remember Object and Location test trial
   trial {
      trial_type = correct_response;
      trial_duration = forever;
      stimulus_event {
         picture {
            background_color = 255,255,255;
            line_graphic grid;
            x = 0; y = 0;

            bitmap image1;
            x = 0; y = 0;
         } practice_Conjunction_test_pic;
         target_button = 2,3;
```

```
      port_code = 10;
      code = "Practice Remember Obj+Loc Test";
   };
} practice_Conjunction_test_trial;

#Remember Object and Location test trial
trial {
   trial_type = correct_response;
   trial_duration = forever;
   stimulus_event {
      picture {
         background_color = 255,255,255;
         line_graphic grid;
         x = 0; y = 0;

         bitmap image1;
         x = 0; y = 0;
      } Conjunction_test_pic;
      target_button = 2,3;
      port_code = 6;
      code = "Remember Obj+Loc Test";
   };
} Conjunction_test_trial;

#Inter-trial Blank Trial
trial {
   trial_type = fixed;
   trial_duration = 500;
   picture {
      box blank_box;
      x = 0; y = 0;
   };
} blank_trial;

#Rest betwen Part 1 and Part 2
trial {
   trial_type = correct_response;
   trial_duration = forever;
   stimulus_event {
      picture {
         box blank_box;
         x = 0; y = 0;

         text {
         caption = "Rest";
         font_size = 44;
         };
         x = 0; y = 150;

         text {
         caption = "Press the space bar to begin Part 2.";
         font_size = 36;
         };
         x = 0; y = -410;

      }rest_pic;
      target_button = 1;
      code = "Rest";
   } rest_event;
} rest_trial;

#Repeat Practice option for the experimenter
trial {
   trial_type = correct_response;
```

```
674      trial_duration = forever;
675      stimulus_event {
676         picture {
677
678         text {
679            caption = "Experimenter please press keys to continue.";
680            font_size = 60;
681            };
682            x = 0; y = 110;
683
684         } repeat_practice_pic;
685         target_button = 4,5;
686         code = "Whether Repeat Practice";
687      };
688   } repeat_practice_trial;
689
690   #Practice Correct Feedback
691   trial {
692      trial_type = fixed;
693      trial_duration = 1500;
694      stimulus_event {
695         picture {
696
697         text {
698            caption = "<b>CORRECT</b>";
699            font_size = 60;
700            font_color = 0,255,0;
701            formatted_text = true;
702            };
703            x = 0; y = 110;
704
705         } feedback_correct_pic;
706         code = "Practice Correct Feedback";
707      };
708   } feedback_correct_trial;
709
710   #Practice Incorrect Feedback
711   trial {
712      trial_type = fixed;
713      trial_duration = 1500;
714      stimulus_event {
715         picture {
716
717         text {
718            caption = "<b>INCORRECT</b>";
719            font_size = 60;
720            font_color = 255,0,0;
721            formatted_text = true;
722            };
723            x = 0; y = 110;
724
725         } feedback_incorrect_pic;
726         code = "Practice Incorrect Feedback";
727      };
728   } feedback_incorrect_trial;
729
730   ##############################################################################
      ######################
731   #House keeping parameters before beginning the experiment
732
733   #Begin PCL (Presentation Control Language)
734   begin_pcl;
735
736   #specifying output file
```

```
737  string logpath = logfile_directory;
738  string fn = logpath +logfile.subject()+"_ObjLoc.txt";
739  logfile.set_filename(logpath +logfile.subject() + "_ObjLoc_logfile.log");
740  output_file ofile1 = new output_file;
741  ofile1.open_append(fn);
742
743  #Setting column headers for output file
744  ofile1.print("Block\t"+"Trial\t"+"Cond\t"+"Studied\t"+"Resp\t"+"Corr\t"+"RT\n");
745
746  #Variables
747  int Block1 = 48; #This should be 48 after done testing
748  int Block2 = 24; #This should be 24 after done testing
749  int Studied_pic_count = 1;
750  int Non_studied_pic_count = 1;
751  int Loc;
752  int Resp;
753
754  response_data my_response;
755  response_data my_response_practice;
756  stimulus_data my_data;
757  stimulus_data my_data_practice;
758  int resp_button;
759  int correct_button;
760  int resp_button_practice;
761  int RT;
762  int corr_resp;
763  string condition;
764  int studied;
765
766  #Concatenate the two arrays of picture stimuli
767  pictures.append(pictures_b);
768  #Randomize the order of picture stimuli
769  pictures.shuffle();
770
771  #Instantiate empty bitmap arrays
772  array<bitmap>Studied_pics[240];
773  array<bitmap>Non_studied_pics[18]; # Reserve 18 pictures to be new stimuli that
     will only be shown at testing
774
775  #Update array values with picture stimuli
776  loop int i = 1 until i > pictures.count() begin
777     if (i <= 240) then
778        Studied_pics[i] = pictures[i];
779     else
780        Non_studied_pics[i-240] = pictures[i];
781     end;
782     i = i + 1;
783  end;
784
785
786  #Trial Condition for Block1: 0 = Obj condition New, 1 = Obj condition Old, 2 =
     Loc condition New, 3 = Loc condition Old
787  array<int>Block1_trial_type_index[48] = {0,0,0,0,0,0,0,0,0,0,0,0,1,1,1,1,1,1,1,1,1
     ,1,1,1,2,2,2,2,2,2,2,2,2,2,2,2,3,3,3,3,3,3,3,3,3,3,3,3};
788  Block1_trial_type_index.shuffle();
789
790  #Trial Condition for Block2: 0 = New Location, 1 = Old Location
791  #N.B.: conditions only concern location because the objects are always old; no
     new object will be shown in Part 2.
792  array<int>Block2_trial_type_index[24] = {0,0,0,0,0,0,0,0,0,0,0,0,1,1,1,1,1,1,1,1,1
     ,1,1,1};
793  Block2_trial_type_index.shuffle();
794
795  #Trial Condition for practice1
```

```
array<int>Practice_trial_type_index[4] = {0,1,2,3};
array<int>Practice_correct_key[4] = {3,2,3,2};

#Trial Condition for practice2
array<int>Practice2_trial_type_index[2] = {0,1};
array<int>Practice2_correct_key[2] = {3,2};

#Possible object positions
array<double>object_position[8][2]={{-333.33,-333.33},{-333.33,0},{-333.33,333.33
},{0,-333.33},{0,333.33},{333.33,-333.33},{333.33,0},{333.33,333.33}};

#Object test position index
array<int>Obj_test_pos_index[3] = {1,2,3};

#Object test pic index
array<int>Obj_test_pic_index[3] = {1,2,3};

############################################################################################
##############################
#
# Beginning of experiment presentation
#
############################################################################################
##############################

############################################################################################
##############################
output_port port = output_port_manager.get_port( 1 );

#Instructions
#response_manager.set_port_output( false );
Instructions_trial.present();
Instructions_event.set_stimulus(instructions2);
Instructions_trial.present();
Instructions_event.set_stimulus(instructions3);
Instructions_trial.present();
Instructions_event.set_stimulus(instructions4);
Instructions_trial.present();
Instructions_event.set_stimulus(instructions5);
Instructions_trial.present();
Instructions_event.set_stimulus(instructions6);
Instructions_trial.present();
Instructions_event.set_stimulus(instructions7);
Instructions_trial.present();
Instructions_event.set_stimulus(instructions8);
Instructions_trial.present();
Instructions_event.set_stimulus(instructions9);
Instructions_trial.present();

############################################################################################
##############################
#Part 1 Practice - 4 trials: 1 Object-New, 1 Object-Old, 1 Location-New, 1
Location-Old
int Studied_pic_count_holder = Studied_pic_count;
int Non_studied_pic_count_holder = Non_studied_pic_count;

wait_interval (100);
port.send_code(22);
wait_interval (100);

loop int k = 0 until k > 0 begin
   loop int j = 1 until j > 4 begin
      blank_grid_trial.present();
      object_position.shuffle();
```

```
854         loop int i = 1 until i > 3 begin
855            practice_pic.set_part(2, Studied_pics[Studied_pic_count]);
856            practice_pic.set_part_x(2, object_position[i][1]);
857            practice_pic.set_part_y(2, object_position[i][2]);
858            practice_study_trial.present();
859
860            wait_interval(20);
861
862            i = i + 1;
863            Studied_pic_count = Studied_pic_count + 1;
864         end;
865         wait_delay.present();
866
867         if (Practice_trial_type_index[j] == 0 || Practice_trial_type_index[j] == 1)
    then #Obj condition
868            condition = "Obj";
869            Obj_Condition_Message.present();
870            if (Practice_trial_type_index[j] == 0) then #Not-studied Object trial
871               studied = 0;
872               correct_button = 3;
873               practice_Obj_test_pic.set_part(2,
    Non_studied_pics[Non_studied_pic_count]);
874               practice_Obj_test_trial.present();
875               Non_studied_pic_count = Non_studied_pic_count + 1;
876            else #Studied Object trial
877               studied = 1;
878               correct_button = 2;
879               #Randomly choose one of the 3 pictures as the test stimulus
880               Obj_test_pic_index.shuffle();
881               practice_Obj_test_pic.set_part(2, Studied_pics[Studied_pic_count -
    Obj_test_pic_index[1]]);
882               practice_Obj_test_trial.present();
883            end;
884         else #Loc condition
885            condition = "Loc";
886            Loc_Condition_Message.present();
887            if (Practice_trial_type_index[j] == 2) then #Not-studied Location trial
888               studied = 0;
889               correct_button = 3;
890               practice_Loc_test_pic.set_part_x(2, object_position[4][1]);
891               practice_Loc_test_pic.set_part_y(2, object_position[4][2]);
892               practice_Loc_test_trial.present();
893            else #Studied Location trial
894               studied = 1;
895               correct_button = 2;
896               Obj_test_pos_index.shuffle();
897               practice_Loc_test_pic.set_part_x(2,
    object_position[Obj_test_pos_index[1]][1]);
898               practice_Loc_test_pic.set_part_y(2,
    object_position[Obj_test_pos_index[1]][2]);
899               practice_Loc_test_trial.present();
900            end;
901         end;
902
903         wait_interval(20);
904
905         my_data = stimulus_manager.last_stimulus_data();
906         my_response = response_manager.last_response_data();
907         RT = my_data.reaction_time();
908         resp_button = my_data.button();
909
910         if (resp_button == Practice_correct_key[j]) then
911            feedback_correct_trial.present();
912         else
```

```
913             feedback_incorrect_trial.present();
914          end;
915
916          blank_trial.present();
917          j = j + 1;
918       end;
919
920       #Give experimenter option to repeat practice trials if necessary
921       repeat_practice_trial.present();
922
923       my_data = stimulus_manager.last_stimulus_data();
924       resp_button = my_data.button();
925
926       if (resp_button == 4) then
927          #Exit the outer for loop and proceed to Part 1
928          k = 1;
929       else
930          #Reset the counters so we re-use the practice trial pictures
931          Studied_pic_count = Studied_pic_count_holder;
932          Non_studied_pic_count = Non_studied_pic_count_holder;
933       end;
934
935    end;
936
937    wait_interval (100);
938    port.send_code(23);
939    wait_interval (100);
940    #Set the port output to be true - start writing to the output log
941    #response_manager.set_port_output( true );
942
943    ##############################################################################################
       ##############################
944    #Part 1 Single Modality Trials
945    port.send_code(22);
946    wait_interval (100);
947
948    loop int j = 1 until j > Block1 begin
949       blank_grid_trial.present();
950       object_position.shuffle();
951       loop int i = 1 until i > 3 begin
952          pic.set_part(2, Studied_pics[Studied_pic_count]);
953          pic.set_part_x(2, object_position[i][1]);
954          pic.set_part_y(2, object_position[i][2]);
955          study_trial.present();
956
957          wait_interval(20);
958
959          i = i + 1;
960          Studied_pic_count = Studied_pic_count + 1;
961       end;
962
963       wait_delay.present();
964
965       if (Block1_trial_type_index[j] == 0 || Block1_trial_type_index[j] == 1) then
       #Obj condition
966          condition = "Obj";
967          Obj_Condition_Message.present();
968          if (Block1_trial_type_index[j] == 0) then #Not-studied Object trial
969             studied = 0;
970             correct_button = 3;
971             Obj_test_pic.set_part(2, Non_studied_pics[Non_studied_pic_count]);
972             Obj_test_trial.present();
973             Non_studied_pic_count = Non_studied_pic_count + 1;
974          else #Studied Object trial
```

```
975             studied = 1;
976             correct_button = 2;
977             Obj_test_pic_index.shuffle();
978             Obj_test_pic.set_part(2, Studied_pics[Studied_pic_count -
    Obj_test_pic_index[1]]);
979             Obj_test_trial.present();
980          end;
981       else #Loc condition
982          condition = "Loc";
983          Loc_Condition_Message.present();
984          if (Block1_trial_type_index[j] == 2) then #Not-studied Location trial
985             studied = 0;
986             correct_button = 3;
987             Loc_test_pic.set_part_x(2, object_position[4][1]);
988             Loc_test_pic.set_part_y(2, object_position[4][2]);
989             Loc_test_trial.present();
990          else #Studied Location trial
991             studied = 1;
992             correct_button = 2;
993             Obj_test_pos_index.shuffle();
994             Loc_test_pic.set_part_x(2, object_position[Obj_test_pos_index[1]][1]);
995             Loc_test_pic.set_part_y(2, object_position[Obj_test_pos_index[1]][2]);
996             Loc_test_trial.present();
997          end;
998       end;
999
1000      wait_interval(20);
1001
1002      #Saving data
1003      my_data = stimulus_manager.last_stimulus_data();
1004      my_response = response_manager.last_response_data();
1005      RT = my_data.reaction_time();
1006      # RT = my_response.reaction_time();??? - it should be my_data.reaciton_time(),
    my_response doesn't have .reaction_time()
1007      resp_button = my_data.button();
1008
1009      if (resp_button == correct_button) then
1010         corr_resp = 1;
1011      else
1012         corr_resp = 0;
1013      end;
1014
1015      if (resp_button == 2) then
1016         Resp = 1;
1017      else
1018         Resp = 0;
1019      end;
1020
1021      ofile1.print(string(1) + "\t"); #Block number
1022      ofile1.print(string(j) + "\t"); #Trial number
1023      ofile1.print(condition + "\t"); #Condition type (Obj, Loc, or Both)
1024      ofile1.print(string(studied) + "\t"); #Was object studied (0=Not-studied;
    1=Studied)
1025      ofile1.print(string(Resp) + "\t"); #Response (0=New; 1=Old)
1026      ofile1.print(string(corr_resp) + "\t"); # Was response correct (0=incorrect;
    1=correct)
1027      ofile1.print(string(RT) + "\n"); #Response Time
1028
1029      blank_trial.present();
1030      j = j + 1;
1031   end;
1032
1033   wait_interval (100);
1034   port.send_code(23);
```

```
1035   wait_interval (100);
1036
1037   #Show the Rest trial, turn off port output during Rest
1038   #response_manager.set_port_output( false );
1039   rest_trial.present();
1040   #response_manager.set_port_output( true );
1041
1042   ##############################################################################
       ##########################
1043   #Part 2 Instructions
1044
1045   #response_manager.set_port_output( false );
1046   Instructions_event.set_stimulus(instructions10);
1047   Instructions_trial.present();
1048   Instructions_event.set_stimulus(instructions11);
1049   Instructions_trial.present();
1050   Instructions_event.set_stimulus(instructions12);
1051   Instructions_trial.present();
1052   Instructions_event.set_stimulus(instructions13);
1053   Instructions_trial.present();
1054
1055   ##############################################################################
       ##########################
1056   #Part 2 Practice - 2 trials: 1 New Location, 1 Old Location
1057   Studied_pic_count_holder = Studied_pic_count;
1058   Non_studied_pic_count_holder = Non_studied_pic_count;
1059
1060   wait_interval (100);
1061   port.send_code(22);
1062   wait_interval (100);
1063
1064   loop int k = 0 until k > 0 begin
1065      loop int j = 1 until j > 2 begin
1066         blank_grid_trial.present();
1067         object_position.shuffle();
1068         loop int i = 1 until i > 3 begin
1069            practice_pic.set_part(2, Studied_pics[Studied_pic_count]);
1070            practice_pic.set_part_x(2, object_position[i][1]);
1071            practice_pic.set_part_y(2, object_position[i][2]);
1072            practice_study_trial.present();
1073
1074            wait_interval(20);
1075
1076            i = i + 1;
1077            Studied_pic_count = Studied_pic_count + 1;
1078         end;
1079
1080      wait_delay.present();
1081      Conjunction_Condition_Message.present();
1082      condition = "Both";
1083
1084         if (Practice2_trial_type_index[j] == 0) then #Not-studied Location trial
1085            studied = 0;
1086            correct_button = 3;
1087            Obj_test_pic_index.shuffle();
1088            practice_Conjunction_test_pic.set_part(2, Studied_pics[Studied_pic_count
       - Obj_test_pic_index[1]]);
1089            if (Obj_test_pic_index[1] == 3) then
1090               Loc = random(2,3);
1091               practice_Conjunction_test_pic.set_part_x(2, object_position[Loc][1]);
1092               practice_Conjunction_test_pic.set_part_y(2, object_position[Loc][2]);
1093               practice_Conjunction_test_trial.present();
1094            elseif (Obj_test_pic_index[1] == 2) then
1095               int temp = random(1,2);
```

```
1096              if (temp == 1) then
1097                 Loc = 1;
1098              else
1099                 Loc = 3;
1100              end;
1101              practice_Conjunction_test_pic.set_part_x(2, object_position[Loc][1]);
1102              practice_Conjunction_test_pic.set_part_y(2, object_position[Loc][2]);
1103              practice_Conjunction_test_trial.present();
1104           else
1105              Loc = random(1,2);
1106              practice_Conjunction_test_pic.set_part_x(2, object_position[Loc][1]);
1107              practice_Conjunction_test_pic.set_part_y(2, object_position[Loc][2]);
1108              practice_Conjunction_test_trial.present();
1109           end
1110        else #Studied Location trial
1111           studied = 1;
1112           correct_button = 2;
1113           Obj_test_pic_index.shuffle();
1114           practice_Conjunction_test_pic.set_part(2, Studied_pics[Studied_pic_count
     - Obj_test_pic_index[1]]);
1115
1116           if (Obj_test_pic_index[1] == 3) then
1117              practice_Conjunction_test_pic.set_part_x(2, object_position[1][1]);
1118              practice_Conjunction_test_pic.set_part_y(2, object_position[1][2]);
1119           elseif (Obj_test_pic_index[1] == 2) then
1120              practice_Conjunction_test_pic.set_part_x(2, object_position[2][1]);
1121              practice_Conjunction_test_pic.set_part_y(2, object_position[2][2]);
1122           else
1123              practice_Conjunction_test_pic.set_part_x(2, object_position[3][1]);
1124              practice_Conjunction_test_pic.set_part_y(2, object_position[3][2]);
1125           end;
1126           practice_Conjunction_test_trial.present();
1127        end;
1128
1129        wait_interval(20);
1130
1131        my_data = stimulus_manager.last_stimulus_data();
1132        my_response = response_manager.last_response_data();
1133        RT = my_data.reaction_time();
1134        resp_button = my_data.button();
1135
1136        if (resp_button == Practice2_correct_key[j]) then
1137           feedback_correct_trial.present();
1138        else
1139           feedback_incorrect_trial.present();
1140        end;
1141
1142        blank_trial.present();
1143        j = j + 1;
1144     end;
1145
1146     #Give experimenter option to repeat practice trials if necessary
1147     repeat_practice_trial.present();
1148
1149     my_data = stimulus_manager.last_stimulus_data();
1150     resp_button = my_data.button();
1151
1152     if (resp_button == 4) then
1153        #Exit the outer for loop and proceed to Part 1
1154        k = 1;
1155     else
1156        #Reset the counters so we re-use the practice trial pictures
1157        Studied_pic_count = Studied_pic_count_holder;
1158        Non_studied_pic_count = Non_studied_pic_count_holder;
```

```
1159      end;
1160
1161   end;
1162
1163   wait_interval (100);
1164   port.send_code(23);
1165   wait_interval (100);
1166   #Reset the port output to be true - continue writing to the output log
1167   #response_manager.set_port_output( true );
1168
1169   ##############################################################################
      ##############################
1170   #Part 2 Conjunction Condition Trials
1171   port.send_code(22);
1172   wait_interval (100);
1173
1174   loop int j = 1; until j > Block2 begin
1175      blank_grid_trial.present();
1176      object_position.shuffle();
1177      loop int i = 1 until i > 3 begin
1178         pic.set_part(2, Studied_pics[Studied_pic_count]);
1179         pic.set_part_x(2, object_position[i][1]);
1180         pic.set_part_y(2, object_position[i][2]);
1181         study_trial.present();
1182
1183         wait_interval(20);
1184
1185         i = i + 1;
1186         Studied_pic_count = Studied_pic_count + 1;
1187      end;
1188
1189      wait_delay.present();
1190      Conjunction_Condition_Message.present();
1191      condition = "Both";
1192
1193      if (Block2_trial_type_index[j] == 0) then #Not-studied Location trial
1194         studied = 0;
1195         correct_button = 3;
1196         Obj_test_pic_index.shuffle();
1197         Conjunction_test_pic.set_part(2, Studied_pics[Studied_pic_count -
      Obj_test_pic_index[1]]);
1198         if (Obj_test_pic_index[1] == 3) then
1199            Loc = random(2,3);
1200            Conjunction_test_pic.set_part_x(2, object_position[Loc][1]);
1201            Conjunction_test_pic.set_part_y(2, object_position[Loc][2]);
1202            Conjunction_test_trial.present();
1203         elseif (Obj_test_pic_index[1] == 2) then
1204            int temp = random(1,2);
1205            if (temp == 1) then
1206               Loc = 1;
1207            else
1208               Loc = 3;
1209            end;
1210            Conjunction_test_pic.set_part_x(2, object_position[Loc][1]);
1211            Conjunction_test_pic.set_part_y(2, object_position[Loc][2]);
1212            Conjunction_test_trial.present();
1213         else
1214            Loc = random(1,2);
1215            Conjunction_test_pic.set_part_x(2, object_position[Loc][1]);
1216            Conjunction_test_pic.set_part_y(2, object_position[Loc][2]);
1217            Conjunction_test_trial.present();
1218         end
1219      else #Studied Location trial
1220         studied = 1;
```

```
1221         correct_button = 2;
1222         Obj_test_pic_index.shuffle();
1223         Conjunction_test_pic.set_part(2, Studied_pics[Studied_pic_count -
     Obj_test_pic_index[1]]);
1224
1225         if (Obj_test_pic_index[1] == 3) then
1226            Conjunction_test_pic.set_part_x(2, object_position[1][1]);
1227            Conjunction_test_pic.set_part_y(2, object_position[1][2]);
1228         elseif (Obj_test_pic_index[1] == 2) then
1229            Conjunction_test_pic.set_part_x(2, object_position[2][1]);
1230            Conjunction_test_pic.set_part_y(2, object_position[2][2]);
1231         else
1232            Conjunction_test_pic.set_part_x(2, object_position[3][1]);
1233            Conjunction_test_pic.set_part_y(2, object_position[3][2]);
1234         end;
1235         Conjunction_test_trial.present();
1236      end;
1237
1238      wait_interval(20);
1239
1240      #Saving data
1241      my_data = stimulus_manager.last_stimulus_data();
1242      my_response = response_manager.last_response_data();
1243      RT = my_data.reaction_time();
1244      resp_button = my_data.button();
1245
1246      if (resp_button == correct_button) then
1247         corr_resp = 1;
1248      else
1249         corr_resp = 0;
1250      end;
1251
1252      if (resp_button == 2) then
1253         Resp = 1;
1254      else
1255         Resp = 0;
1256      end;
1257
1258      ofile1.print(string(2) + "\t"); #Block number
1259      ofile1.print(string(j) + "\t"); #Trial number
1260      ofile1.print(condition + "\t"); #Condition type (Obj, Loc, or Both)
1261      ofile1.print(string(studied) + "\t"); #Was object studied (0=Not-studied;
     1=Studied)
1262      ofile1.print(string(Resp) + "\t"); #Response (0=New; 1=Old)
1263      ofile1.print(string(corr_resp) + "\t"); # Was response correct (0=incorrect;
     1=correct)
1264      ofile1.print(string(RT) + "\n"); #Response Time
1265
1266      blank_trial.present();
1267      j = j + 1;
1268   end;
1269
1270   ##############################################################################
     ##############################
1271   #End of experiment presentation
1272   wait_interval (100);
1273   port.send_code(23);
1274   wait_interval (100);
1275
1276   #close output file
1277   ofile1.close();
```