Appendix: Task Configurations

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This document begins by describing the configurable fields of M-USE’s base classes. After the base classes, it covers classes that have task-specific inheritances.

## Base Classes

### BlockDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| BlockCount | int | A unique number that represents the block number of the specified block, corresponds with the TrialDef BlockCount. |
| BlockName | string | A unique string used to label different blocks. |
| ContextName | string | Refers to the filename of the PNG texture in the resources folder used during the trial. |
| MinTrials | int | The minimum number of trials in the block. |
| MaxTrials | int | The maximum number of trials in the block. |
| NumTrials | int | The exact number of trials in the block. |
| MinMaxTrials | int[] | An integer array specifying the minimum and maximum number of trials in the block.  \*Note: e.g., [5, 10] means a minimum of 5 trials in the block and a maximum of 10 trials in the block. |
| RandomMinMaxTrials | int[] | An integer array specifying the range for the random selection of the maximum number of trials in a block. \*Note: e.g., [5, 10] means a random number between 5 and 10 trials will run, and then the block will be forced to switch. Block switch can occur before this max number if criterion is met using BlockEndType, BlockEndThreshold, BlockEndWindow and the minimum number of trials is completed, in this example, 5 trials. |
| BlockEndType | string | A strategy defining when to end a block. Options include: CurrentTrialPerformance, SimpleThreshold, ThresholdAndPeak, or ThresholdOrAsymptote. |
| BlockEndThreshold | float | A specified value used in conjunction with the BlockEndType to determine when to conclude a block. |
| BlockEndWindow | int | The number of most recent trials evaluated against the block end threshold. |
| NumPulses | int | The number of pulses transmitted to the SyncBox when a pulse reward is given. |
| PulseSize | int | The magnitude of each pulse sent from the SyncBox for reward. |
| SliderInitialValue | int | The initial position or value of a slider used within the block. |
| TokenGain | int | The number of tokens earned per correct response |
| TokenLoss | int | The number of tokens lost per correct response |
| NumInitialTokens | int | The initial tokens in the token bar at the start of the block. |
| TokenBarCapacity | int | The number of tokens that the token bar can hold.  Note: Ensure the value is less than 10 for CR |
| TrialDefs | List<TrialDef> | A list of trial definitions for the block. |
| RandomNumGenerator | int | Random number generator, used to select random number of max trials in the MinMaxTrials range. |
| DifficultyLevel | Int | The difficulty level for the block. Higher numbers are higher difficulty. |
| PerceptualSimilarity | Int | The perceptual similarity score (1-5) of the Quaddles for that trial |
| ParticleHaloActive | Bool | Whether or not the particle halo will be created after a selection is made |
| CircleHaloActive | Bool | Whether or not the circle halo will be created after a selection is made. |
| MaskValues | Vector3[] | MaskValues [TrialNum, MaskNum, Transparency] |
| MaskColor | Vector3 | Color of the Mask |
| MaskFadeInDuration | Float | Duration for how long it takes the mask to fade onto the screen. |
| StimulationType | String | Stimulation type (FixationChoice\_Target, FixationChoice\_Distractor) |
| InitialFixationDuration | Float | Fixation time before sending the FixationOnsetPassed eventcode (selection actually starts) |
| StimulationDelayDuration | Float | Delay before stimulation is triggered. |
| StimulationConditionCodes | Int[] | Stimulation conditions to be randomized and sent to external python script at start of stimulation trial. |
| TrialsToStimulateOn | Int[] | Trials to stimulate on for the block |
| ObjectsToStimulateOn | Int[][] | Objects to stimulate on for the block (specific to WWW task currently). |
| PosStep | int | This determines the number of DifficultyLevels up the staircase goes after a lower effort choice. For trials in default blocks, you may set this to -1 |
| NegStep | int | This determines the number of DifficultyLevels down the staircase goes after a higher effort choice. For trials in default blocks, you may set this to -1 |
| TrialDefSelectionStyle | string | The selection style for the trial. |
| MaxDiffLevel | int | The maximum difficulty level. |
| AvgDiffLevel | int | The average difficulty level. |
| DiffLevelJitter | int | The amount of jitter with the difficulty levels. |
| NumReversalsUntilTerm | int | The number of reversals required until termination. |
| MinTrialsBeforeTermProcedure | int | The minimum number of trials before the termination procedure. |
| TerminationWindowSize | int | The size of the termination window. |
| RandomMinTrialDuration | Float[] | The list of trial durations to be randomized. |
| MinTrialDuration | Float? | The minimum trial duration. |

### TrialDef

TrialDef variables include each of the above BlockDef variables (See **BlockDef**), in addition to the variables listed below.

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| TrialCountInBlock | int | The count of trials within a block. |
| TrialCountInTask | int | The count of trials within a task. |
| TrialID | string | A unique string identifier for a trial. |
| NumTrialsBeforePosStep | Int | The number of trials before the positive step up in difficulty level |
| NumTrialsBeforeNegStep | int | The number of trials before the negative step down in difficulty level |

### TaskDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| TaskName | string | Represents the name of the Task |
| ContextExternalFilePath | String | Directory path to the external file associated with the context images |
| AudioClipsFolderPath | String | Directory path to the external folder containing the audio clips. |
| ExternalStimFolderPath | String | Directory path to the external folder where the stimuli files are located. |
| ExternalStimScale | Float? | Scale applied to the external stimuli |
| FeedbackControllers | List<string> | List of controllers used for feedback (Audio, Halo, Slider, Token) |
| TouchFeedbackDuration | Float | The duration of the selection error touch feedback. Default is 0.3. |
| TotalTokensNum | Int | The total number of tokens in the token bar. Default is 5. |
| StartButtonPosition | Vector3 | Position of the start button. Default is (0, 0, 0) |
| StartButtonScale | Float | Scale applied to the Start Button. Default is 1.2. |
| TouchFeedbackSize | Float | Scale of the Touch Feedback circle. Default is 20. |
| StimFacingCamera | bool | A boolean indicating if the stimuli should automatically orient to face the camera. |
| ShadowType | string | A string indicating the type of shadow the stimulus produces. Available options are: "None", "Soft", and "Hard". |
| NeutralITI | bool | A boolean denoting if a neutral texture should be presented during the task's Inter-Trial Interval. The "NeutralITI" texture from the resources is utilized for this purpose. |
| StimFacingCamera | bool | A boolean used to have the stimuli face the camera during the trial. |
| TaskDirectionalLightIntensity | Float | The task’s directional light intensity |
| ShotgunRadius\_Pixels | Int | Controls the tasks’ Shotgun radius in pixels. (only applicable if using a shotgun handler as your selection type). |
| RunStimulation | Bool | Whether or not to run the task a simulation (specific to KeepTrack task). |

Below are the listed configurable fields for every task implemented in M-USE, along with their type and description. All tasks’ **BlockDef**, **TrialDef**, **TaskDef,** and **StimDef** inherit from the base class detailed above.

## AntiSaccade

### BlockDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| MaxTrialsInBlock | Int | The maximum number of trials in the block. |

### TrialDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| PreCue\_Size | int | Size of the PreCue gameobject. |
| SpatialCue\_Icon | string | The name of the icon to use as the SpatialCue gameobject. |
| Mask\_Icon | string | A name of the icon to use as the Mask gameobject. |
| SpatialCueActiveThroughDisplayTarget | bool | A boolean for whether or not the SpatialCue is active through the display target state. |
| UseSpinAnimation | bool | A Boolean to determine whether or not to use the SpinAnimation. |
| DeactivateNonSelectedStimOnSel | bool | A Boolean to determine whether or not to have the non selected stimuli disappear after the selection. |
| RandomSpatialCueColor | bool | A Boolean to determine whether or not to use a random SpatialCue color. |
| RandomMaskColor | bool | A Boolean to determine whether or not to use a random mask color. |
| TargetStimIndex | int | The index of the Target Stim. |
| DistractorStimIndices | int[] | The indices of the Distractor Stims. |
| Mask\_Pos | Vector3 | The position of the Mask gameobject. |
| SpatialCue\_Pos | Vector3 | The position of the SpatialCue gameobject. |
| TargetStim\_DisplayPos | Vector3 | The display position of the TargetStim. |
| TargetStim\_ChoosePos | Vector3 | The choose position of the TargetStim. |
| DistractorStims\_ChoosePos | Vector3[] | The choose positions of the DistractorStims. |
| HaloFbDuration | Float | The duration of the halo feedback. |
| RewardMag | Int | The token reward magnitude. |
| PreCueDuration | Float | The duration of the PreCue state. |
| AlertCueDuration | Float | The duration of the AlertCue state. |
| AlertCueDelayDuration | Float | The duration of the AlertCueDelay state. |
| SpatialCueDuration | float | The duration of the SpatialCue state. |
| SpatialCueDelayDuration | Float[] | The duration of the SpatialCueDelay state. |
| DisplayTargetDuration | Float[] | The duration of the DisplayTarget state. |
| MaskDuration | Float | The duration of the Mask state. |
| PostMaskDelayDuration | Float | The duration of the PostMaskDelay state. |
| ChooseStimDuration | Float | The duration of the ChooseStim state. |
| FeedbackDuration | Float | The duration of the Feedback state. |
| ItiDuration | Float | The duration of the ITI state. |
| MaxTrialsInBlock | Int | Max number of trials in the block. |

### StimDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| IsTarget | bool | A boolean for whether or not the stimuli is the target stimuli for the trial. |

### TaskDef

No additional variables used.

## AudioVisual

### TrialDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| AudioClipName | int | Size of the PreCue gameobject. |
| CorrectObject | string | The name of the icon to use as the SpatialCue gameobject. |
| AudioClipLength | string | A name of the icon to use as the Mask gameobject. |
| ShowTextFeedback | Bool | Whether or not to show text feedback. |
| WaitCueIcon | string | The name of the WaitCue icon. |
| WaitCueSize | float | The size of the WaitCue icon. |
| WaitCueColor | Float[] | The color of the WaitCue. |
| LeftObjectIcon | string | The name of the LeftObject Icon. |
| LeftObjectSize | float | The size of the LeftObject. |
| LeftObjectPos | Vector3 | The position of the LeftObject. |
| LeftObjectColor | Float[] | The color of the left object. |
| RightObjectIcon | string | The name of the RightObject icon. |
| RightObjectSize | float | The size of the RightObject. |
| RightObjectPos | Vector3 | The position of the RightObject. |
| RightObjectColor | Float[] | The color of the RightObject. |
| PreparationDuration | Float | The duration of the Preparation state. |
| DisplayOptionsDuration | Float | The duration of the DisplayOptions state. |
| WaitPeriodDuration | Float | The duration of the WaitPeriod state. |
| ChoiceDuration | Float | The duration of the Choice state. |
| FeedbackDuration | Float | The duration of the Feedback state. |
| ItiDuration | Float | The duration of the ITI state. |

### BlockDef

No additional variables used.

### TaskDef

No additional variables used.

### StimDef

No additional variables used.

## Continuous Recognition

### BlockDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| ShakeStim | bool | A boolean that defines whether the stimuli will wobble in a small circle during the trial.  \*Note: Primarily used for added difficulty. |
| FindAllStim | bool | A boolean for whether or not the block can be completed by finding all stim. \*Default: Block is ended by completing all trials in the TrialDef. |
| UseStarfield | bool | A boolean that assigns the visibility of the Starfield (snow-like particle system).  \*Note: Primarily used for added difficulty. |
| ManuallySpecifyLocations | bool | A boolean for manually specifying stimulus locations in the BlockDef config file. Setting to true indicates that stimuli locations are specified in the BlockStimLocations field. |
| SliderChange | int | The change in the sliders value after a selection |
| BlockStimIndices | int[] | An array of integers that indicate the stimuli loaded for the block, using the index that corresponds to the StimIndex of the StimDef config file. |
| NumObjectsMinMax | int[] | The number of stim in the first and last trial. Total number of trials is calculated as (Num 2 – Num 1) + 1.  \*Note: Ensure the value for the second number is 24 or less. |
| BlockStimLocations | Vector3[] | The stimuli locations if you set the ManuallySpecifyLocations field to true. |
| X\_Locations | float[] | The stimuli X locations used to generate the stimulus locations. |
| Y\_Locations | float[] | The stimuli Y locations used to generate the stimulus locations. |
| SlopeOfRewardIncreaseOverTrials | Float | The slope of the reward increase over the trials. |
| \*MaxNumTrials | int | The maximum number of trials in a block. Calculation depends on the type of block end: FindAllStim or CompleteAllTrials.  \*Note: Not a configurable variable. Calculated in script. |

### TrialDef

The TrialDef variables are the same as the BlockDef variables, see **BlockDef**.

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| ShakeStim | bool | A boolean that defines whether the stimuli will wobble in a small circle during the trial.  \*Note: Primarily used for added difficulty. |
| FindAllStim | bool | A boolean for whether or not the block can be completed by finding all stim. \*Default: Block is ended by completing all trials in the TrialDef. |
| UseStarfield | bool | A boolean that assigns the visibility of the Starfield (snow-like particle system).  \*Note: Primarily used for added difficulty. |
| SliderChange | int | The change in the sliders value after a selection |
| BlockStimIndices | int[] | An array of integers that indicate the stimuli loaded for the block, using the index that corresponds to the StimIndex of the StimDef config file. |
| NumObjectsMinMax | int[] | The number of stim in the first and last trial. Total number of trials is calculated as (Num 2 – Num 1) + 1.  \*Note: Ensure the value for the second number is 24 or less. |
| ItiDuration | Float | The duration of the ITI state. |
| X\_FbLocations | float[] | The stimuli X feedback locations used to generate the stimulus locations. |
| Y\_FbLocations | float[] | The stimuli Y feedback locations used to generate the stimulus locations. |
| SlopeOfRewardIncreaseOverTrials | Float | The slope of the reward increase over the trials. |

### TaskDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| MakeStimPopOut | Bool | Controls whether or not to make the stim appear very large so that the correct choices stand our for debugging purposes. |

### StimDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| PreviouslyChosen | bool | A boolean that assigns if the stimulus has already been chosen during the block. |
| TrialNumFirstShownOn | Int | The trial number that the stimuli was initially shown during. |

## Effort Control

### BlockDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| NumClicksLeft | int | The number of outlines for the balloon on the left. |
| NumClicksRight | int | The number of outlines for the balloon on the right. |
| NumCoinsLeft | int | The number of tokens shown above the balloon on the left. |
| NumCoinsRight | int | The number of tokens shown above the balloon on the right. |
| NumPulsesLeft | int | The number of pulses delivered for completed left balloon inflation. |
| NumPulsesRight | int | The number of pulses delivered for completed right balloon inflation. |
| PulseSizeLeft | int | The size of the pulses delivered for completed left balloon inflation. |
| PulseSizeRight | int | The size of the pulses delivered for completed right balloon inflation. |
| ClicksPerOutline | int | The number of clicks needed to inflate the balloon to the next outline |
| TokensInMiddleOfOutlines | Bool | Whether or not to have the tokens in the middle of the balloon outlines. |

### TrialDef

See **BlockDef**

### TaskDef

No additional variables used.

### StimDef

No additional variables used.

## Flex Learning

### BlockDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| TrialStimLocations | Vector3[] | An array of 3D vectors specifying where each stimulus will appear, following the order in the TrialStimIndices. |
| TrialStimIndices | int[] | An array of integers that indicate the stimuli loaded for the block, using the index that corresponds to the StimIndex of the StimDef config file. |
| ProbabilisticTrialStimTokenReward | Reward[][] | An array indicating the likelihood of obtaining varying reward amounts for each stimulus, assigned based on the order in the TrialStimIndices. |
| ProbabilisticNumPulses | Reward[] | An array indicating the likelihood of receiving varied reward amounts when a reward pulse is issued. |
| RandomizedLocations | bool | A boolean indicating if the positions in TrialStimLocations are randomly allocated or are assigned as listed. |
| TokensWithStimOn | bool | A boolean that determines if the stimuli and associated feedback remain visible on screen while token rewards are being given.  \*Default: false. |
| FeatureSimilarity | Float? | The value indicating the feature similarity. |

### TrialDef

See **BlockDef**.

### TaskDef

No additional variables used.

### StimDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| IsTarget | bool | A boolean that determines if the stimulus is the target object, based on a positive reward assignment. |

## Fruit Runner

### BlockDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| FogStrength | Float | The value indicating the strength of the fog UI for that block. |

### TrialDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| TrialStimIndices | Int[] | The indices of the stim for that trial. |
| ProbabilisticTokenReward | Reward[][] | The probabilities of specific token rewards. Maps to trialStimIndices. |
| TrialGroup\_InSpawnOrder | Int[][] | Trial stim indices in spawn order (blockade is -1). |
| TrialStimGeneralPositions | String[][] | Options are Left, Right, or Middle. Values are mapped to TrialGroup\_InSpawnOrder. |
| NumGroups | Int | The number of groups for the Trial. |
| BlockadeTokenLoss | Int | The token loss from hitting a blockade. |
| BananaTokenGain | Int | The token gain from hitting a banana. |
| FloorMovementSpeed | Float | The movement speed of the floor tiles |
| FloorTileLength | Float | The number of floor tiles. |
| AllowItemPickupAnimations | Bool | Whether or not to allow Item Pickup Animations. |
| SkyboxName | String | Name of the Skybox to be used during that trial. |
| ShowUI | Bool | Whether or not to show the UI. |
| StimFacingCamera | Bool | Whether or not the stim face the camera. |
| SkipCelebrationState | Bool | Whether or not to skip the Celebration state. |

### StimDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| QuaddleFeedbackType | String | The feedback type for the Quaddle. |

### TaskDef

No additional variables used.

## Keep Track

### TrialDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| TrialObjectIndices | Int[] | The indices of the stimuli for that trial. |
| DisplayTargetDuration | Float | The duration of the DisplayTarget state. |
| DisplayDistractorsDuration | Float | The duration of the DisplayDistractors state. |

### BlockDef

No additional variables used.

### TaskDef

No additional variables used.

### StimDef

No additional variables used.

## Maze Game

### BlockDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| MazeName | string | A unique string identifier for the maze. |
| MazeDims | Vector2 | A 2D vector that indicates the dimensions of the maze in terms of width and height. |
| MazeStart | string | A string identifier indicating the starting position within the maze (e.g., A1 represents the bottom left of the maze). |
| MazeFinish | string | A string identifier indicating the finishing or end position within the maze (e.g., A1 represents the bottom left of the maze). |
| MazeNumSquares | int | The total number of squares along the maze path. |
| MazeNumTurns | int | The total number of turns along the maze path. |
| ViewPath | bool | A boolean indicating if the chosen path through the maze should be visualized or highlighted for the participant. |
| RewardRatio | int | An integer indicating the fixed number of correct responses required before a reward is given. |
| ErrorPenalty | bool | A boolean indicating whether a penalty is applied for incorrect responses or errors. |
| FlashingTileRatio | int | Indicates the frequency of the tile flashing.  \*Note: The pattern always begins with the start tile flashing. A value of 0 indicates that there are no tiles along the path that are flashing. A value of 1 indicates that the next correct tile along the path will flash. A value of 2 indicates that every other tile will flash, etc.. |
| DefaultTileColor | float[] | The RGB values of the default color for the maze tiles.  \*Note: Values range from [0,1], divide integer values by 255 |
| MazeDef | String | The name of the MazeDef to use for the block. |
| Landmarks | Dictionary<string,string> | A dictionary of the landmarks to be used for the block. |
| Blockades | List<string> | A list of the blockades to be used for the block. |

### TrialDef

See **BlockDef.**

### TaskDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| MazePosition | Vector3 | The 3D coordinates for the center of the maze within the scene. |
| MazeBackgroundTexture | string | The texture applied as the maze background. |
| SpaceBetweenTiles | float | The distance maintained between individual tiles in the maze. |
| TileSize | float | The size of individual tiles in the maze. |
| TileTexture | string | The texture or pattern applied to each maze tile. |
| StartColor | float[] | The RGB values of the color of the first tile in the hidden maze.  \*Note: Values range from [0,1], divide integer values by 255 |
| FinishColor | float[] | The RGB values of the color of the final tile in the hidden maze.  \*Note: Values range from [0,1], divide integer values by 255 |
| CorrectColor | float[] | The RGB values of the color displayed given a correct tile selection.  \*Note: Values range from [0,1], divide integer values by 255 |
| LastCorrectColor | float[] | The color displayed given the re-selection of the current position within the sequence and for the blinking of the next correct tile in the sequence.  \*Note: Values range from [0,1], divide integer values by 255 |
| IncorrectRuleAbidingColor | float[] | The color displayed given an incorrect selection that still adheres to established rules.  \*Note: Values range from [0,1], divide integer values by 255 |
| IncorrectRuleBreakingColor | float[] | The color displayed given an incorrect selection that breaks or violates established rules.  \*Note: Values range from [0,1], divide integer values by 255 |
| NumBlinks | int | The number of times a tile blinks or flashes. Used in GuidedMazeSelection or when indicating last correct tile following a perseverative error. |
| UsingFixedRatioReward | bool | Indicates if rewards are given based on a fixed ratio, which is assigned in the BlockDef. |
| DefaultTileColor | Float[] | The default tile color to be used for the task. |

### StimDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| IsTarget | Bool | Whether or not the stimuli is a target for the trial. |
| TokenUpdate | Int | The token increase for that stimulus. |

### MazeDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| mName | string | A unique string identifier for the maze. |
| mDims | Vector2 | A 2D vector that indicates the dimensions of the maze in terms of width and height.  \*Note: Use of mDims implies the generation of a rectangular maze. |
| mStart | string | A string identifier indicating the starting position within the maze. \*Note: e.g., A1 represents the bottom left of the maze. |
| mFinish | string | A string identifier indicating the finishing or end position within the maze. \*Note: e.g., A1 represents the bottom left of the maze. |
| mNumSquares | int | The total number of squares along the maze path. |
| mNumTurns | int | The total number of turns along the maze path. |
| mString | string | The JSON string representation of the maze that is loaded. |

## Touch-Hold-Release

### BlockDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| ShowNegFB | bool | A boolean that determines the presentation of negative visual feedback when the subject holds too long, holds too short, or moves their touch beyond the bounds of the object. |
| PerfWindowEndTrials | int | The number of most recent trials evaluated against the block end threshold. |
| PerfThresholdEndTrials | float | The necessary performance percentage needed to end the block. |
| AvoidObjectDuration | float | The duration of the AvoidObject State. The units are in seconds. |
| SelectObjectDuration | float | The duration of the SelectObject state. The units are in seconds. |
| TimeoutDuration | float | The duration of the timeout for clicking incorrectly. The units are in seconds. |
| ItiDuration | float | The duration of the ITI state. The units are in seconds. |
| MinTouchDuration | float | The minimum touch duration required to be considered a successful object selection. |
| MaxTouchDuration | float | The maximum touch duration that is the threshold of a successful object selection. |
| ObjectSize | float | The size of the object. |
| ObjectSizeMin | float | The minimum size of the object. |
| ObjectSizeMax | float | The maximum size of the object. |
| PositionX | int | The x position of the object. |
| PositionX\_Min | int | The minimum x position of the object. |
| PositionX\_Max | int | The maximum x position of the object. |
| PositionY | int | The y position of the object. |
| PositionY\_Min | int | The minimum y position of the object. |
| PositionY\_Max | int | The maximum y position of the object. |
| RewardTouch | bool | A boolean that determines if reward is sent for touching an object for the appropriate duration.  \*Note: Ensure only one of RewardTouch or RewardRelease are set to true. |
| RewardRelease | bool | A boolean that determines if reward is sent upon selecting the blue object for the appropriate duration.  \*Note: Ensure only one of RewardTouch or RewardRelease are set to true. |
| NumTouchPulses | int | The number of pulses transmitted to the SyncBox when a pulse reward is given for object touch. |
| NumReleasePulses | int | The number of pulses transmitted to the SyncBox when a pulse reward is given for object release. |
| RandomObjectSize | bool | A boolean that randomizes the object’s size. |
| RandomObjectPosition | bool | A boolean that randomizes the object’s position. |
| TimeToAutoEndTrialSec | int | The number of seconds before the trial automatically terminates.. |
| TouchToRewardDelay | float | The duration between the initiation of a touch and the sending of reward. |
| ReleaseToRewardDelay | float | The duration between the release of a touch and the sending of reward. |

### TrialDef

See **BlockDef**.

### TaskDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| StartWithSelectObjectState | bool | A boolean for whether the trial skips the AvoidObject State and begins with the SelectObject state. |

## Visual Search

### BlockDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| ProbabilisticTrialStimTokenReward | Reward[][] | An array indicating the likelihood of obtaining varying reward amounts for each stimulus, assigned based on the order in the TrialStimIndices. |
| ProbabilisticNumPulses | Reward[] | An array indicating the likelihood of receiving varied reward amounts when a reward pulse is issued. |
| RandomizedLocations | bool | A boolean indicating if the positions in TrialStimLocations are randomly allocated or are used as listed. |
| TokensWithStimOn | bool | A boolean that determines if the stimuli and associated feedback remain visible on screen while token rewards appear.  \*Default: false. |
| FeatureSimilarity | Float? | The value used to depict the feature similarity for that trial. |

### TrialDef

The TrialDef contains the BlockDef variables listed above, in addition to the following variables:

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| TrialStimLocations | Vector3[] | An array of 3D vectors specifying where each stimulus will appear, following the order in the TrialStimIndices. |
| TrialStimIndices | int[] | An array of integers that indicate the stimuli loaded for the block, using the index that corresponds to the StimIndex of the StimDef config file. |
| TrialStimTokenReward | int[] | An array of integers that indicate number of tokens that are added or subtracted from the token bar if that stimulus is selected |

### TrialDef

See **BlockDef**.

### TaskDef

No additional variables used.

### StimDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| IsTarget | bool | A boolean that determines if the stimulus is the target object, based on a positive reward assignment. |

## What-When-Where

### BlockDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| CorrectObjectTouchOrder | int[] | Assigns the order of selection for the block sequence, indexing through the stimuli defined in SearchStimIndices. |
| SearchStimIndices | int[] | An array of integers that indicate the search stimuli loaded for the block, using the index that corresponds to the StimIndex of the StimDef config file. |
| SearchStimLocations | Vector3[] | An array of 3D vectors specifying where each stimulus will appear, assigning according to the order in the SearchStimsIndices. |
| DistractorStimIndices | int[] | An array of integers that indicate the distractor stimuli loaded for the block, using the index that corresponds to the StimIndex of the StimDef config file. |
| DistractorStimLocations | Vector3[] | An array of 3D vectors specifying where each stimulus will appear, assigning according to the order in the DistractorStimsIndices. |
| RandomizedLocations | bool | If set to true, the SearchStimLocations and DistractorStimLocations are pooled and assigned. |
| LeaveFeedbackOn | bool | A boolean that indicates whether halo feedback remains visible after selecting an object. |
| SliderGain | int[] | An integer array that assigns the slider value gain, given the index in the in the sequence. |
| SliderLoss | int[] | An integer array that assigns the slider value loss, given the index in the in the sequence. |
| ErrorThreshold | int | An integer that indicates the number of consecutive errors the participant can make before imposing a delay of the start button presentation. |
| MaxTrialErrors | int | If the BlockEndType is CurrentTrialErrorCount or CurrentTrialPercentError, the player is limited to MaxTrialErrors in a single trial before the trial will terminate. |
| GuidedSequenceLearning | bool | A boolean that guides sequence learning by flashing a yellow halo around the next correct stimulus in the sequence. |
| MaxCorrectTrials | Int | The maximum number of correct trials |
| MaxSimilarity | Float | The maximum similarity score. |
| MinSimilarity | Float | The minimum similarity score. |
| MeanSimilarity | Float | The average similarity score. |
| MaskErrorsAllowed\_Trial | Int | The number of mask errors allowed during the trial. |

\*Note: If the BlockEndType is CurrentTrialErrorCount or CurrentTrialPercentError, the player can make several errors in a single trial and the block will terminate once they have completed the minimum number of trials in the block and the error count or percent error is below or equal to the BlockEndThreshold on the most recent trial.

### TrialDef

See **BlockDef.**

### TaskDef

No additional variables used.

### StimDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| IsCurrentTarget | bool | A boolean that indicates whether the stimulus is the target. |
| IsDistractor | bool | A boolean that indicates whether the stimulus is a distractor. |
| WasCorrectlyChosen | Bool | Whether or not the stimulus was chosen correctly. |

## Working Memory

### BlockDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| SampleStimLocation | Vector3 | A 3D vector specifying the location of the sample stim at the start of the trial. |
| SearchStimIndices | int[] | An array of integers that indicate the search stimuli loaded for the block, using the index that corresponds to the StimIndex of the StimDef config file. |
| SearchStimLocations | Vector3[] | An array of 3D vectors specifying where each stimulus will appear, assigning according to the order in the SearchStimIndices. |
| PostSampleDistractorStimIndices | int[] | An array of integers that indicate the post-sample distractor stimuli loaded for the block, using the index that corresponds to the StimIndex of the StimDef config file. |
| PostSampleDistractorStimLocations | Vector3[] | An array of 3D vectors specifying where each stimulus will appear, following the order in the PostSampleDistractorStimIndices. |
|  |  |  |
| SearchStimTokenReward | int[] | An array of integers that indicate number of tokens that are added or subtracted from the token bar if that stimulus is selected.  Note: Target is assigned by having a reward greater than 0, only one stimulus in the trial can have a positive token reward. |
| ProbabilisticSearchStimTokenReward | Reward[][] | An array indicating the likelihood of obtaining varying reward amounts for each stimulus, assigned based on the order in the TrialStimIndices. |
| DisplaySampleDuration | Float | The duration of the DisplaySample state |
| PosSampleDelayDuration | Float | The duration of the PostSampleDelay state. |
| DisplayPostSampleDistractorsDuration | Float | The duration of the DisplayPostSampleDistractors state. |
| PreTargetDelayDuration | Float | The duration of the PreTargetDelay state. |

### TrialDef

See **BlockDef**.

### TaskDef

No additional variables used.

### StimDef

|  |  |  |
| --- | --- | --- |
| *Variable Name* | *Type* | *Description* |
| IsTarget | bool | A boolean that determines if the stimulus is the target object, based on a positive reward assignment. |