User Study 02 - RL Audio Notebook

Please click the folliwng two links to read the explanatory statrement and answer the pre-study questionnaire.

Explanatory Statement: https://drive.google.com/file/d/1-8npbW1wg_ABzBnnGa1dgEgCaYjDED8o/view?usp=sharing

Pre-study Questionnaire: https://forms.gle/GAU8xzekWKkTMDLVA (Participant ID Required)

Setup

Before starting this Notebook...

1. **Sub the line of code specifying PWD path** on your device to: ./../RL_audio/notebooks

2. **Install the required packages** (below) to run the notebook

3. **Enable JupyterLab Dark**. Under "Settings" --> Theme --> "JupyterLab Dark" (*Optional but recommended*)

```
In [1]:   %cd /home/liamroy/Documents/PHD/repos/RL_audio/notebooks

          # %cd /Users/liamroy/Documents/Studies/Monash_31194990/PHD/repos/RL_audio/no

          # %cd <add your path here and comment out the others>
```
```
/home/liamroy/Documents/PHD/repos/RL_audio/notebooks
```
```
In [2]:   PWD = %pwd
```

Packages

Please install the following:

pygame (see this webpage ~ https://www.pygame.org/wiki/GettingStarted)
jupyterlab, numpy, termcolor, openpyxl, nbconvert-webpdf

Either use:
--> sudo apt-get install <package_name>
--> python3 -m pip install <package_name>
--> conda install -c conda-forge <package_name>

Example using conda:

--> conda install -c conda-forge <package_name>

jupyterlab or notebook

numpy

termcolor

openpyxl

nbconvert-webpdf

Imports

```
In [3]:  #  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
         # IMPORTS
         import os
         import shutil
         import time
         import numpy as np
         import random
         import argparse
         import linecache

         from scripts import audio_control_V2 as audio_ctrl
         from scripts import ucb1_algorithm_V2 as ucb1
         from scripts import misc_helpers_V2 as mischelp

         import sys

         from termcolor import colored, cprint
         # Termcolor guide: https://pypi.org/project/termcolor/


         #   ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
         #   ARGUMENTS & PARSER (Save this code for scripts working with CLI)

         # argParser = argparse.ArgumentParser()

         # # Enter any valid integer value
         # argParser.add_argument("-b", "--budg", required=False, help="select the bu

         # # Enter a valid parameter discritization integer (must match sound library
         # argParser.add_argument("-d", "--disc", required=False, help="select discri

         # # Enter true if you would like to see hidden print log, including Q-tables
         # argParser.add_argument("-p", "--prnt", required=False, help="show hidden p

         # # To load and save, simply enter in the base filename such as "lastsave" c
         # argParser.add_argument("-s", "--save", required=False, help="filename to s
         # argParser.add_argument("-l", "--load", required=False, help="load Q-table
```

Initializations

```
In [4]:  # Parameter discritization
         param_disc = 3

         state_descriptions = ["Stuck      \t- robot is in trouble and needs your hel
                               "Accomplished \t- robot has successfully completed it'
                               "Progressing \t- robot is working and doesn't need hel
                               "None of the above"]


         num_of_states = len(state_descriptions) - 1 # Adding a minus 1 since the las
         state_range = np.arange(num_of_states)


         # CREATE SOUND LIBRARY A
         # For library A, setup the array using libA
         library_A = "libA"

         # Create an array of size (N x N x N) where N = number of discretized regior
         # number of discretized regions for each param --> i.e. if equals 3 then (0,
         # ** must align with the discretization for selected sound library
         sound_obj_array_A = np.ndarray((param_disc, param_disc, param_disc),dtype=ob

         for param_1_range in range(param_disc):
                 for param_2_range in range(param_disc):
                         for param_3_range in range(param_disc):
                                 sound_obj_array_A[param_1_range, param_2_range, para


         # CREATE SOUND LIBRARY B
         # For library B, setup the array using libB
         library_B = "libB"

         # Create an array of size (N x N x N) where N = number of discretized regior
         # number of discretized regions for each param --> i.e. if equals 3 then (0,
         # ** must align with the discretization for selected sound library
         sound_obj_array_B = np.ndarray((param_disc, param_disc, param_disc),dtype=ob

         for param_1_range in range(param_disc):
                 for param_2_range in range(param_disc):
                         for param_3_range in range(param_disc):
                                 sound_obj_array_B[param_1_range, param_2_range, para
```

Start by entering your user ID.
Click on the first cell below & hit 'shift + enter'...

```
In [5]:  current_user_ID_str = mischelp.get_user_ID(parent_dir=PWD, num_of_states=num
```

```
------------------------------------------------------------------------
------------------------------------------------------------------------

Great job! You are user: 12

Click on the next cell below and hit 'shift + enter' to continue

------------------------------------------------------------------------
------------------------------------------------------------------------
```

MAIN STUDY

Welcome to this study's **Jupyter notebook**. In this work, we are developing strategies for improving human-robot interaction with nonverbal sounds (*beeps & boops*).

This study is best completed with **headphones**. Ensure your volume is on.

While a robot is working on a task, it can have many different internal states. Consider a scenario in which you are guiding a robot as it navigates a maze to find fruit:

If the robot gets lost or stuck behind an obstacle, the robot's internal state is: **Stuck**

Similarly, if the robot was able to reach it's goal (find a fruit), the robot's internal state is: **Accomplished**

If the robot is actively working on the task (navigating through the maze) but has neither gotten stuck nor completed the task, the robot's internal state is: **Progressing**

In this notebook, you will be asked to run through **3 sections**. In each of these sections, a virtual robot will play a sound. Once you listen to the sound, you will be asked to select which robot state you think the virtual robot is in. You will have the options: **Stuck**, **Accomplished**, **Progressing** and **None of the above**.

In addition to each answer, you will also self-score how confident you are in your response, on a scale from 1 to 10.

This process will repeat several times as a learning algorithm is processing in the background. **If you have any questions, ask your study moderator**. Have fun!

SECTION 1A

Our first robot is named Jackal.

Let's listen to **Jackal** make a few sounds to express itself.

For each sound, you will asked to select which robot state you think the robot is in.

Click on the cell below & hit 'shift + enter'...

```
In [6]:   mischelp.get_user_accuracy(sound_obj_array=sound_obj_array_A, lib_str=librar
                                      states_array=np.ndarray(num_of_states, dtype=obje
```

```
--------------------------------------------------------------------------
--------------------------------------------------------------------------

Robot sound is playing....
```

What state is the robot in:

```
[S]: Stuck            - robot is in trouble and needs your help
[A]: Accomplished     - robot has successfully completed it's task
[P]: Progressing      - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
```
Select a state by entering its first letter [S - A - P - N]:

```
You entered: S
```
Stuck   - robot is in trouble and needs your help

```
To replay the sound: Leave the input empty and hit 'enter'...
```
Score your confidence in this response from [0 to 10]
** or **
Type 'back' to change your response:

```
You entered: 7


--------------------------------------------------------------------------
--------------------------------------------------------------------------

Robot sound is playing....
```

What state is the robot in:

```
[S]: Stuck            - robot is in trouble and needs your help
[A]: Accomplished     - robot has successfully completed it's task
[P]: Progressing      - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
```
Select a state by entering its first letter [S - A - P - N]:

You entered: N
None of the above

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 5

Great job!
Click on the next cell below and hit 'shift + enter' to continue

----

Jackal Robot

SECTION 1B

Our next robot is named the Spot.

Let's listen to **Spot** make a few sounds to express itself.

You will notice **Spot** sounds slightly different to **Jackal**. For each sound, you will asked to select which robot state you think the robot is in.

Click on the cell below & hit 'shift + enter'...

```
In [7]:  mischelp.get_user_accuracy(sound_obj_array=sound_obj_array_B, lib_str=library
                                      states_array=np.ndarray(num_of_states, dtype=obje
```

```
-------------------------------------------------------------------------
-------------------------------------------------------------------------

Robot sound is playing....

What state is the robot in:

[S]: Stuck              - robot is in trouble and needs your help
[A]: Accomplished       - robot has successfully completed it's task
[P]: Progressing        - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A
Accomplished    - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:
```

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 5

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

```
You entered: 7
```


Great job!
Click on the next cell below and hit 'shift + enter' to continue

----

Spot Robot

Section 2

In section 2, we'll be listening to **Jackal** again.

Similar to before, **Jackal** make a few sounds to express itself, and you will asked to select which robot state you think the robot is in.

This process will repeat several times as a learning algorithm is processing in the background.

Section 2O

Click on the cell below & hit 'shift + enter'...

In [8]: *# SECTION 2O*

```
ucb1.ucb1_algor(num_of_states=num_of_states, state_descriptions=state_descri
                sound_obj_array=sound_obj_array_A, current_user_ID_str=curre
                delta_Q_thresh=2.0, conv_thresh=3, printer=None, mixer_volum


sect3_load_str = current_user_ID_str + "_sect20_final"
```


Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 8

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:
```

You entered: P

To replay the sound: Leave the input empty and hit 'enter'...
**Score your confidence in this response from [0 to 10]**
 **or**
**Type 'back' to change your response:**

You entered: 5


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--------------------------------------------------------------------------

Robot sound is playing....

**What state is the robot in:**

[S]: Stuck           - robot is in trouble and needs your help
[A]: Accomplished    - robot has successfully completed it's task
[P]: Progressing     - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
**Select a state by entering its first letter [S - A - P - N]:**

You entered: S
**Stuck             - robot is in trouble and needs your help**

To replay the sound: Leave the input empty and hit 'enter'...
**Score your confidence in this response from [0 to 10]**
 **or**
**Type 'back' to change your response:**

You entered: 3


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Robot sound is playing....

**What state is the robot in:**

[S]: Stuck           - robot is in trouble and needs your help
[A]: Accomplished    - robot has successfully completed it's task
[P]: Progressing     - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
**Select a state by entering its first letter [S - A - P - N]:**

You entered: A

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7


--------------------------------------------------------------------------
--------------------------------------------------------------------------


Robot sound is playing....

What state is the robot in:

[S]: Stuck            - robot is in trouble and needs your help
[A]: Accomplished     - robot has successfully completed it's task
[P]: Progressing      - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A
Accomplished     - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7


--------------------------------------------------------------------------
--------------------------------------------------------------------------


Robot sound is playing....

What state is the robot in:

[S]: Stuck            - robot is in trouble and needs your help
[A]: Accomplished     - robot has successfully completed it's task
[P]: Progressing      - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 6


--------------------------------------------------------------------------
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Robot sound is playing....

What state is the robot in:

[S]: Stuck             - robot is in trouble and needs your help
[A]: Accomplished      - robot has successfully completed it's task
[P]: Progressing       - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A

Accomplished     - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 6


--------------------------------------------------------------------------
--------------------------------------------------------------------------


Robot sound is playing....

What state is the robot in:

[S]: Stuck             - robot is in trouble and needs your help
[A]: Accomplished      - robot has successfully completed it's task
[P]: Progressing       - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
**Stuck           - robot is in trouble and needs your help**

To replay the sound: Leave the input empty and hit 'enter'...
**Score your confidence in this response from [0 to 10]**
 **or**
**Type 'back' to change your response:**

You entered: 5


--------------------------------------------------------------------------
--------------------------------------------------------------------------

Robot sound is playing....

**What state is the robot in:**

[S]: Stuck            - robot is in trouble and needs your help
[A]: Accomplished     - robot has successfully completed it's task
[P]: Progressing      - robot is working and doesn't need help
[N]: None of the above



To replay the sound: leave the input empty and hit 'enter'...
**Select a state by entering its first letter [S - A - P - N]:**

You entered: P
**Progressing      - robot is working and doesn't need help**

To replay the sound: Leave the input empty and hit 'enter'...
**Score your confidence in this response from [0 to 10]**
 **or**
**Type 'back' to change your response:**

You entered: 6


--------------------------------------------------------------------------
--------------------------------------------------------------------------

Robot sound is playing....

**What state is the robot in:**

[S]: Stuck            - robot is in trouble and needs your help
[A]: Accomplished     - robot has successfully completed it's task
[P]: Progressing      - robot is working and doesn't need help
[N]: None of the above



To replay the sound: leave the input empty and hit 'enter'...
**Select a state by entering its first letter [S - A - P - N]:**

You entered: P
**Progressing    - robot is working and doesn't need help**

To replay the sound: Leave the input empty and hit 'enter'...
**Score your confidence in this response from [0 to 10]**
** or **
**Type 'back' to change your response:**

You entered: 6

----------------------------------------------------------------------
----------------------------------------------------------------------

Robot sound is playing....

**What state is the robot in:**

[S]: Stuck            - robot is in trouble and needs your help
[A]: Accomplished     - robot has successfully completed it's task
[P]: Progressing      - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
**Select a state by entering its first letter [S - A - P - N]:**

You entered: P
**Progressing    - robot is working and doesn't need help**

To replay the sound: Leave the input empty and hit 'enter'...
**Score your confidence in this response from [0 to 10]**
** or **
**Type 'back' to change your response:**

You entered: 6

----------------------------------------------------------------------
----------------------------------------------------------------------

Robot sound is playing....

**What state is the robot in:**

[S]: Stuck            - robot is in trouble and needs your help
[A]: Accomplished     - robot has successfully completed it's task
[P]: Progressing      - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
**Select a state by entering its first letter [S - A - P - N]:**

You entered: S
Stuck           - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 5


-------------------------------------------------------------------------
-------------------------------------------------------------------------

Robot sound is playing....

What state is the robot in:

[S]: Stuck             - robot is in trouble and needs your help
[A]: Accomplished      - robot has successfully completed it's task
[P]: Progressing       - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck           - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 5


-------------------------------------------------------------------------
-------------------------------------------------------------------------

Robot sound is playing....

What state is the robot in:

[S]: Stuck             - robot is in trouble and needs your help
[A]: Accomplished      - robot has successfully completed it's task
[P]: Progressing       - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

```
You entered: S
```

```
To replay the sound: Leave the input empty and hit 'enter'...
```
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

```
You entered: 5
```

```
----------------------------------------------------------------------
----------------------------------------------------------------------
```

Great job! The system terminated successfully at itter: 14.
Click on the next cell below and hit 'shift + enter' to continue

```
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```


Jackal Robot

Section 2X

Click on the cell below & hit 'shift + enter'...

```
In [ ]:
```

```
In [10]:  ###### SECTION 2X
```

```
ucb1.ucb1_algor(num_of_states=num_of_states, state_descriptions=state_descri
                sound_obj_array=sound_obj_array_A, current_user_ID_str=curre
                delta_Q_thresh=2.0, conv_thresh=3, printer=None, mixer_volum


sect3_load_str = current_user_ID_str + "_sect2X_final"
```


Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 5

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:
```

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 5

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 6

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 6

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 6

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 6

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 8

Robot sound is playing....

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...

You entered: S

To replay the sound: Leave the input empty and hit 'enter'...

You entered: 6

Robot sound is playing....

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...

You entered: A

To replay the sound: Leave the input empty and hit 'enter'...

You entered: 9

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 6

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 5

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A
Accomplished   - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 6

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A
Accomplished   - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 8

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 8

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 9

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A
Accomplished   - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 9

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
** or **
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
** or **
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 8

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A
Accomplished   - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 8

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 8

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A
Accomplished   - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 4

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A
Accomplished   - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 6

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A
Accomplished   - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 6

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 6

Great job! The system terminated successfully at itter: 41.
Click on the next cell below and hit 'shift + enter' to continue

----

Jackal Robot

Section 3A

We're nearly finished ~ **home stretch!**

Let's listen to **Jackal** express itself one last time.

For each sound, you will asked to select which robot state you think the robot is in.

Click on the cell below & hit 'shift + enter'...

```
In [11]: mischelp.get_user_accuracy(sound_obj_array=sound_obj_array_A, lib_str=librar
                                     states_array=np.ndarray(num_of_states, dtype=obje
```

```
-----------------------------------------------------------------------
-----------------------------------------------------------------------

Robot sound is playing....

What state is the robot in:

[S]: Stuck              - robot is in trouble and needs your help
[A]: Accomplished       - robot has successfully completed it's task
[P]: Progressing        - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A
Accomplished     - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:
```

You entered: 8

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 7

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck   - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

```
You entered: 9
```


Great job!
Click on the next cell below and hit 'shift + enter' to continue

----

Jackal Robot

Section 3B

Lastly, let's listen to **Spot** express itself one last time.

You will notice **Spot** sounds slightly different to **Jackal**. For each sound, you will asked to select which robot state you think the robot is in.

Click on the cell below & hit 'shift + enter'...

```
In [12]: mischelp.get_user_accuracy(sound_obj_array=sound_obj_array_B, lib_str=librar
                              states_array=np.ndarray(num_of_states, dtype=obje
```

```
--------------------------------------------------------------------------
--------------------------------------------------------------------------

Robot sound is playing....

What state is the robot in:

[S]: Stuck            - robot is in trouble and needs your help
[A]: Accomplished     - robot has successfully completed it's task
[P]: Progressing      - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: S
Stuck            - robot is in trouble and needs your help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 5


--------------------------------------------------------------------------
--------------------------------------------------------------------------

Robot sound is playing....

What state is the robot in:

[S]: Stuck            - robot is in trouble and needs your help
[A]: Accomplished     - robot has successfully completed it's task
[P]: Progressing      - robot is working and doesn't need help
[N]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: A
Accomplished     - robot has successfully completed it's task

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:
```

You entered: 8

Robot sound is playing....

What state is the robot in:

[S]: Stuck   - robot is in trouble and needs your help
[A]: Accomplished   - robot has successfully completed it's task
[P]: Progressing   - robot is working and doesn't need help
[N]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state by entering its first letter [S - A - P - N]:

You entered: P
Progressing   - robot is working and doesn't need help

To replay the sound: Leave the input empty and hit 'enter'...
Score your confidence in this response from [0 to 10]
 or
Type 'back' to change your response:

You entered: 8

Great job!
Click on the next cell below and hit 'shift + enter' to continue

----

Spot Robot

Final Results

Lets listen to the sounds the robot learned to express each of it's 3 states...

Click on the cell below & hit 'shift + enter'...

In [13]:
```python
# State 0 - Stuck


mischelp.play_final_sound(sound_obj_array=sound_obj_array_B, lib_str=library
                          states_array=np.ndarray(num_of_states, dtype=obje
```

Using Array Path: 12_sect2X_final

```
--------------------------------------------------------------------------
```

This is the state:
Stuck   - robot is in trouble and needs your help

```
--------------------------------------------------------------------------
```

Playing MP3 Path: audio/sonif_libB/looped/0_1_0.mp3

Robot sound playing for:
Param 1: 0
Param 2: 1
Param 3: 0

In [ ]:
```python
# State 1 - Accomplished


mischelp.play_final_sound(sound_obj_array=sound_obj_array_B, lib_str=library
                          states_array=np.ndarray(num_of_states, dtype=obje
```

In [ ]:
```python
# State 2 - Progressing


mischelp.play_final_sound(sound_obj_array=sound_obj_array_B, lib_str=library
                          states_array=np.ndarray(num_of_states, dtype=obje
```

Save the Output

Run the following code block to save the output of this Jupyter Notebook.

```
In [ ]:  file_path_name = "user_data/user_" + current_user_ID_str + "/final_output"

         cmd = "jupyter nbconvert --to webpdf --allow-chromium-download study_noteboo
         if(os.system(cmd)):
                 print("Error converting to .py")
                 print(f"cmd: {cmd}")
```

Closing Survey

Please click the folliwng link to answer a short post-study questionnaire.

Pre-study Questionnaire: https://forms.gle/K6RnncY82vSVdyE38 (Participant ID Required)

Thank you for completing this Jupyter Notebook.

NOTES & DEBUG

This section is not part of the survey.

```
In [ ]:  # PILOTSET ARRAY VALUE SETTER

         # State 0: Stuck - Pilot Set
         manual_Qtable_state_0 = np.array([[[1., -1., -3.], [2., 0., -3.], [3., 2., -
                                                                           [[2., -1.,
                                                                           [[2., -1.,

         print("State 0: Stuck")
         print(manual_Qtable_state_0.shape, "\n")
         print(manual_Qtable_state_0, "\n")



         # State 1: Successful - Pilot Set
         manual_Qtable_state_1 = np.array([[[-3., 0., 2.], [-3., 1., 3.], [-3., 0., 2
                                                                           [[-3., 0.,
                                                                           [[-3., 0.,

         print("State 1: Successful")
         print(manual_Qtable_state_1.shape, "\n")
         print(manual_Qtable_state_1, "\n")



         # State 2: Progressing - Pilot Set
         manual_Qtable_state_2 = np.array([[[0., 3., 0.], [-3., 2., -3.], [-3., 1., -
                                                                           [[0., 5.,
                                                                           [[0., 4.,
```

```python
print("State 2: Successful")
print(manual_Qtable_state_2.shape, "\n")
print(manual_Qtable_state_2, "\n")




np.save("arrays/pilotset_st0.npy", manual_Qtable_state_0)
np.save("arrays/pilotset_st1.npy", manual_Qtable_state_1)
np.save("arrays/pilotset_st2.npy", manual_Qtable_state_2)
```

Creating buttons and widgets: https://medium.com/@technologger/how-to-interact-with-jupyter-33a98686f24e

In [ ]:

In [ ]:
```python
%whos
```