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

Imports & Args

Before starting this Notebook...

1. Enable JupyterLab Dark. Under "settings" --> theme --> **"JupyterLab Dark"**
2. Sub the line of code below with the path on your device to: **./../RL_audio/notebooks**

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
```

In [3]:
```
# You will need to install:
# --> pygame   (see this webpage ~ https://www.pygame.org/wiki/GettingStarte
# --> 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 or
#                                  numpy
#                                  termcolor
#                                  openpyxl
#                                  nbconvert-webpdf
#
```

```
#  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
# IMPORTS
import os
import shutil
import time
import numpy as np
import random
import argparse
import linecache

from scripts import audio_control
from scripts import ucb1_algorithm as ucb1
from scripts import misc_helpers 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" d
# 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 needs your help", "Successful \t
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
```

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...

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

Similarly, if the robot was able to reach it's goal, the robot's internal state is: **Successful**

If the robot is actively working on the task 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**, **Successful**, **Progressing** and **Not Sure**

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 1

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: 01

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

---

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:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

Please enter the numerical index of the state...

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 1 --> state: Successful    - robot has 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 go
 back:

You entered: 10

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 10
```

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

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

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

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=librar
                           states_array=np.ndarray(num_of_states, dtype=obje
```

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 1 --> state: Successful    - robot has 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 go
 back:

You entered: 8

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 2 --> state: 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 go
 back:
```

```
You entered: 9

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 0 --> state: Stuck         - robot 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 go
 back:

You entered: 9




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

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

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

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 2X

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

In [8]:
```
# SECTION 2X


time_step_2X_str = ucb1.ucb1_algor(num_of_states=num_of_states, state_descri
                                   current_user_ID_str=current_user_ID_str, sect
```

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

STARTING NEW LOOP
------------------------------------------------------------
------------------------------------------------------------



(Hidden loop layer):
Time Step: 01
state_idx_set: {0, 1, 2}
current_state_index: 0

N_array in loop at time 1:
[[[0 0 0]
  [0 0 0]
  [0 0 0]]

 [[0 0 0]
  [0 0 0]
  [0 0 0]]

 [[0 0 0]
  [0 0 0]
  [0 0 0]]]

New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

Please enter the numerical index of the state...

Robot sound is playing....

What state is the robot in:

[0]: Stuck - robot needs your help
[1]: Successful - robot has completed it's task
[2]: Progressing - robot is working and doesn't need help
[3]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 2 --> state: 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 go back:

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 1
Delta_Q for state 0 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 0:

[[[10. 10. 10.]
  [10. 10. 10.]
  [10. 10. 10.]]

 [[10. 10. 10.]
  [10. -9. 10.]
  [10. 10. 10.]]

 [[10. 10. 10.]
  [10. 10. 10.]
  [10. 10. 10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 1
Delta_Q for state 1 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 1:

[[[10. 10. 10.]
  [10. 10. 10.]
  [10. 10. 10.]]

 [[10. 10. 10.]
  [10. -9. 10.]
  [10. 10. 10.]]

 [[10. 10. 10.]
  [10. 10. 10.]
  [10. 10. 10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       9.0
N value for state 2 is 1
Delta_Q for state 2 is: 1.0
```

```
New action value (Q):    9.0
Q-table after update for state 2:

[[[10. 10. 10.]
  [10. 10. 10.]
  [10. 10. 10.]]

 [[10. 10. 10.]
  [10.  9. 10.]
  [10. 10. 10.]]

 [[10. 10. 10.]
  [10. 10. 10.]
  [10. 10. 10.]]]

in_a_row_st0 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 02
state_idx_set: {0, 1, 2}
current_state_index: 0

N_array in loop at time 2:
[[[0 0 0]
  [0 0 0]
  [0 0 0]]

 [[0 0 0]
  [0 1 0]
  [0 0 0]]

 [[0 0 0]
  [0 0 0]
  [0 0 0]]]

action value:
 [[[10. 10. 10.]
  [10. 10. 10.]
  [10. 10. 10.]]

 [[10. 10. 10.]
  [10. -9. 10.]
  [10. 10. 10.]]
```

```
 [[10. 10. 10.]
  [10. 10. 10.]
  [10. 10. 10.]]]

uncertainty:
 [[[inf inf inf]
  [inf inf inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf 0.41627730557884884 inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf inf inf]
  [inf inf inf]]]

action value with uncertainty
 [[[inf inf inf]
  [inf inf inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf -8.583722694421152 inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf inf inf]
  [inf inf inf]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

Please enter the numerical index of the state...

Robot sound is playing....

What state is the robot in:

[0]: Stuck   - robot needs your help
[1]: Successful   - robot has completed it's task
[2]: Progressing   - robot is working and doesn't need help
[3]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 1 --> state: Successful   - robot has 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 go back:

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 1
Delta_Q for state 0 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       10.0
N value for state 1 is 1
Delta_Q for state 1 is: 0.0
New action value (Q):    10.0
Q-table after update for state 1:

[[[10. 10. 10.]
  [10. 10. 10.]
  [10. 10. 10.]]

 [[10. 10. 10.]
  [10. -9. 10.]
  [10. 10. 10.]]

 [[10. 10. 10.]
  [10. 10. 10.]
  [10. 10. 10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 1
Delta_Q for state 2 is: 20.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]

in_a_row_st0 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 03
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 3:
[[[0 0 0]
  [0 0 0]
  [0 0 0]]

 [[0 0 1]
  [0 1 0]
  [0 0 0]]

 [[0 0 0]
  [0 0 0]
  [0 0 0]]]

action value:
 [[[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]
```

```
 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]

uncertainty:
 [[[inf inf inf]
  [inf inf inf]
  [inf inf inf]]

 [[inf inf 0.5240735369841025]
  [inf 0.5240735369841025 inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf inf inf]
  [inf inf inf]]]

action value with uncertainty
 [[[inf inf inf]
  [inf inf inf]
  [inf inf inf]]

 [[inf inf -9.475926463015897]
  [inf 9.524073536984103 inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf inf inf]
  [inf inf inf]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 1
Delta_Q for state 0 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.  10.  10.]
  [ 10. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 1
Delta_Q for state 1 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ 10.  10.  10.]
  [ 10. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 1
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    10.0
Q-table after update for state 2:

[[[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]

in_a_row_st2 +1, total 0 becase correct and under delta Q thresh



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 04
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 4:
[[[0 0 0]
  [0 1 0]
  [0 0 0]]

 [[0 0 1]
  [0 1 0]
  [0 0 0]]

 [[0 0 0]
  [0 0 0]
  [0 0 0]]]

action value:
 [[[ 10.  10.  10.]
  [ 10. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]
```

```
 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]

uncertainty:
 [[[inf inf inf]
  [inf 0.5887050112577373 inf]
  [inf inf inf]]

 [[inf inf 0.5887050112577373]
  [inf 0.5887050112577373 inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf inf inf]
  [inf inf inf]]]

action value with uncertainty
 [[[inf inf inf]
  [inf -9.411294988742263 inf]
  [inf inf inf]]

 [[inf inf 10.588705011257737]
  [inf -8.411294988742263 inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf inf inf]
  [inf inf inf]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 1
Delta_Q for state 0 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 0:

[[[ 10.  10.  -9.]
  [ 10. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       9.0
N value for state 1 is 1
Delta_Q for state 1 is: 1.0
New action value (Q):    9.0
Q-table after update for state 1:

[[[ 10.  10.   9.]
  [ 10. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 1
Delta_Q for state 2 is: 19.0
```

```
New action value (Q):    -9.0
Q-table after update for state 2:

[[[ 10.  10.  -9.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]

in_a_row_st1 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 05
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 5:
[[[0 0 1]
  [0 1 0]
  [0 0 0]]

 [[0 0 1]
  [0 1 0]
  [0 0 0]]

 [[0 0 0]
  [0 0 0]
  [0 0 0]]]

action value:
 [[[ 10.  10.   9.]
  [ 10. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]
```

```
 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]

uncertainty:
 [[[inf inf 0.6343181205897598]
  [inf 0.6343181205897598 inf]
  [inf inf inf]]

 [[inf inf 0.6343181205897598]
  [inf 0.6343181205897598 inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf inf inf]
  [inf inf inf]]]

action value with uncertainty
 [[[inf inf 9.634318120589759]
  [inf -9.365681879410241 inf]
  [inf inf inf]]

 [[inf inf 10.634318120589759]
  [inf -8.365681879410241 inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf inf inf]
  [inf inf inf]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 1
Delta_Q for state 0 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.  10.  -9.]
  [ 10. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       10.0
N value for state 1 is 1
Delta_Q for state 1 is: 0.0
New action value (Q):    10.0
Q-table after update for state 1:

[[[ 10.  10.   9.]
  [ 10. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 1
Delta_Q for state 2 is: 20.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ 10.  10.  -9.]
  [ 10.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]

in_a_row_st1 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 06
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 6:
[[[0 0 1]
  [0 1 0]
  [0 0 1]]

 [[0 0 1]
  [0 1 0]
  [0 0 0]]

 [[0 0 0]
  [0 0 0]
  [0 0 0]]]

action value:
 [[[ 10.  10.  -9.]
  [ 10.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]
```

```
 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]

uncertainty:
 [[[inf inf 0.6692830995229252]
  [inf 0.6692830995229252 inf]
  [inf inf 0.6692830995229252]]

 [[inf inf 0.6692830995229252]
  [inf 0.6692830995229252 inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf inf inf]
  [inf inf inf]]]

action value with uncertainty
 [[[inf inf -8.330716900477075]
  [inf 10.669283099522925 inf]
  [inf inf -9.330716900477075]]

 [[inf inf -9.330716900477075]
  [inf 9.669283099522925 inf]
  [inf inf inf]]

 [[inf inf inf]
  [inf inf inf]
  [inf inf inf]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       10.0
N value for state 0 is 1
Delta_Q for state 0 is: 0.0
New action value (Q):    10.0
Q-table after update for state 0:

[[[ 10.  10.  -9.]
  [ 10. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.  10.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 1
Delta_Q for state 1 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ 10.  10.   9.]
  [ 10. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.  10.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 1
Delta_Q for state 2 is: 20.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ 10.  10.  -9.]
  [ 10.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.  10.  10.]]]

in_a_row_st2 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 07
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 7:
[[[0 0 1]
  [0 1 0]
  [0 0 1]]

 [[0 0 1]
  [0 1 0]
  [0 0 0]]

 [[0 0 0]
  [1 0 0]
  [0 0 0]]]

action value:
 [[[ 10.  10.   9.]
  [ 10. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]
```

```
 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.  10.  10.]]]

uncertainty:
 [[[inf inf 0.6974794170897292]
  [inf 0.6974794170897292 inf]
  [inf inf 0.6974794170897292]]

 [[inf inf 0.6974794170897292]
  [inf 0.6974794170897292 inf]
  [inf inf inf]]

 [[inf inf inf]
  [0.6974794170897292 inf inf]
  [inf inf inf]]]

action value with uncertainty
 [[[inf inf 9.69747941708973]
  [inf -9.30252058291027 inf]
  [inf inf 10.69747941708973]]

 [[inf inf 10.69747941708973]
  [inf -8.30252058291027 inf]
  [inf inf inf]]

 [[inf inf inf]
  [-9.30252058291027 inf inf]
  [inf inf inf]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

Please enter the numerical index of the state...

Robot sound is playing....

What state is the robot in:

[0]: Stuck - robot needs your help
[1]: Successful - robot has completed it's task
[2]: Progressing - robot is working and doesn't need help
[3]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

```
You entered: 3 --> state: None of the above



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

(Hidden state 0 layer):
Reward_signal (R):       0.0
N value for state 0 is 1
Delta_Q for state 0 is: 10.0
New action value (Q):    0.0
Q-table after update for state 0:

[[[ 10.  10.  -9.]
  [ 10. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       0.0
N value for state 1 is 1
Delta_Q for state 1 is: 10.0
New action value (Q):    0.0
Q-table after update for state 1:

[[[ 10.  10.   9.]
  [ 10. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       0.0
N value for state 2 is 1
Delta_Q for state 2 is: 10.0
```

```
New action value (Q):    0.0
Q-table after update for state 2:

[[[ 10.  10.  -9.]
  [ 10.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]

in_a_row_st1 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 08
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 8:
[[[0 0 1]
  [0 1 0]
  [0 0 1]]

 [[0 0 1]
  [0 1 0]
  [0 0 0]]

 [[0 0 0]
  [1 0 0]
  [0 1 0]]]

action value:
 [[[ 10.  10.  -9.]
  [ 10.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]
```

```
 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]

uncertainty:
 [[[inf inf 0.7210134433004415]
  [inf 0.7210134433004415 inf]
  [inf inf 0.7210134433004415]]

 [[inf inf 0.7210134433004415]
  [inf 0.7210134433004415 inf]
  [inf inf inf]]

 [[inf inf inf]
  [0.7210134433004415 inf inf]
  [inf 0.7210134433004415 inf]]]

action value with uncertainty
 [[[inf inf -8.278986556699559]
  [inf 10.721013443300441 inf]
  [inf inf -9.278986556699559]]

 [[inf inf -9.278986556699559]
  [inf 9.721013443300441 inf]
  [inf inf inf]]

 [[inf inf inf]
  [-9.278986556699559 inf inf]
  [inf 0.7210134433004415 inf]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       9.0
N value for state 0 is 1
Delta_Q for state 0 is: 1.0
New action value (Q):    9.0
Q-table after update for state 0:

[[[ 10.  10.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 1
Delta_Q for state 1 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 1:

[[[ 10.  10.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 1
Delta_Q for state 2 is: 19.0
```

```
New action value (Q):    -9.0
Q-table after update for state 2:

[[[ 10.  10.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]

in_a_row_st2 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 09
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 9:
[[[0 0 1]
  [1 1 0]
  [0 0 1]]

 [[0 0 1]
  [0 1 0]
  [0 0 0]]

 [[0 0 0]
  [1 0 0]
  [0 1 0]]]

action value:
 [[[ 10.  10.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]
```

```
 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]

uncertainty:
 [[[inf inf 0.7411519036837556]
  [0.7411519036837556 0.7411519036837556 inf]
  [inf inf 0.7411519036837556]]

 [[inf inf 0.7411519036837556]
  [inf 0.7411519036837556 inf]
  [inf inf inf]]

 [[inf inf inf]
  [0.7411519036837556 inf inf]
  [inf 0.7411519036837556 inf]]]

action value with uncertainty
 [[[inf inf -8.258848096316244]
  [-8.258848096316244 10.741151903683756 inf]
  [inf inf -9.258848096316244]]

 [[inf inf -9.258848096316244]
  [inf 9.741151903683756 inf]
  [inf inf inf]]

 [[inf inf inf]
  [-9.258848096316244 inf inf]
  [inf 0.7411519036837556 inf]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 1
Delta_Q for state 0 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 1
Delta_Q for state 1 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 1:

[[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       9.0
N value for state 2 is 1
Delta_Q for state 2 is: 1.0
```

```
New action value (Q):    9.0
Q-table after update for state 2:

[[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]

in_a_row_st2 +1, total 0 becase correct and under delta Q thresh



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 10
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 10:
[[[0 1 1]
  [1 1 0]
  [0 0 1]]

 [[0 0 1]
  [0 1 0]
  [0 0 0]]

 [[0 0 0]
  [1 0 0]
  [0 1 0]]]

action value:
 [[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [ 10.  10.  10.]]
```

```
 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]

uncertainty:
 [[[inf 0.7587135646925732 0.7587135646925732]
  [0.7587135646925732 0.7587135646925732 inf]
  [inf inf 0.7587135646925732]]

 [[inf inf 0.7587135646925732]
  [inf 0.7587135646925732 inf]
  [inf inf inf]]

 [[inf inf inf]
  [0.7587135646925732 inf inf]
  [inf 0.7587135646925732 inf]]]

action value with uncertainty
 [[[inf 9.758713564692574 -8.241286435307426]
  [-8.241286435307426 10.758713564692574 inf]
  [inf inf -9.241286435307426]]

 [[inf inf -9.241286435307426]
  [inf 9.758713564692574 inf]
  [inf inf inf]]

 [[inf inf inf]
  [-9.241286435307426 inf inf]
  [inf 0.7587135646925732 inf]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

Please enter the numerical index of the state...

Robot sound is playing....

What state is the robot in:

[0]: Stuck   - robot needs your help
[1]: Successful   - robot has completed it's task
[2]: Progressing   - robot is working and doesn't need help
[3]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 0 --> state: Stuck   - robot 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 go back:

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       10.0
N value for state 0 is 1
Delta_Q for state 0 is: 0.0
New action value (Q):    10.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [ 10.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 1
Delta_Q for state 1 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 1
Delta_Q for state 2 is: 20.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]

in_a_row_st2 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 11
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 11:
[[[0 1 1]
  [1 1 0]
  [0 0 1]]

 [[0 0 1]
  [0 1 0]
  [1 0 0]]

 [[0 0 0]
  [1 0 0]
  [0 1 0]]]

action value:
 [[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  10.]]
```

```
 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ 10.   0.  10.]]]

uncertainty:
 [[[inf 0.7742569458516938 0.7742569458516938]
  [0.7742569458516938 0.7742569458516938 inf]
  [inf inf 0.7742569458516938]]

 [[inf inf 0.7742569458516938]
  [inf 0.7742569458516938 inf]
  [0.7742569458516938 inf inf]]

 [[inf inf inf]
  [0.7742569458516938 inf inf]
  [inf 0.7742569458516938 inf]]]

action value with uncertainty
 [[[inf 9.774256945851693 -8.225743054148307]
  [-8.225743054148307 10.774256945851693 inf]
  [inf inf -9.225743054148307]]

 [[inf inf -9.225743054148307]
  [inf 9.774256945851693 inf]
  [-9.225743054148307 inf inf]]

 [[inf inf inf]
  [-9.225743054148307 inf inf]
  [inf 0.7742569458516938 inf]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       9.0
N value for state 0 is 1
Delta_Q for state 0 is: 1.0
New action value (Q):    9.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 1
Delta_Q for state 1 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 1:

[[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 1
Delta_Q for state 2 is: 19.0
```

```
New action value (Q):    -9.0
Q-table after update for state 2:

[[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]

in_a_row_st2 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 12
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 12:
[[[0 1 1]
  [1 1 0]
  [0 0 1]]

 [[0 0 1]
  [0 1 0]
  [1 0 0]]

 [[0 0 0]
  [1 0 0]
  [1 1 0]]]

action value:
 [[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  10.]]
```

```
 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]

uncertainty:
 [[[inf 0.7881793339380322 0.7881793339380322]
  [0.7881793339380322 0.7881793339380322 inf]
  [inf inf 0.7881793339380322]]

 [[inf inf 0.7881793339380322]
  [inf 0.7881793339380322 inf]
  [0.7881793339380322 inf inf]]

 [[inf inf inf]
  [0.7881793339380322 inf inf]
  [0.7881793339380322 0.7881793339380322 inf]]]

action value with uncertainty
 [[[inf 9.788179333938032 -8.211820666061968]
  [-8.211820666061968 10.788179333938032 inf]
  [inf inf -9.211820666061968]]

 [[inf inf -9.211820666061968]
  [inf 9.788179333938032 inf]
  [-9.211820666061968 inf inf]]

 [[inf inf inf]
  [-9.211820666061968 inf inf]
  [-8.211820666061968 0.7881793339380322 inf]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       10.0
N value for state 0 is 1
Delta_Q for state 0 is: 0.0
New action value (Q):    10.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10.  10.]
  [ 10.  10.  10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 1
Delta_Q for state 1 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10.  10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 1
Delta_Q for state 2 is: 20.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]

in_a_row_st2 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 13
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 13:
[[[0 1 1]
  [1 1 0]
  [0 0 1]]

 [[1 0 1]
  [0 1 0]
  [1 0 0]]

 [[0 0 0]
  [1 0 0]
  [1 1 0]]]

action value:
 [[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10.  10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.  10.]]
```

```
 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]

uncertainty:
 [[[inf 0.8007729636828308 0.8007729636828308]
  [0.8007729636828308 0.8007729636828308 inf]
  [inf inf 0.8007729636828308]]

 [[0.8007729636828308 inf 0.8007729636828308]
  [inf 0.8007729636828308 inf]
  [0.8007729636828308 inf inf]]

 [[inf inf inf]
  [0.8007729636828308 inf inf]
  [0.8007729636828308 0.8007729636828308 inf]]]

action value with uncertainty
 [[[inf -8.199227036317168 9.800772963682832]
  [-8.199227036317168 -9.199227036317168 inf]
  [inf inf 10.800772963682832]]

 [[-9.199227036317168 inf 10.800772963682832]
  [inf -8.199227036317168 inf]
  [-9.199227036317168 inf inf]]

 [[inf inf inf]
  [-9.199227036317168 inf inf]
  [-8.199227036317168 0.8007729636828308 inf]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 1
Delta_Q for state 0 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10. -10.]
  [ 10.  10.  10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       10.0
N value for state 1 is 1
Delta_Q for state 1 is: 0.0
New action value (Q):    10.0
Q-table after update for state 1:

[[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10.  10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 1
Delta_Q for state 2 is: 20.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  10.]]

 [[ 10.  10. -10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]

in_a_row_st1 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 14
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 14:
[[[0 1 1]
  [1 1 0]
  [0 0 1]]

 [[1 0 1]
  [0 1 0]
  [1 0 0]]

 [[0 0 1]
  [1 0 0]
  [1 1 0]]]

action value:
 [[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  10.]]
```

```
 [[ 10.  10. -10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]

uncertainty:
 [[[inf 0.8122587841345975 0.8122587841345975]
  [0.8122587841345975 0.8122587841345975 inf]
  [inf inf 0.8122587841345975]]

 [[0.8122587841345975 inf 0.8122587841345975]
  [inf 0.8122587841345975 inf]
  [0.8122587841345975 inf inf]]

 [[inf inf 0.8122587841345975]
  [0.8122587841345975 inf inf]
  [0.8122587841345975 0.8122587841345975 inf]]]

action value with uncertainty
 [[[inf 9.812258784134597 -8.187741215865403]
  [-8.187741215865403 10.812258784134597 inf]
  [inf inf -9.187741215865403]]

 [[-9.187741215865403 inf -9.187741215865403]
  [inf 9.812258784134597 inf]
  [-9.187741215865403 inf inf]]

 [[inf inf -9.187741215865403]
  [-9.187741215865403 inf inf]
  [-8.187741215865403 0.8122587841345975 inf]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 1
Delta_Q for state 0 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  10.]]

 [[ 10.  10. -10.]
  [ 10.  10. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       10.0
N value for state 1 is 1
Delta_Q for state 1 is: 0.0
New action value (Q):    10.0
Q-table after update for state 1:

[[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10.  10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.  10.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 1
Delta_Q for state 2 is: 20.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  10.]]

 [[ 10.  10. -10.]
  [-10.  10. -10.]
  [ -9.   0.  10.]]]

in_a_row_st2 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 15
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 15:
[[[0 1 1]
  [1 1 0]
  [0 0 1]]

 [[1 0 1]
  [0 1 0]
  [1 0 0]]

 [[0 0 1]
  [1 0 1]
  [1 1 0]]]

action value:
 [[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  10.]]
```

```
 [[ 10.  10. -10.]
  [-10.  10. -10.]
  [ -9.   0.  10.]]]

uncertainty:
 [[[inf 0.8228077237578367 0.8228077237578367]
  [0.8228077237578367 0.8228077237578367 inf]
  [inf inf 0.8228077237578367]]

 [[0.8228077237578367 inf 0.8228077237578367]
  [inf 0.8228077237578367 inf]
  [0.8228077237578367 inf inf]]

 [[inf inf 0.8228077237578367]
  [0.8228077237578367 inf 0.8228077237578367]
  [0.8228077237578367 0.8228077237578367 inf]]]

action value with uncertainty
 [[[inf 9.822807723757837 -8.177192276242163]
  [-8.177192276242163 10.822807723757837 inf]
  [inf inf -9.177192276242163]]

 [[-9.177192276242163 inf -9.177192276242163]
  [inf 9.822807723757837 inf]
  [-9.177192276242163 inf inf]]

 [[inf inf -9.177192276242163]
  [-9.177192276242163 inf -9.177192276242163]
  [-8.177192276242163 0.8228077237578367 inf]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 1
Delta_Q for state 0 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10.  10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  -9.]]

 [[ 10.  10. -10.]
  [ 10.  10. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       9.0
N value for state 1 is 1
Delta_Q for state 1 is: 1.0
New action value (Q):    9.0
Q-table after update for state 1:

[[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10.  10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.   9.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 1
Delta_Q for state 2 is: 19.0
```

```
New action value (Q):    -9.0
Q-table after update for state 2:

[[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  -9.]]

 [[ 10.  10. -10.]
  [-10.  10. -10.]
  [ -9.   0.  10.]]]

in_a_row_st2 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 16
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 16:
[[[0 1 1]
  [1 1 0]
  [0 0 1]]

 [[1 0 1]
  [0 1 0]
  [1 0 1]]

 [[0 0 1]
  [1 0 1]
  [1 1 0]]]

action value:
 [[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10.  10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.   9.]]
```

```
 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]

uncertainty:
 [[[inf 0.8325546111576977 0.8325546111576977]
  [0.8325546111576977 0.8325546111576977 inf]
  [inf inf 0.8325546111576977]]

 [[0.8325546111576977 inf 0.8325546111576977]
  [inf 0.8325546111576977 inf]
  [0.8325546111576977 inf 0.8325546111576977]]

 [[inf inf 0.8325546111576977]
  [0.8325546111576977 inf 0.8325546111576977]
  [0.8325546111576977 0.8325546111576977 inf]]]

action value with uncertainty
 [[[inf -8.167445388842303 9.832554611157697]
  [-8.167445388842303 -9.167445388842303 inf]
  [inf inf 10.832554611157697]]

 [[-9.167445388842303 inf 10.832554611157697]
  [inf -8.167445388842303 inf]
  [-9.167445388842303 inf 9.832554611157697]]

 [[inf inf 10.832554611157697]
  [-9.167445388842303 inf 10.832554611157697]
  [-8.167445388842303 0.8325546111576977 inf]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 1
Delta_Q for state 0 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  -9.]]

 [[ 10.  10. -10.]
  [ 10.  10. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 1
Delta_Q for state 1 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.   9.]]

 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 1
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    10.0
Q-table after update for state 2:

[[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  -9.]]

 [[ 10.  10. -10.]
  [-10.  10. -10.]
  [ -9.   0.  10.]]]

in_a_row_st1 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 17
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 17:
[[[0 1 1]
  [1 1 0]
  [0 0 1]]

 [[1 1 1]
  [0 1 0]
  [1 0 1]]

 [[0 0 1]
  [1 0 1]
  [1 1 0]]]

action value:
 [[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.   9.]]
```

```
 [[ 10.  10.  10.]
  [-10.  10.  10.]
  [ -9.   0.  10.]]]

uncertainty:
 [[[inf 0.8416075902783042 0.8416075902783042]
  [0.8416075902783042 0.8416075902783042 inf]
  [inf inf 0.8416075902783042]]

 [[0.8416075902783042 0.8416075902783042 0.8416075902783042]
  [inf 0.8416075902783042 inf]
  [0.8416075902783042 inf 0.8416075902783042]]

 [[inf inf 0.8416075902783042]
  [0.8416075902783042 inf 0.8416075902783042]
  [0.8416075902783042 0.8416075902783042 inf]]]

action value with uncertainty
 [[[inf -8.158392409721696 9.841607590278304]
  [-8.158392409721696 -9.158392409721696 inf]
  [inf inf 10.841607590278304]]

 [[-9.158392409721696 -9.158392409721696 10.841607590278304]
  [inf -8.158392409721696 inf]
  [-9.158392409721696 inf 9.841607590278304]]

 [[inf inf 10.841607590278304]
  [-9.158392409721696 inf 10.841607590278304]
  [-8.158392409721696 0.8416075902783042 inf]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 1
Delta_Q for state 0 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  -9.]]

 [[ 10.  10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 1
Delta_Q for state 1 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 1:

[[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.   9.]]

 [[ 10.  10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       9.0
N value for state 2 is 1
Delta_Q for state 2 is: 1.0
```

```
New action value (Q):    9.0
Q-table after update for state 2:

[[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  -9.]]

 [[ 10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  10.]]]

in_a_row_st1 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 18
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 18:
[[[0 1 1]
  [1 1 0]
  [0 0 1]]

 [[1 1 1]
  [0 1 0]
  [1 0 1]]

 [[0 0 1]
  [1 1 1]
  [1 1 0]]]

action value:
 [[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.   9.]]
```

```
 [[ 10.  10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]

uncertainty:
 [[[inf 0.85005466852082 0.85005466852082]
  [0.85005466852082 0.85005466852082 inf]
  [inf inf 0.85005466852082]]

 [[0.85005466852082 0.85005466852082 0.85005466852082]
  [inf 0.85005466852082 inf]
  [0.85005466852082 inf 0.85005466852082]]

 [[inf inf 0.85005466852082]
  [0.85005466852082 0.85005466852082 0.85005466852082]
  [0.85005466852082 0.85005466852082 inf]]]

action value with uncertainty
 [[[inf -8.14994533147918 9.85005466852082]
  [-8.14994533147918 -9.14994533147918 inf]
  [inf inf 10.85005466852082]]

 [[-9.14994533147918 -9.14994533147918 10.85005466852082]
  [inf -8.14994533147918 inf]
  [-9.14994533147918 inf 9.85005466852082]]

 [[inf inf 10.85005466852082]
  [-9.14994533147918 -8.14994533147918 10.85005466852082]
  [-8.14994533147918 0.85005466852082 inf]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       10.0
N value for state 0 is 1
Delta_Q for state 0 is: 0.0
New action value (Q):    10.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  -9.]]

 [[ 10.  10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 1
Delta_Q for state 1 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.   9.]]

 [[-10.  10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 1
Delta_Q for state 2 is: 20.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ 10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  -9.]]

 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  10.]]]

in_a_row_st1 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 19
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 19:
[[[0 1 1]
  [1 1 0]
  [0 0 1]]

 [[1 1 1]
  [0 1 0]
  [1 0 1]]

 [[1 0 1]
  [1 1 1]
  [1 1 0]]]

action value:
 [[[ 10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.   9.]]
```

```
 [[-10.  10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]

uncertainty:
 [[[inf 0.857968382163125 0.857968382163125]
  [0.857968382163125 0.857968382163125 inf]
  [inf inf 0.857968382163125]]

 [[0.857968382163125 0.857968382163125 0.857968382163125]
  [inf 0.857968382163125 inf]
  [0.857968382163125 inf 0.857968382163125]]

 [[0.857968382163125 inf 0.857968382163125]
  [0.857968382163125 0.857968382163125 0.857968382163125]
  [0.857968382163125 0.857968382163125 inf]]]

action value with uncertainty
 [[[inf -8.142031617836874 9.857968382163126]
  [-8.142031617836874 -9.142031617836874 inf]
  [inf inf 10.857968382163126]]

 [[-9.142031617836874 -9.142031617836874 10.857968382163126]
  [inf -8.142031617836874 inf]
  [-9.142031617836874 inf 9.857968382163126]]

 [[-9.142031617836874 inf 10.857968382163126]
  [-9.142031617836874 -8.142031617836874 10.857968382163126]
  [-8.142031617836874 0.857968382163125 inf]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       10.0
N value for state 0 is 1
Delta_Q for state 0 is: 0.0
New action value (Q):    10.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  -9.]]

 [[ 10.  10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 1
Delta_Q for state 1 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.   9.]]

 [[-10.  10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 1
Delta_Q for state 2 is: 20.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[-10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  -9.]]

 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  10.]]]

in_a_row_st1 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 20
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 20:
[[[1 1 1]
  [1 1 0]
  [0 0 1]]

 [[1 1 1]
  [0 1 0]
  [1 0 1]]

 [[1 0 1]
  [1 1 1]
  [1 1 0]]]

action value:
 [[[-10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  -9.]]
```

```
 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  10.]]]

uncertainty:
 [[[0.8654091913011427 0.8654091913011427 0.8654091913011427]
  [0.8654091913011427 0.8654091913011427 inf]
  [inf inf 0.8654091913011427]]

 [[0.8654091913011427 0.8654091913011427 0.8654091913011427]
  [inf 0.8654091913011427 inf]
  [0.8654091913011427 inf 0.8654091913011427]]

 [[0.8654091913011427 inf 0.8654091913011427]
  [0.8654091913011427 0.8654091913011427 0.8654091913011427]
  [0.8654091913011427 0.8654091913011427 inf]]]

action value with uncertainty
 [[[-9.134590808698857 9.865409191301143 -8.134590808698857]
  [-8.134590808698857 10.865409191301143 inf]
  [inf inf -9.134590808698857]]

 [[-9.134590808698857 10.865409191301143 -9.134590808698857]
  [inf 9.865409191301143 inf]
  [-9.134590808698857 inf -8.134590808698857]]

 [[-9.134590808698857 inf -9.134590808698857]
  [-9.134590808698857 9.865409191301143 -9.134590808698857]
  [-8.134590808698857 0.8654091913011427 inf]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:

Please enter a valid integer in the range 0 to 10 or type 'back' to go bac
k...

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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 1
Delta_Q for state 0 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  -9.]]

 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 1
Delta_Q for state 1 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.  10.   9.]]

 [[-10. -10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 1
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    10.0
Q-table after update for state 2:

[[[-10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.  10.  -9.]]

 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  10.]]]

in_a_row_st2 +1, total 0 becase correct and under delta Q thresh



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 21
state_idx_set: {0, 1, 2}
current_state_index: 0

N_array in loop at time 21:
[[[1 1 1]
  [1 1 0]
  [0 0 1]]

 [[1 1 1]
  [0 1 0]
  [1 0 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 0]]]

action value:
 [[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.  10.  -9.]]
```

```
 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]

uncertainty:
 [[[0.8724279967027971 0.8724279967027971 0.8724279967027971]
  [0.8724279967027971 0.8724279967027971 inf]
  [inf inf 0.8724279967027971]]

 [[0.8724279967027971 0.8724279967027971 0.8724279967027971]
  [inf 0.8724279967027971 inf]
  [0.8724279967027971 inf 0.8724279967027971]]

 [[0.8724279967027971 0.8724279967027971 0.8724279967027971]
  [0.8724279967027971 0.8724279967027971 0.8724279967027971]
  [0.8724279967027971 0.8724279967027971 inf]]]

action value with uncertainty
 [[[10.872427996702797 -8.127572003297203 -8.127572003297203]
  [9.872427996702797 -9.127572003297203 inf]
  [inf inf -9.127572003297203]]

 [[10.872427996702797 -9.127572003297203 -9.127572003297203]
  [inf -8.127572003297203 inf]
  [10.872427996702797 inf -8.127572003297203]]

 [[10.872427996702797 -9.127572003297203 -9.127572003297203]
  [10.872427996702797 -8.127572003297203 -9.127572003297203]
  [9.872427996702797 0.8724279967027971 inf]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 3 --> state: None of the above



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

(Hidden state 0 layer):
Reward_signal (R):       0.0
N value for state 0 is 1
Delta_Q for state 0 is: 10.0
New action value (Q):    0.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.   0.  -9.]]

 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       0.0
N value for state 1 is 1
Delta_Q for state 1 is: 10.0
New action value (Q):    0.0
Q-table after update for state 1:

[[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ 10.  10.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.   0.   9.]]

 [[-10. -10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       0.0
N value for state 2 is 1
Delta_Q for state 2 is: 10.0
```

```
New action value (Q):    0.0
Q-table after update for state 2:

[[[-10.   9.  -9.]
  [ -9.  10.  10.]
  [ 10.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.   0.  -9.]]

 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  10.]]]

in_a_row_st0 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 22
state_idx_set: {0, 1, 2}
current_state_index: 0

N_array in loop at time 22:
[[[1 1 1]
  [1 1 0]
  [0 0 1]]

 [[1 1 1]
  [0 1 0]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 0]]]

action value:
 [[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [ 10.  10. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.   0.  -9.]]
```

```
 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]

uncertainty:
 [[[0.8790680368091989 0.8790680368091989 0.8790680368091989]
  [0.8790680368091989 0.8790680368091989 inf]
  [inf inf 0.8790680368091989]]

 [[0.8790680368091989 0.8790680368091989 0.8790680368091989]
  [inf 0.8790680368091989 inf]
  [0.8790680368091989 0.8790680368091989 0.8790680368091989]]

 [[0.8790680368091989 0.8790680368091989 0.8790680368091989]
  [0.8790680368091989 0.8790680368091989 0.8790680368091989]
  [0.8790680368091989 0.8790680368091989 inf]]]

action value with uncertainty
 [[[10.8790680368092 -8.1209319631908 -8.1209319631908]
  [9.8790680368092 -9.1209319631908 inf]
  [inf inf -9.1209319631908]]

 [[10.8790680368092 -9.1209319631908 -9.1209319631908]
  [inf -8.1209319631908 inf]
  [10.8790680368092 0.8790680368091989 -8.1209319631908]]

 [[10.8790680368092 -9.1209319631908 -9.1209319631908]
  [10.8790680368092 -8.1209319631908 -9.1209319631908]
  [9.8790680368092 0.8790680368091989 inf]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck          - robot 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 go
 back:


Please enter a valid integer in the range 0 to 10 or type 'back' to go bac
k...

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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       9.0
N value for state 0 is 1
Delta_Q for state 0 is: 1.0
New action value (Q):    9.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [  9.  10. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.   0.  -9.]]

 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 1
Delta_Q for state 1 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 1:

[[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ -9.  10.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.   0.   9.]]

 [[-10. -10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 1
Delta_Q for state 2 is: 19.0
```

```
New action value (Q):    -9.0
Q-table after update for state 2:

[[[-10.   9.  -9.]
  [ -9.  10.  10.]
  [ -9.  10. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.   0.  -9.]]

 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  10.]]]

in_a_row_st0 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 23
state_idx_set: {0, 1, 2}
current_state_index: 0

N_array in loop at time 23:
[[[1 1 1]
  [1 1 0]
  [1 0 1]]

 [[1 1 1]
  [0 1 0]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 0]]]

action value:
 [[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [  9.  10. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.   0.  -9.]]
```

```
 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]

uncertainty:
 [[[0.8853663388576999 0.8853663388576999 0.8853663388576999]
  [0.8853663388576999 0.8853663388576999 inf]
  [0.8853663388576999 inf 0.8853663388576999]]

 [[0.8853663388576999 0.8853663388576999 0.8853663388576999]
  [inf 0.8853663388576999 inf]
  [0.8853663388576999 0.8853663388576999 0.8853663388576999]]

 [[0.8853663388576999 0.8853663388576999 0.8853663388576999]
  [0.8853663388576999 0.8853663388576999 0.8853663388576999]
  [0.8853663388576999 0.8853663388576999 inf]]]

action value with uncertainty
 [[[10.8853663388577 -8.1146336611423 -8.1146336611423]
  [9.8853663388577 -9.1146336611423 inf]
  [9.8853663388577 inf -9.1146336611423]]

 [[10.8853663388577 -9.1146336611423 -9.1146336611423]
  [inf -8.1146336611423 inf]
  [10.8853663388577 0.8853663388576999 -8.1146336611423]]

 [[10.8853663388577 -9.1146336611423 -9.1146336611423]
  [10.8853663388577 -8.1146336611423 -9.1146336611423]
  [9.8853663388577 0.8853663388576999 inf]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

Please enter the numerical index of the state...

Robot sound is playing....

What state is the robot in:

[0]: Stuck - robot needs your help
[1]: Successful - robot has completed it's task
[2]: Progressing - robot is working and doesn't need help
[3]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

```
You entered: 3 --> state: None of the above



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

(Hidden state 0 layer):
Reward_signal (R):       0.0
N value for state 0 is 1
Delta_Q for state 0 is: 10.0
New action value (Q):    0.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10.  10.]
  [  9.   0. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.   0.  -9.]]

 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       0.0
N value for state 1 is 1
Delta_Q for state 1 is: 10.0
New action value (Q):    0.0
Q-table after update for state 1:

[[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ -9.   0.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.   0.   9.]]

 [[-10. -10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       0.0
N value for state 2 is 1
Delta_Q for state 2 is: 10.0
```

```
New action value (Q):    0.0
Q-table after update for state 2:

[[[-10.   9.  -9.]
  [ -9.  10.  10.]
  [ -9.   0. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.   0.  -9.]]

 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  10.]]]

in_a_row_st0 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 24
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 24:
[[[1 1 1]
  [1 1 0]
  [1 1 1]]

 [[1 1 1]
  [0 1 0]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 0]]]

action value:
 [[[-10.   9.  -9.]
  [ -9.  10.  10.]
  [ -9.   0. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.   0.  -9.]]
```

```
 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  10.]]]

uncertainty:
 [[[0.891354843811928 0.891354843811928 0.891354843811928]
  [0.891354843811928 0.891354843811928 inf]
  [0.891354843811928 0.891354843811928 0.891354843811928]]

 [[0.891354843811928 0.891354843811928 0.891354843811928]
  [inf 0.891354843811928 inf]
  [0.891354843811928 0.891354843811928 0.891354843811928]]

 [[0.891354843811928 0.891354843811928 0.891354843811928]
  [0.891354843811928 0.891354843811928 0.891354843811928]
  [0.891354843811928 0.891354843811928 inf]]]

action value with uncertainty
 [[[-9.108645156188071 9.891354843811929 -8.108645156188071]
  [-8.108645156188071 10.891354843811929 inf]
  [-8.108645156188071 0.891354843811928 -9.108645156188071]]

 [[-9.108645156188071 10.891354843811929 -9.108645156188071]
  [inf 9.891354843811929 inf]
  [-9.108645156188071 0.891354843811928 -8.108645156188071]]

 [[-9.108645156188071 10.891354843811929 -9.108645156188071]
  [-9.108645156188071 9.891354843811929 -9.108645156188071]
  [-8.108645156188071 0.891354843811928 inf]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

Please enter the numerical index of the state...

Robot sound is playing....

What state is the robot in:

[0]: Stuck - robot needs your help
[1]: Successful - robot has completed it's task
[2]: Progressing - robot is working and doesn't need help
[3]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 1 --> state: Successful - robot has 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 go back:

Please enter a valid integer in the range 0 to 10 or type 'back' to go back...

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 go back:

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 1
Delta_Q for state 0 is: 20.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10. -10.]
  [  9.   0. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  10.]
  [ 10.   0.  -9.]]

 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       10.0
N value for state 1 is 1
Delta_Q for state 1 is: 0.0
New action value (Q):    10.0
Q-table after update for state 1:

[[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ -9.   0.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.   0.   9.]]

 [[-10. -10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 1
Delta_Q for state 2 is: 20.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[-10.   9.  -9.]
  [ -9.  10. -10.]
  [ -9.   0. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  10.]
  [-10.   0.  -9.]]

 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  10.]]]

in_a_row_st2 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 25
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 25:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 1 1]
  [0 1 0]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 0]]]

action value:
 [[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ -9.   0.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.  10.]
  [-10.   0.   9.]]
```

```
 [[-10. -10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]

uncertainty:
 [[[0.8970612889970507 0.8970612889970507 0.8970612889970507]
  [0.8970612889970507 0.8970612889970507 0.8970612889970507]
  [0.8970612889970507 0.8970612889970507 0.8970612889970507]]

 [[0.8970612889970507 0.8970612889970507 0.8970612889970507]
  [inf 0.8970612889970507 inf]
  [0.8970612889970507 0.8970612889970507 0.8970612889970507]]

 [[0.8970612889970507 0.8970612889970507 0.8970612889970507]
  [0.8970612889970507 0.8970612889970507 0.8970612889970507]
  [0.8970612889970507 0.8970612889970507 inf]]]

action value with uncertainty
 [[[-9.102938711002949 -8.102938711002949 9.897061288997051]
  [-8.102938711002949 -9.102938711002949 10.897061288997051]
  [-8.102938711002949 0.8970612889970507 10.897061288997051]]

 [[-9.102938711002949 -9.102938711002949 10.897061288997051]
  [inf -8.102938711002949 inf]
  [-9.102938711002949 0.8970612889970507 9.897061288997051]]

 [[-9.102938711002949 -9.102938711002949 10.897061288997051]
  [-9.102938711002949 -8.102938711002949 10.897061288997051]
  [-8.102938711002949 0.8970612889970507 inf]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 1
Delta_Q for state 0 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10. -10.]
  [  9.   0. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  -9.]
  [ 10.   0.  -9.]]

 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       9.0
N value for state 1 is 1
Delta_Q for state 1 is: 1.0
New action value (Q):    9.0
Q-table after update for state 1:

[[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ -9.   0.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.   9.]
  [-10.   0.   9.]]

 [[-10. -10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.  10.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 1
Delta_Q for state 2 is: 19.0
```

```
New action value (Q):    -9.0
Q-table after update for state 2:

[[[-10.   9.  -9.]
  [ -9.  10. -10.]
  [ -9.   0. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  -9.]
  [-10.   0.  -9.]]

 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  10.]]]

in_a_row_st1 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 26
state_idx_set: {0, 1, 2}
current_state_index: 0

N_array in loop at time 26:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 1 1]
  [0 1 1]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 0]]]

action value:
 [[[ 10.  -9.  -9.]
  [  9. -10. -10.]
  [  9.   0. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  -9.]
  [ 10.   0.  -9.]]
```

```
 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  10.]]]

uncertainty:
 [[[0.9025099082588349 0.9025099082588349 0.9025099082588349]
  [0.9025099082588349 0.9025099082588349 0.9025099082588349]
  [0.9025099082588349 0.9025099082588349 0.9025099082588349]]

 [[0.9025099082588349 0.9025099082588349 0.9025099082588349]
  [inf 0.9025099082588349 0.9025099082588349]
  [0.9025099082588349 0.9025099082588349 0.9025099082588349]]

 [[0.9025099082588349 0.9025099082588349 0.9025099082588349]
  [0.9025099082588349 0.9025099082588349 0.9025099082588349]
  [0.9025099082588349 0.9025099082588349 inf]]]

action value with uncertainty
 [[[10.902509908258835 -8.097490091741165 -8.097490091741165]
  [9.902509908258835 -9.097490091741165 -9.097490091741165]
  [9.902509908258835 0.9025099082588349 -9.097490091741165]]

 [[10.902509908258835 -9.097490091741165 -9.097490091741165]
  [inf -8.097490091741165 -8.097490091741165]
  [10.902509908258835 0.9025099082588349 -8.097490091741165]]

 [[10.902509908258835 -9.097490091741165 -9.097490091741165]
  [10.902509908258835 -8.097490091741165 -9.097490091741165]
  [9.902509908258835 0.9025099082588349 inf]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 8



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

(Hidden state 0 layer):
Reward_signal (R):       -8.0
N value for state 0 is 1
Delta_Q for state 0 is: 18.0
New action value (Q):    -8.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10. -10.]
  [  9.   0. -10.]]

 [[ 10. -10. -10.]
  [ 10.  -9.  -9.]
  [ 10.   0.  -9.]]

 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  -8.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       8.0
N value for state 1 is 1
Delta_Q for state 1 is: 2.0
New action value (Q):    8.0
Q-table after update for state 1:

[[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ -9.   0.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.   9.]
  [-10.   0.   9.]]

 [[-10. -10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.   8.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -8.0
N value for state 2 is 1
Delta_Q for state 2 is: 18.0
```

```
New action value (Q):    -8.0
Q-table after update for state 2:

[[[-10.   9.  -9.]
  [ -9.  10. -10.]
  [ -9.   0. -10.]]

 [[-10.  10. -10.]
  [ 10.   9.  -9.]
  [-10.   0.  -9.]]

 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  -8.]]]

in_a_row_st0 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 27
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 27:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 1 1]
  [0 1 1]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 1]]]

action value:
 [[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ -9.   0.  10.]]

 [[-10. -10.  10.]
  [ 10.  -9.   9.]
  [-10.   0.   9.]]
```

```
 [[-10. -10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.   8.]]]

uncertainty:
 [[[0.9077219929587925 0.9077219929587925 0.9077219929587925]
  [0.9077219929587925 0.9077219929587925 0.9077219929587925]
  [0.9077219929587925 0.9077219929587925 0.9077219929587925]]

 [[0.9077219929587925 0.9077219929587925 0.9077219929587925]
  [inf 0.9077219929587925 0.9077219929587925]
  [0.9077219929587925 0.9077219929587925 0.9077219929587925]]

 [[0.9077219929587925 0.9077219929587925 0.9077219929587925]
  [0.9077219929587925 0.9077219929587925 0.9077219929587925]
  [0.9077219929587925 0.9077219929587925 0.9077219929587925]]]

action value with uncertainty
 [[[-9.092278007041207 -8.092278007041207 9.907721992958793]
  [-8.092278007041207 -9.092278007041207 10.907721992958793]
  [-8.092278007041207 0.9077219929587925 10.907721992958793]]

 [[-9.092278007041207 -9.092278007041207 10.907721992958793]
  [inf -8.092278007041207 9.907721992958793]
  [-9.092278007041207 0.9077219929587925 9.907721992958793]]

 [[-9.092278007041207 -9.092278007041207 10.907721992958793]
  [-9.092278007041207 -8.092278007041207 10.907721992958793]
  [-8.092278007041207 0.9077219929587925 8.907721992958793]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

Please enter the numerical index of the state...

Robot sound is playing....

What state is the robot in:

[0]: Stuck   - robot needs your help
[1]: Successful   - robot has completed it's task
[2]: Progressing   - robot is working and doesn't need help
[3]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 0 --> state: Stuck   - robot 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 go back:

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       9.0
N value for state 0 is 1
Delta_Q for state 0 is: 1.0
New action value (Q):    9.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10. -10.]
  [  9.   0. -10.]]

 [[ 10. -10. -10.]
  [  9.  -9.  -9.]
  [ 10.   0.  -9.]]

 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  -8.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 1
Delta_Q for state 1 is: 19.0
New action value (Q):    -9.0
Q-table after update for state 1:

[[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ -9.   0.  10.]]

 [[-10. -10.  10.]
  [ -9.  -9.   9.]
  [-10.   0.   9.]]

 [[-10. -10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.   8.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 1
Delta_Q for state 2 is: 19.0
```

```
New action value (Q):    -9.0
Q-table after update for state 2:

[[[-10.   9.  -9.]
  [ -9.  10. -10.]
  [ -9.   0. -10.]]

 [[-10.  10. -10.]
  [ -9.   9.  -9.]
  [-10.   0.  -9.]]

 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  -8.]]]

in_a_row_st1 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 28
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 28:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 1]]]

action value:
 [[[-10.   9.  -9.]
  [ -9.  10. -10.]
  [ -9.   0. -10.]]

 [[-10.  10. -10.]
  [ -9.   9.  -9.]
  [-10.   0.  -9.]]
```

```
 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  -8.]]]

uncertainty:
 [[[0.9127163456100701 0.9127163456100701 0.9127163456100701]
  [0.9127163456100701 0.9127163456100701 0.9127163456100701]
  [0.9127163456100701 0.9127163456100701 0.9127163456100701]]

 [[0.9127163456100701 0.9127163456100701 0.9127163456100701]
  [0.9127163456100701 0.9127163456100701 0.9127163456100701]
  [0.9127163456100701 0.9127163456100701 0.9127163456100701]]

 [[0.9127163456100701 0.9127163456100701 0.9127163456100701]
  [0.9127163456100701 0.9127163456100701 0.9127163456100701]
  [0.9127163456100701 0.9127163456100701 0.9127163456100701]]]

action value with uncertainty
 [[[-9.08728365438993 9.91271634561007 -8.08728365438993]
  [-8.08728365438993 10.91271634561007 -9.08728365438993]
  [-8.08728365438993 0.9127163456100701 -9.08728365438993]]

 [[-9.08728365438993 10.91271634561007 -9.08728365438993]
  [-8.08728365438993 9.91271634561007 -8.08728365438993]
  [-9.08728365438993 0.9127163456100701 -8.08728365438993]]

 [[-9.08728365438993 10.91271634561007 -9.08728365438993]
  [-9.08728365438993 9.91271634561007 -9.08728365438993]
  [-8.08728365438993 0.9127163456100701 -7.08728365438993]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 2
Delta_Q for state 0 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.  -9.  -9.]
  [  9. -10. -10.]
  [  9.   0. -10.]]

 [[ 10. -10. -10.]
  [  9.  -9.  -9.]
  [ 10.   0.  -9.]]

 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  -8.]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 2
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[-10.  -9.   9.]
  [ -9. -10.  10.]
  [ -9.   0.  10.]]

 [[-10. -10.  10.]
  [ -9.  -9.   9.]
  [-10.   0.   9.]]

 [[-10. -10.  10.]
  [-10.  -9.  10.]
  [ -9.   0.   8.]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 2
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    10.0
Q-table after update for state 2:

[[[-10.   9.  -9.]
  [ -9.  10. -10.]
  [ -9.   0. -10.]]

 [[-10.  10. -10.]
  [ -9.   9.  -9.]
  [-10.   0.  -9.]]

 [[-10.  10. -10.]
  [-10.   9. -10.]
  [ -9.   0.  -8.]]]

in_a_row_st2 +1, total 0 becase correct and under delta Q thresh



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 29
state_idx_set: {0, 1, 2}
current_state_index: 0

N_array in loop at time 29:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 2 1]
  [1 1 1]
  [1 1 1]]]

action value:
 [[[ 10.  -9.  -9.]
  [  9. -10. -10.]
  [  9.   0. -10.]]

 [[ 10. -10. -10.]
  [  9.  -9.  -9.]
  [ 10.   0.  -9.]]
```

```
 [[ 10. -10. -10.]
  [ 10.  -9. -10.]
  [  9.   0.  -8.]]]

uncertainty:
 [[[0.9175096498111714 0.9175096498111714 0.9175096498111714]
  [0.9175096498111714 0.9175096498111714 0.9175096498111714]
  [0.9175096498111714 0.9175096498111714 0.9175096498111714]]

 [[0.9175096498111714 0.9175096498111714 0.9175096498111714]
  [0.9175096498111714 0.9175096498111714 0.9175096498111714]
  [0.9175096498111714 0.9175096498111714 0.9175096498111714]]

 [[0.9175096498111714 0.6487772951855739 0.9175096498111714]
  [0.9175096498111714 0.9175096498111714 0.9175096498111714]
  [0.9175096498111714 0.9175096498111714 0.9175096498111714]]]

action value with uncertainty
 [[[10.917509649811171 -8.082490350188829 -8.082490350188829]
  [9.917509649811171 -9.082490350188829 -9.082490350188829]
  [9.917509649811171 0.9175096498111714 -9.082490350188829]]

 [[10.917509649811171 -9.082490350188829 -9.082490350188829]
  [9.917509649811171 -8.082490350188829 -8.082490350188829]
  [10.917509649811171 0.9175096498111714 -8.082490350188829]]

 [[10.917509649811171 -9.351222704814425 -9.082490350188829]
  [10.917509649811171 -8.082490350188829 -9.082490350188829]
  [9.917509649811171 0.9175096498111714 -7.082490350188829]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       9.0
N value for state 0 is 2
Delta_Q for state 0 is: 0.5
New action value (Q):    9.5
Q-table after update for state 0:

[[[ 10.   -9.   -9. ]
  [  9.  -10.  -10. ]
  [  9.    0.  -10. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[ 10.  -10.  -10. ]
  [ 10.   -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 2
Delta_Q for state 1 is: 0.5
New action value (Q):    -9.5
Q-table after update for state 1:

[[[-10.   -9.    9. ]
  [ -9.  -10.   10. ]
  [ -9.    0.   10. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[-10.  -10.   10. ]
  [-10.   -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 2
Delta_Q for state 2 is: 0.5
```

```
New action value (Q):    -9.5
Q-table after update for state 2:

[[[-10.    9.   -9. ]
  [ -9.   10.  -10. ]
  [ -9.    0.  -10. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[-10.   10.  -10. ]
  [-10.    9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st0 +1, total 0 becase correct and under delta Q thresh



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

STARTING NEW LOOP
----------------------------------------------------------------
----------------------------------------------------------------



(Hidden loop layer):
Time Step: 30
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 30:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[2 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 2 1]
  [1 1 1]
  [1 1 1]]]

action value:
 [[[-10.   -9.    9. ]
  [ -9.  -10.   10. ]
  [ -9.    0.   10. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]
```

```
 [[-10.  -10.   10. ]
  [-10.   -9.   10. ]
  [ -9.    0.    8. ]]]

uncertainty:
 [[[0.9221167742837882 0.9221167742837882 0.9221167742837882]
  [0.9221167742837882 0.9221167742837882 0.9221167742837882]
  [0.9221167742837882 0.9221167742837882 0.9221167742837882]]

 [[0.6520350241419317 0.9221167742837882 0.9221167742837882]
  [0.9221167742837882 0.9221167742837882 0.9221167742837882]
  [0.9221167742837882 0.9221167742837882 0.9221167742837882]]

 [[0.9221167742837882 0.6520350241419317 0.9221167742837882]
  [0.9221167742837882 0.9221167742837882 0.9221167742837882]
  [0.9221167742837882 0.9221167742837882 0.9221167742837882]]]

action value with uncertainty
 [[[-9.077883225716212 -8.077883225716212 9.922116774283788]
  [-8.077883225716212 -9.077883225716212 10.922116774283788]
  [-8.077883225716212 0.9221167742837882 10.922116774283788]]

 [[-8.84796497585807 -9.077883225716212 10.922116774283788]
  [-8.077883225716212 -8.077883225716212 9.922116774283788]
  [-9.077883225716212 0.9221167742837882 9.922116774283788]]

 [[-9.077883225716212 -9.34796497585807 10.922116774283788]
  [-9.077883225716212 -8.077883225716212 10.922116774283788]
  [-8.077883225716212 0.9221167742837882 8.922116774283788]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 8



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

(Hidden state 0 layer):
Reward_signal (R):       -8.0
N value for state 0 is 2
Delta_Q for state 0 is: 1.0
New action value (Q):    -9.0
Q-table after update for state 0:

[[[ 10.   -9.   -9. ]
  [  9.  -10.  -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[ 10.  -10.  -10. ]
  [ 10.   -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       8.0
N value for state 1 is 2
Delta_Q for state 1 is: 1.0
New action value (Q):    9.0
Q-table after update for state 1:

[[[-10.   -9.    9. ]
  [ -9.  -10.   10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[-10.  -10.   10. ]
  [-10.   -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -8.0
N value for state 2 is 2
Delta_Q for state 2 is: 1.0
```

```
New action value (Q):    -9.0
Q-table after update for state 2:

[[[-10.    9.   -9. ]
  [ -9.   10.  -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[-10.   10.  -10. ]
  [-10.    9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st1 +1, total 3 becase correct and under delta Q thresh
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 31
state_idx_set: {0, 2}
current_state_index: 2

N_array in loop at time 31:
[[[1 1 1]
  [1 1 1]
  [1 1 2]]

 [[2 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 2 1]
  [1 1 1]
  [1 1 1]]]

action value:
 [[[-10.    9.   -9. ]
  [ -9.   10.  -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]
```

```
 [[-10.   10.  -10. ]
  [-10.    9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.9265510245643716 0.9265510245643716 0.9265510245643716]
  [0.9265510245643716 0.9265510245643716 0.9265510245643716]
  [0.9265510245643716 0.9265510245643716 0.6551705125848105]]

 [[0.6551705125848105 0.9265510245643716 0.9265510245643716]
  [0.9265510245643716 0.9265510245643716 0.9265510245643716]
  [0.9265510245643716 0.9265510245643716 0.9265510245643716]]

 [[0.9265510245643716 0.6551705125848105 0.9265510245643716]
  [0.9265510245643716 0.9265510245643716 0.9265510245643716]
  [0.9265510245643716 0.9265510245643716 0.9265510245643716]]]

action value with uncertainty
 [[[-9.073448975435628 9.926551024564372 -8.073448975435628]
  [-8.073448975435628 10.926551024564372 -9.073448975435628]
  [-8.073448975435628 0.9265510245643716 -8.34482948741519]]

 [[-8.84482948741519 10.926551024564372 -9.073448975435628]
  [-8.073448975435628 9.926551024564372 -8.073448975435628]
  [-9.073448975435628 0.9265510245643716 -8.073448975435628]]

 [[-9.073448975435628 10.65517051258481 -9.073448975435628]
  [-9.073448975435628 9.926551024564372 -9.073448975435628]
  [-8.073448975435628 0.9265510245643716 -7.073448975435628]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 2
Delta_Q for state 0 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.   -9.   -9. ]
  [  9.  -10.  -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[ 10.  -10.  -10. ]
  [ 10.   -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 2
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[-10.   -9.    9. ]
  [ -9.  -10.   10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[-10.  -10.   10. ]
  [-10.   -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 2
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    10.0
Q-table after update for state 2:

[[[-10.    9.   -9. ]
  [ -9.   10.  -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[-10.   10.  -10. ]
  [-10.    9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st2 +1, total 0 becase correct and under delta Q thresh
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 32
state_idx_set: {0, 2}
current_state_index: 2

N_array in loop at time 32:
[[[1 1 1]
  [1 1 1]
  [1 1 2]]

 [[2 2 1]
  [1 1 1]
  [1 1 1]]

 [[1 2 1]
  [1 1 1]
  [1 1 1]]]

action value:
 [[[-10.    9.   -9. ]
  [ -9.   10.  -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]
```

```
 [[-10.   10.  -10. ]
  [-10.    9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.9308243527647585 0.9308243527647585 0.9308243527647585]
  [0.9308243527647585 0.9308243527647585 0.9308243527647585]
  [0.9308243527647585 0.9308243527647585 0.6581922119335398]]

 [[0.6581922119335398 0.6581922119335398 0.9308243527647585]
  [0.9308243527647585 0.9308243527647585 0.9308243527647585]
  [0.9308243527647585 0.9308243527647585 0.9308243527647585]]

 [[0.9308243527647585 0.6581922119335398 0.9308243527647585]
  [0.9308243527647585 0.9308243527647585 0.9308243527647585]
  [0.9308243527647585 0.9308243527647585 0.9308243527647585]]]

action value with uncertainty
 [[[-9.069175647235241 9.930824352764759 -8.069175647235241]
  [-8.069175647235241 10.930824352764759 -9.069175647235241]
  [-8.069175647235241 0.9308243527647585 -8.34180778806646]]

 [[-8.84180778806646 10.65819221193354 -9.069175647235241]
  [-8.069175647235241 9.930824352764759 -8.069175647235241]
  [-9.069175647235241 0.9308243527647585 -8.069175647235241]]

 [[-9.069175647235241 10.65819221193354 -9.069175647235241]
  [-9.069175647235241 9.930824352764759 -9.069175647235241]
  [-8.069175647235241 0.9308243527647585 -7.069175647235242]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 7



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

(Hidden state 0 layer):
Reward_signal (R):       -7.0
N value for state 0 is 2
Delta_Q for state 0 is: 1.5
New action value (Q):    -8.5
Q-table after update for state 0:

[[[ 10.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[ 10.  -10.  -10. ]
  [ 10.   -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -7.0
N value for state 1 is 2
Delta_Q for state 1 is: 1.5
New action value (Q):    -8.5
Q-table after update for state 1:

[[[-10.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[-10.  -10.   10. ]
  [-10.   -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       7.0
N value for state 2 is 2
Delta_Q for state 2 is: 1.5
```

```
New action value (Q):    8.5
Q-table after update for state 2:

[[[-10.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[-10.   10.  -10. ]
  [-10.    9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st2 +1, total 0 becase correct and under delta Q thresh
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 33
state_idx_set: {0, 2}
current_state_index: 2

N_array in loop at time 33:
[[[1 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 2 1]
  [1 1 1]
  [1 1 1]]

 [[1 2 1]
  [1 1 1]
  [1 1 1]]]

action value:
 [[[-10.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]
```

```
 [[-10.   10.  -10. ]
  [-10.    9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.9349475334833608 0.9349475334833608 0.9349475334833608]
  [0.9349475334833608 0.6611077409797211 0.9349475334833608]
  [0.9349475334833608 0.9349475334833608 0.6611077409797211]]

 [[0.6611077409797211 0.6611077409797211 0.9349475334833608]
  [0.9349475334833608 0.9349475334833608 0.9349475334833608]
  [0.9349475334833608 0.9349475334833608 0.9349475334833608]]

 [[0.9349475334833608 0.6611077409797211 0.9349475334833608]
  [0.9349475334833608 0.9349475334833608 0.9349475334833608]
  [0.9349475334833608 0.9349475334833608 0.9349475334833608]]]

action value with uncertainty
 [[[-9.06505246651664 9.93494753348336 -8.06505246651664]
  [-8.06505246651664 9.161107740979721 -9.06505246651664]
  [-8.06505246651664 0.9349475334833608 -8.338892259020279]]

 [[-8.838892259020279 10.661107740979721 -9.06505246651664]
  [-8.06505246651664 9.93494753348336 -8.06505246651664]
  [-9.06505246651664 0.9349475334833608 -8.06505246651664]]

 [[-9.06505246651664 10.661107740979721 -9.06505246651664]
  [-9.06505246651664 9.93494753348336 -9.06505246651664]
  [-8.06505246651664 0.9349475334833608 -7.065052466516639]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

Please enter the numerical index of the state...

Robot sound is playing....

What state is the robot in:

[0]: Stuck - robot needs your help
[1]: Successful - robot has completed it's task
[2]: Progressing - robot is working and doesn't need help
[3]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 2 --> state: 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 go back:

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 3
Delta_Q for state 0 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[ 10.  -10.  -10. ]
  [ 10.   -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 3
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[-10.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[-10.  -10.   10. ]
  [-10.   -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 3
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    10.0
Q-table after update for state 2:

[[[-10.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[-10.   10.  -10. ]
  [-10.    9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st2 +1, total 0 becase correct and under delta Q thresh
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 34
state_idx_set: {0, 2}
current_state_index: 0

N_array in loop at time 34:
[[[1 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 2 1]
  [1 1 1]
  [1 1 1]]

 [[1 3 1]
  [1 1 1]
  [1 1 1]]]

action value:
 [[[ 10.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]
```

```
 [[ 10.  -10.  -10. ]
  [ 10.   -9.  -10. ]
  [  9.    0.   -8. ]]]

uncertainty:
 [[[0.9389303121925718 0.9389303121925718 0.9389303121925718]
  [0.9389303121925718 0.6639239908129696 0.9389303121925718]
  [0.9389303121925718 0.9389303121925718 0.6639239908129696]]

 [[0.6639239908129696 0.6639239908129696 0.9389303121925718]
  [0.9389303121925718 0.9389303121925718 0.9389303121925718]
  [0.9389303121925718 0.9389303121925718 0.9389303121925718]]

 [[0.9389303121925718 0.5420916684946807 0.9389303121925718]
  [0.9389303121925718 0.9389303121925718 0.9389303121925718]
  [0.9389303121925718 0.9389303121925718 0.9389303121925718]]]

action value with uncertainty
 [[[10.938930312192571 -8.061069687807429 -8.061069687807429]
  [9.938930312192571 -7.83607600918703 -9.061069687807429]
  [9.938930312192571 0.9389303121925718 -8.33607600918703]]

 [[10.16392399081297 -9.33607600918703 -9.061069687807429]
  [9.938930312192571 -8.061069687807429 -8.061069687807429]
  [10.938930312192571 0.9389303121925718 -8.061069687807429]]

 [[10.938930312192571 -9.457908331505319 -9.061069687807429]
  [10.938930312192571 -8.061069687807429 -9.061069687807429]
  [9.938930312192571 0.9389303121925718 -7.061069687807429]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       9.0
N value for state 0 is 2
Delta_Q for state 0 is: 0.5
New action value (Q):    9.5
Q-table after update for state 0:

[[[ 10.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [ 10.   -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 2
Delta_Q for state 1 is: 0.5
New action value (Q):    -9.5
Q-table after update for state 1:

[[[-10.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [-10.   -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 2
Delta_Q for state 2 is: 0.5
```

```
New action value (Q):    -9.5
Q-table after update for state 2:

[[[-10.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [-10.    9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st0 +1, total 0 becase correct and under delta Q thresh
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 35
state_idx_set: {0, 2}
current_state_index: 0

N_array in loop at time 35:
[[[1 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 2 1]
  [1 1 1]
  [1 1 1]]

 [[2 3 1]
  [1 1 1]
  [1 1 1]]]

action value:
 [[[ 10.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]
```

```
 [[  9.5 -10.  -10. ]
  [ 10.   -9.  -10. ]
  [  9.    0.   -8. ]]]

uncertainty:
 [[[0.9427815310942156 0.9427815310942156 0.9427815310942156]
  [0.9427815310942156 0.6666472138141557 0.9427815310942156]
  [0.9427815310942156 0.9427815310942156 0.6666472138141557]]

 [[0.6666472138141557 0.6666472138141557 0.9427815310942156]
  [0.9427815310942156 0.9427815310942156 0.9427815310942156]
  [0.9427815310942156 0.9427815310942156 0.9427815310942156]]

 [[0.6666472138141557 0.544315170764253 0.9427815310942156]
  [0.9427815310942156 0.9427815310942156 0.9427815310942156]
  [0.9427815310942156 0.9427815310942156 0.9427815310942156]]]

action value with uncertainty
 [[[10.942781531094216 -8.057218468905784 -8.057218468905784]
  [9.942781531094216 -7.833352786185844 -9.057218468905784]
  [9.942781531094216 0.9427815310942156 -8.333352786185845]]

 [[10.166647213814155 -9.333352786185845 -9.057218468905784]
  [9.942781531094216 -8.057218468905784 -8.057218468905784]
  [10.942781531094216 0.9427815310942156 -8.057218468905784]]

 [[10.166647213814155 -9.455684829235746 -9.057218468905784]
  [10.942781531094216 -8.057218468905784 -9.057218468905784]
  [9.942781531094216 0.9427815310942156 -7.057218468905784]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck          - robot 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 go
 back:


Please enter a valid integer in the range 0 to 10 or type 'back' to go bac
k...

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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       9.0
N value for state 0 is 2
Delta_Q for state 0 is: 0.5
New action value (Q):    9.5
Q-table after update for state 0:

[[[ 10.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 2
Delta_Q for state 1 is: 0.5
New action value (Q):    -9.5
Q-table after update for state 1:

[[[-10.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 2
Delta_Q for state 2 is: 0.5
```

```
New action value (Q):    -9.5
Q-table after update for state 2:

[[[-10.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st0 +1, total 0 becase correct and under delta Q thresh
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 36
state_idx_set: {0, 2}
current_state_index: 2

N_array in loop at time 36:
[[[1 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 2 1]
  [1 1 1]
  [1 1 1]]

 [[2 3 1]
  [2 1 1]
  [1 1 1]]]

action value:
 [[[-10.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]
```

```
 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.9465092364124227 0.9465092364124227 0.9465092364124227]
  [0.9465092364124227 0.6692830995229252 0.9465092364124227]
  [0.9465092364124227 0.9465092364124227 0.6692830995229252]]

 [[0.6692830995229252 0.6692830995229252 0.9465092364124227]
  [0.9465092364124227 0.9465092364124227 0.9465092364124227]
  [0.9465092364124227 0.9465092364124227 0.9465092364124227]]

 [[0.6692830995229252 0.5464673624331794 0.9465092364124227]
  [0.6692830995229252 0.9465092364124227 0.9465092364124227]
  [0.9465092364124227 0.9465092364124227 0.9465092364124227]]]

action value with uncertainty
 [[[-9.053490763587577 9.946509236412423 -8.053490763587577]
  [-8.053490763587577 9.169283099522925 -9.053490763587577]
  [-8.053490763587577 0.9465092364124227 -8.330716900477075]]

 [[-8.830716900477075 10.669283099522925 -9.053490763587577]
  [-8.053490763587577 9.946509236412423 -8.053490763587577]
  [-9.053490763587577 0.9465092364124227 -8.053490763587577]]

 [[-8.830716900477075 10.54646736243318 -9.053490763587577]
  [-8.830716900477075 9.946509236412423 -9.053490763587577]
  [-8.053490763587577 0.9465092364124227 -7.053490763587577]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 3
Delta_Q for state 0 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[ 10.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 3
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[-10.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 3
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    10.0
Q-table after update for state 2:

[[[-10.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st2 +1, total 0 becase correct and under delta Q thresh
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 37
state_idx_set: {0, 2}
current_state_index: 0

N_array in loop at time 37:
[[[1 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 3 1]
  [1 1 1]
  [1 1 1]]

 [[2 3 1]
  [2 1 1]
  [1 1 1]]]

action value:
 [[[ 10.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]
```

```
 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]

uncertainty:
 [[[0.9501207703029421 0.9501207703029421 0.9501207703029421]
  [0.9501207703029421 0.6718368396273965 0.9501207703029421]
  [0.9501207703029421 0.9501207703029421 0.6718368396273965]]

 [[0.6718368396273965 0.5485524824970582 0.9501207703029421]
  [0.9501207703029421 0.9501207703029421 0.9501207703029421]
  [0.9501207703029421 0.9501207703029421 0.9501207703029421]]

 [[0.6718368396273965 0.5485524824970582 0.9501207703029421]
  [0.6718368396273965 0.9501207703029421 0.9501207703029421]
  [0.9501207703029421 0.9501207703029421 0.9501207703029421]]]

action value with uncertainty
 [[[10.950120770302942 -8.049879229697058 -8.049879229697058]
  [9.950120770302942 -7.828163160372603 -9.049879229697058]
  [9.950120770302942 0.9501207703029421 -8.328163160372604]]

 [[10.171836839627396 -9.451447517502942 -9.049879229697058]
  [9.950120770302942 -8.049879229697058 -8.049879229697058]
  [10.950120770302942 0.9501207703029421 -8.049879229697058]]

 [[10.171836839627396 -9.451447517502942 -9.049879229697058]
  [10.171836839627396 -8.049879229697058 -9.049879229697058]
  [9.950120770302942 0.9501207703029421 -7.049879229697058]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 8



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

(Hidden state 0 layer):
Reward_signal (R):       8.0
N value for state 0 is 2
Delta_Q for state 0 is: 1.0
New action value (Q):    9.0
Q-table after update for state 0:

[[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -8.0
N value for state 1 is 2
Delta_Q for state 1 is: 1.0
New action value (Q):    -9.0
Q-table after update for state 1:

[[[ -9.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -8.0
N value for state 2 is 2
Delta_Q for state 2 is: 1.0
```

```
New action value (Q):    -9.0
Q-table after update for state 2:

[[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st0 +1, total 0 becase correct and under delta Q thresh
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 38
state_idx_set: {0, 2}
current_state_index: 2

N_array in loop at time 38:
[[[2 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 3 1]
  [1 1 1]
  [1 1 1]]

 [[2 3 1]
  [2 1 1]
  [1 1 1]]]

action value:
 [[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]
```

```
 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.6743131838884645 0.9536228499420494 0.9536228499420494]
  [0.9536228499420494 0.6743131838884645 0.9536228499420494]
  [0.9536228499420494 0.9536228499420494 0.6743131838884645]]

 [[0.6743131838884645 0.5505744091194203 0.9536228499420494]
  [0.9536228499420494 0.9536228499420494 0.9536228499420494]
  [0.9536228499420494 0.9536228499420494 0.9536228499420494]]

 [[0.6743131838884645 0.5505744091194203 0.9536228499420494]
  [0.6743131838884645 0.9536228499420494 0.9536228499420494]
  [0.9536228499420494 0.9536228499420494 0.9536228499420494]]]

action value with uncertainty
 [[[-8.325686816111535 9.95362284994205 -8.04637715005795]
  [-8.04637715005795 9.174313183888465 -9.04637715005795]
  [-8.04637715005795 0.9536228499420494 -8.325686816111535]]

 [[-8.825686816111535 10.55057440911942 -9.04637715005795]
  [-8.04637715005795 9.95362284994205 -8.04637715005795]
  [-9.04637715005795 0.9536228499420494 -8.04637715005795]]

 [[-8.825686816111535 10.55057440911942 -9.04637715005795]
  [-8.825686816111535 9.95362284994205 -9.04637715005795]
  [-8.04637715005795 0.9536228499420494 -7.046377150057951]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 4
Delta_Q for state 0 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 4
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ -9.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 4
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    10.0
Q-table after update for state 2:

[[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st2 +1, total 1 becase correct and same
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 39
state_idx_set: {0, 2}
current_state_index: 0

N_array in loop at time 39:
[[[2 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 4 1]
  [1 1 1]
  [1 1 1]]

 [[2 3 1]
  [2 1 1]
  [1 1 1]]]

action value:
 [[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]
```

```
 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]

uncertainty:
 [[[0.6767164884692893 0.9570216358747652 0.9570216358747652]
  [0.9570216358747652 0.6767164884692893 0.9570216358747652]
  [0.9570216358747652 0.9570216358747652 0.6767164884692893]]

 [[0.6767164884692893 0.4785108179373826 0.9570216358747652]
  [0.9570216358747652 0.9570216358747652 0.9570216358747652]
  [0.9570216358747652 0.9570216358747652 0.9570216358747652]]

 [[0.6767164884692893 0.5525366990925917 0.9570216358747652]
  [0.6767164884692893 0.9570216358747652 0.9570216358747652]
  [0.9570216358747652 0.9570216358747652 0.9570216358747652]]]

action value with uncertainty
 [[[9.676716488469289 -8.042978364125235 -8.042978364125235]
  [9.957021635874765 -7.823283511530711 -9.042978364125235]
  [9.957021635874765 0.9570216358747652 -8.323283511530711]]

 [[10.176716488469289 -9.521489182062618 -9.042978364125235]
  [9.957021635874765 -8.042978364125235 -8.042978364125235]
  [10.957021635874765 0.9570216358747652 -8.042978364125235]]

 [[10.176716488469289 -9.447463300907408 -9.042978364125235]
  [10.176716488469289 -8.042978364125235 -9.042978364125235]
  [9.957021635874765 0.9570216358747652 -7.042978364125235]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck          - robot 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 go
 back:


Please enter a valid integer in the range 0 to 10 or type 'back' to go bac
k...

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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       10.0
N value for state 0 is 2
Delta_Q for state 0 is: 0.0
New action value (Q):    10.0
Q-table after update for state 0:

[[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 2
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ -9.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 2
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st0 +1, total 0 becase correct and under delta Q thresh
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 40
state_idx_set: {0, 2}
current_state_index: 0

N_array in loop at time 40:
[[[2 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 4 1]
  [1 1 1]
  [2 1 1]]

 [[2 3 1]
  [2 1 1]
  [1 1 1]]]

action value:
 [[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]
```

```
 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]

uncertainty:
 [[[0.6790507578703098 0.9603227913199207 0.9603227913199207]
  [0.9603227913199207 0.6790507578703098 0.9603227913199207]
  [0.9603227913199207 0.9603227913199207 0.6790507578703098]]

 [[0.6790507578703098 0.48016139565996035 0.9603227913199207]
  [0.9603227913199207 0.9603227913199207 0.9603227913199207]
  [0.6790507578703098 0.9603227913199207 0.9603227913199207]]

 [[0.6790507578703098 0.5544426220774891 0.9603227913199207]
  [0.6790507578703098 0.9603227913199207 0.9603227913199207]
  [0.9603227913199207 0.9603227913199207 0.9603227913199207]]]

action value with uncertainty
 [[[9.67905075787031 -8.039677208680079 -8.039677208680079]
  [9.960322791319921 -7.82094924212969 -9.039677208680079]
  [9.960322791319921 0.9603227913199207 -8.32094924212969]]

 [[10.17905075787031 -9.51983860434004 -9.039677208680079]
  [9.960322791319921 -8.039677208680079 -8.039677208680079]
  [10.67905075787031 0.9603227913199207 -8.039677208680079]]

 [[10.17905075787031 -9.44555737792251 -9.039677208680079]
  [10.17905075787031 -8.039677208680079 -9.039677208680079]
  [9.960322791319921 0.9603227913199207 -7.039677208680079]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       10.0
N value for state 0 is 3
Delta_Q for state 0 is: 0.0
New action value (Q):    10.0
Q-table after update for state 0:

[[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 3
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ -9.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 3
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st0 +1, total 1 becase correct and same
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 41
state_idx_set: {0, 2}
current_state_index: 0

N_array in loop at time 41:
[[[2 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 4 1]
  [1 1 1]
  [3 1 1]]

 [[2 3 1]
  [2 1 1]
  [1 1 1]]]

action value:
 [[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]
```

```
 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]

uncertainty:
 [[[0.6813196814550703 0.9635315338254773 0.9635315338254773]
  [0.9635315338254773 0.6813196814550703 0.9635315338254773]
  [0.9635315338254773 0.9635315338254773 0.6813196814550703]]

 [[0.6813196814550703 0.48176576691273865 0.9635315338254773]
  [0.9635315338254773 0.9635315338254773 0.9635315338254773]
  [0.5562951904268324 0.9635315338254773 0.9635315338254773]]

 [[0.6813196814550703 0.5562951904268324 0.9635315338254773]
  [0.6813196814550703 0.9635315338254773 0.9635315338254773]
  [0.9635315338254773 0.9635315338254773 0.9635315338254773]]]

action value with uncertainty
 [[[9.68131968145507 -8.036468466174522 -8.036468466174522]
  [9.963531533825478 -7.81868031854493 -9.036468466174522]
  [9.963531533825478 0.9635315338254773 -8.31868031854493]]

 [[10.18131968145507 -9.518234233087261 -9.036468466174522]
  [9.963531533825478 -8.036468466174522 -8.036468466174522]
  [10.556295190426832 0.9635315338254773 -8.036468466174522]]

 [[10.18131968145507 -9.443704809573168 -9.036468466174522]
  [10.18131968145507 -8.036468466174522 -9.036468466174522]
  [9.963531533825478 0.9635315338254773 -7.036468466174522]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       10.0
N value for state 0 is 4
Delta_Q for state 0 is: 0.0
New action value (Q):    10.0
Q-table after update for state 0:

[[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 4
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ -9.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 4
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st0 +1, total 2 becase correct and same
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 42
state_idx_set: {0, 2}
current_state_index: 0

N_array in loop at time 42:
[[[2 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 4 1]
  [1 1 1]
  [4 1 1]]

 [[2 3 1]
  [2 1 1]
  [1 1 1]]]

action value:
 [[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]
```

```
 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]

uncertainty:
 [[[0.6835266653799404 0.966652680423968 0.966652680423968]
  [0.966652680423968 0.6835266653799404 0.966652680423968]
  [0.966652680423968 0.966652680423968 0.6835266653799404]]

 [[0.6835266653799404 0.483326340211984 0.966652680423968]
  [0.966652680423968 0.966652680423968 0.966652680423968]
  [0.483326340211984 0.966652680423968 0.966652680423968]]

 [[0.6835266653799404 0.5580971852556512 0.966652680423968]
  [0.6835266653799404 0.966652680423968 0.966652680423968]
  [0.966652680423968 0.966652680423968 0.966652680423968]]]

action value with uncertainty
 [[[9.68352666537994 -8.033347319576032 -8.033347319576032]
  [9.966652680423968 -7.81647333462006 -9.033347319576032]
  [9.966652680423968 0.966652680423968 -8.316473334620061]

 [[10.18352666537994 -9.516673659788015 -9.033347319576032]
  [9.966652680423968 -8.033347319576032 -8.033347319576032]
  [10.483326340211985 0.966652680423968 -8.033347319576032]]

 [[10.18352666537994 -9.44190281474435 -9.033347319576032]
  [10.18352666537994 -8.033347319576032 -9.033347319576032]
  [9.966652680423968 0.966652680423968 -7.033347319576032]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

Please enter the numerical index of the state...

Robot sound is playing....

What state is the robot in:

[0]: Stuck   - robot needs your help
[1]: Successful   - robot has completed it's task
[2]: Progressing   - robot is working and doesn't need help
[3]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 0 --> state: Stuck   - robot 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 go back:

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       10.0
N value for state 0 is 5
Delta_Q for state 0 is: 0.0
New action value (Q):    10.0
Q-table after update for state 0:

[[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 5
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ -9.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -10.0
N value for state 2 is 5
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    -10.0
Q-table after update for state 2:

[[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st0 +1, total 3 becase correct and same
State 0 Converged
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------
------------------------------------------------------------



(Hidden loop layer):
Time Step: 43
state_idx_set: {2}
current_state_index: 2

N_array in loop at time 43:
[[[2 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 4 1]
  [1 1 1]
  [5 1 1]]

 [[2 3 1]
  [2 1 1]
  [1 1 1]]]

action value:
 [[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
```

```
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.6856748606020898 0.9696906872417568 0.9696906872417568]
  [0.9696906872417568 0.6856748606020898 0.9696906872417568]
  [0.9696906872417568 0.9696906872417568 0.6856748606020898]]

 [[0.6856748606020898 0.4848453436208784 0.9696906872417568]
  [0.9696906872417568 0.9696906872417568 0.9696906872417568]
  [0.4336588587642113 0.9696906872417568 0.9696906872417568]]

 [[0.6856748606020898 0.5598511793097015 0.9696906872417568]
  [0.6856748606020898 0.9696906872417568 0.9696906872417568]
  [0.9696906872417568 0.9696906872417568 0.9696906872417568]]]

action value with uncertainty
 [[[-8.31432513939791 9.969690687241757 -8.030309312758243]
  [-8.030309312758243 9.18567486060209 -9.030309312758243]
  [-8.030309312758243 0.9696906872417568 -8.31432513939791]]

 [[-8.81432513939791 10.48484534362088 -9.030309312758243]
  [-8.030309312758243 9.969690687241757 -8.030309312758243]
  [-9.566341141235789 0.9696906872417568 -8.030309312758243]]

 [[-8.81432513939791 10.559851179309701 -9.030309312758243]
  [-8.81432513939791 9.969690687241757 -9.030309312758243]
  [-8.030309312758243 0.9696906872417568 -7.030309312758243]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 4
Delta_Q for state 0 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 4
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ -9.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 4
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    10.0
Q-table after update for state 2:

[[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st2 +1, total 1 becase correct and under delta Q thresh
State 0 Converged
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 44
state_idx_set: {2}
current_state_index: 2

N_array in loop at time 44:
[[[2 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 4 1]
  [1 1 1]
  [5 1 1]]

 [[2 4 1]
  [2 1 1]
  [1 1 1]]]

action value:
 [[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
```

```
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.6877671875277147 0.9726496843568938 0.9726496843568938]
  [0.9726496843568938 0.6877671875277147 0.9726496843568938]
  [0.9726496843568938 0.9726496843568938 0.6877671875277147]]

 [[0.6877671875277147 0.4863248421784469 0.9726496843568938]
  [0.9726496843568938 0.9726496843568938 0.9726496843568938]
  [0.4349821625031457 0.9726496843568938 0.9726496843568938]]

 [[0.6877671875277147 0.4863248421784469 0.9726496843568938]
  [0.6877671875277147 0.9726496843568938 0.9726496843568938]
  [0.9726496843568938 0.9726496843568938 0.9726496843568938]]]

action value with uncertainty
 [[[-8.312232812472285 9.972649684356893 -8.027350315643107]
  [-8.027350315643107 9.187767187527715 -9.027350315643107]
  [-8.027350315643107 0.9726496843568938 -8.312232812472285]]

 [[-8.812232812472285 10.486324842178448 -9.027350315643107]
  [-8.027350315643107 9.972649684356893 -8.027350315643107]
  [-9.565017837496855 0.9726496843568938 -8.027350315643107]]

 [[-8.812232812472285 10.486324842178448 -9.027350315643107]
  [-8.812232812472285 9.972649684356893 -9.027350315643107]
  [-8.027350315643107 0.9726496843568938 -7.0273503156431065]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 5
Delta_Q for state 0 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 5
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ -9.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 5
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    10.0
Q-table after update for state 2:

[[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st2 +1, total 2 becase correct and same
State 0 Converged
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------
------------------------------------------------------------



(Hidden loop layer):
Time Step: 45
state_idx_set: {2}
current_state_index: 2

N_array in loop at time 45:
[[[2 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 4 1]
  [1 1 1]
  [5 1 1]]

 [[2 5 1]
  [2 1 1]
  [1 1 1]]]

action value:
 [[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
```

```
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.6898063577709979 0.9755335065709326 0.9755335065709326]
  [0.9755335065709326 0.6898063577709979 0.9755335065709326]
  [0.9755335065709326 0.9755335065709326 0.6898063577709979]]

 [[0.6898063577709979 0.4877667532854663 0.9755335065709326]
  [0.9755335065709326 0.9755335065709326 0.9755335065709326]
  [0.43627184700426863 0.9755335065709326 0.9755335065709326]]

 [[0.6898063577709979 0.43627184700426863 0.9755335065709326]
  [0.6898063577709979 0.9755335065709326 0.9755335065709326]
  [0.9755335065709326 0.9755335065709326 0.9755335065709326]]]

action value with uncertainty
 [[[-8.310193642229002 9.975533506570933 -8.024466493429067]
  [-8.024466493429067 9.189806357770998 -9.024466493429067]
  [-8.024466493429067 0.9755335065709326 -8.310193642229002]]

 [[-8.810193642229002 10.487766753285467 -9.024466493429067]
  [-8.024466493429067 9.975533506570933 -8.024466493429067]
  [-9.563728152995731 0.9755335065709326 -8.024466493429067]]

 [[-8.810193642229002 10.436271847004269 -9.024466493429067]
  [-8.810193642229002 9.975533506570933 -9.024466493429067]
  [-8.024466493429067 0.9755335065709326 -7.024466493429068]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 5
Delta_Q for state 0 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 0:

[[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 5
Delta_Q for state 1 is: 0.0
New action value (Q):    -10.0
Q-table after update for state 1:

[[[ -9.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 5
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    10.0
Q-table after update for state 2:

[[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st2 +1, total 2 becase correct and under delta Q thresh
State 0 Converged
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 46
state_idx_set: {2}
current_state_index: 2

N_array in loop at time 46:
[[[2 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 5 1]
  [1 1 1]
  [5 1 1]]

 [[2 5 1]
  [2 1 1]
  [1 1 1]]]

action value:
 [[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
```

```
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.691794893419384 0.9783457206541427 0.9783457206541427]
  [0.9783457206541427 0.691794893419384 0.9783457206541427]
  [0.9783457206541427 0.9783457206541427 0.691794893419384]]

 [[0.691794893419384 0.4375295073757366 0.9783457206541427]
  [0.9783457206541427 0.9783457206541427 0.9783457206541427]
  [0.4375295073757366 0.9783457206541427 0.9783457206541427]]

 [[0.691794893419384 0.4375295073757366 0.9783457206541427]
  [0.691794893419384 0.9783457206541427 0.9783457206541427]
  [0.9783457206541427 0.9783457206541427 0.9783457206541427]]]

action value with uncertainty
 [[[-8.308205106580616 9.978345720654143 -8.021654279345857]
  [-8.021654279345857 9.191794893419384 -9.021654279345857]
  [-8.021654279345857 0.9783457206541427 -8.308205106580616]]

 [[-8.808205106580616 10.437529507375736 -9.021654279345857]
  [-8.021654279345857 9.978345720654143 -8.021654279345857]
  [-9.562470492624264 0.9783457206541427 -8.021654279345857]]

 [[-8.808205106580616 10.437529507375736 -9.021654279345857]
  [-8.808205106580616 9.978345720654143 -9.021654279345857]
  [-8.021654279345857 0.9783457206541427 -7.021654279345857]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

Please enter the numerical index of the state...

Robot sound is playing....

What state is the robot in:

[0]: Stuck - robot needs your help
[1]: Successful - robot has completed it's task
[2]: Progressing - robot is working and doesn't need help
[3]: None of the above

To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 2 --> state: 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 go back:

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 2
Delta_Q for state 0 is: 0.0
New action value (Q):    -9.0
Q-table after update for state 0:

[[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 2
Delta_Q for state 1 is: 0.0
New action value (Q):    -9.0
Q-table after update for state 1:

[[[ -9.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       9.0
N value for state 2 is 2
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    9.0
Q-table after update for state 2:

[[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st2 +1, total 2 becase correct and under delta Q thresh
State 0 Converged
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 47
state_idx_set: {2}
current_state_index: 2

N_array in loop at time 47:
[[[2 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 5 1]
  [1 1 1]
  [5 1 1]]

 [[2 5 1]
  [2 2 1]
  [1 1 1]]]

action value:
 [[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
```

```
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.6937351441391428 0.9810896495364297 0.9810896495364297]
  [0.9810896495364297 0.6937351441391428 0.9810896495364297]
  [0.9810896495364297 0.9810896495364297 0.6937351441391428]]

 [[0.6937351441391428 0.4387566296769804 0.9810896495364297]
  [0.9810896495364297 0.9810896495364297 0.9810896495364297]
  [0.4387566296769804 0.9810896495364297 0.9810896495364297]]

 [[0.6937351441391428 0.4387566296769804 0.9810896495364297]
  [0.6937351441391428 0.6937351441391428 0.9810896495364297]
  [0.9810896495364297 0.9810896495364297 0.9810896495364297]]]

action value with uncertainty
 [[[-8.306264855860856 9.981089649536429 -8.018910350463571]
  [-8.018910350463571 9.193735144139144 -9.018910350463571]
  [-8.018910350463571 0.9810896495364297 -8.306264855860856]]

 [[-8.806264855860856 10.43875662967698 -9.018910350463571]
  [-8.018910350463571 9.981089649536429 -8.018910350463571]
  [-9.56124337032302 0.9810896495364297 -8.018910350463571]]

 [[-8.806264855860856 10.43875662967698 -9.018910350463571]
  [-8.806264855860856 9.693735144139144 -9.018910350463571]
  [-8.018910350463571 0.9810896495364297 -7.018910350463571]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 2
Delta_Q for state 0 is: 0.0
New action value (Q):    -9.0
Q-table after update for state 0:

[[[  9.   -9.   -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 2
Delta_Q for state 1 is: 0.0
New action value (Q):    -9.0
Q-table after update for state 1:

[[[ -9.   -9.    9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       9.0
N value for state 2 is 2
Delta_Q for state 2 is: 0.0
```

```
New action value (Q):    9.0
Q-table after update for state 2:

[[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st2 +1, total 2 becase correct and under delta Q thresh
State 0 Converged
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 48
state_idx_set: {2}
current_state_index: 2

N_array in loop at time 48:
[[[2 1 1]
  [1 2 1]
  [1 1 2]]

 [[2 5 1]
  [1 2 1]
  [5 1 1]]

 [[2 5 1]
  [2 2 1]
  [1 1 1]]]

action value:
 [[[ -9.    9.   -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
```

```
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.6956293024042952 0.9837683938442894 0.9837683938442894]
  [0.9837683938442894 0.6956293024042952 0.9837683938442894]
  [0.9837683938442894 0.9837683938442894 0.6956293024042952]]

 [[0.6956293024042952 0.4399546005503233 0.9837683938442894]
  [0.9837683938442894 0.6956293024042952 0.9837683938442894]
  [0.4399546005503233 0.9837683938442894 0.9837683938442894]]

 [[0.6956293024042952 0.4399546005503233 0.9837683938442894]
  [0.6956293024042952 0.6956293024042952 0.9837683938442894]
  [0.9837683938442894 0.9837683938442894 0.9837683938442894]]]

action value with uncertainty
 [[[-8.304370697595704 9.98376839384429 -8.01623160615571]
  [-8.01623160615571 9.195629302404296 -9.01623160615571]
  [-8.01623160615571 0.9837683938442894 -8.304370697595704]]

 [[-8.804370697595704 10.439954600550323 -9.01623160615571]
  [-8.01623160615571 9.695629302404296 -8.01623160615571]
  [-9.560045399449677 0.9837683938442894 -8.01623160615571]]

 [[-8.804370697595704 10.439954600550323 -9.01623160615571]
  [-8.804370697595704 9.695629302404296 -9.01623160615571]
  [-8.01623160615571 0.9837683938442894 -7.016231606155711]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 2
Delta_Q for state 0 is: 0.5
New action value (Q):    -9.5
Q-table after update for state 0:

[[[  9.   -9.5  -9. ]
  [  9.   -8.5 -10. ]
  [  9.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.   -9.   -9. ]
  [ 10.    0.   -9. ]]

 [[  9.5 -10.  -10. ]
  [  9.5  -9.  -10. ]
  [  9.    0.   -8. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 2
Delta_Q for state 1 is: 0.5
New action value (Q):    -9.5
Q-table after update for state 1:

[[[ -9.   -9.5   9. ]
  [ -9.   -8.5  10. ]
  [ -9.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.   -9.    9. ]
  [-10.    0.    9. ]]

 [[ -9.5 -10.   10. ]
  [ -9.5  -9.   10. ]
  [ -9.    0.    8. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 2
Delta_Q for state 2 is: 0.5
```

```
New action value (Q):    9.5
Q-table after update for state 2:

[[[ -9.    9.5  -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

in_a_row_st2 +1, total 2 becase correct and under delta Q thresh
State 0 Converged
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 49
state_idx_set: {2}
current_state_index: 2

N_array in loop at time 49:
[[[2 2 1]
  [1 2 1]
  [1 1 2]]

 [[2 5 1]
  [1 2 1]
  [5 1 1]]

 [[2 5 1]
  [2 2 1]
  [1 1 1]]]

action value:
 [[[ -9.    9.5  -9. ]
  [ -9.    8.5 -10. ]
  [ -9.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.    9.   -9. ]
```

```
  [-10.    0.   -9. ]]

 [[ -9.5  10.  -10. ]
  [ -9.5   9.  -10. ]
  [ -9.    0.   -8. ]]]

uncertainty:
 [[[0.6974794170897292 0.6974794170897292 0.9863848511243756]
  [0.9863848511243756 0.6974794170897292 0.9863848511243756]
  [0.9863848511243756 0.9863848511243756 0.6974794170897292]]

 [[0.6974794170897292 0.44112471581802276 0.9863848511243756]
  [0.9863848511243756 0.6974794170897292 0.9863848511243756]
  [0.44112471581802276 0.9863848511243756 0.9863848511243756]]

 [[0.6974794170897292 0.44112471581802276 0.9863848511243756]
  [0.6974794170897292 0.6974794170897292 0.9863848511243756]
  [0.9863848511243756 0.9863848511243756 0.9863848511243756]]]

action value with uncertainty
 [[[-8.30252058291027 10.19747941708973 -8.013615148875624]
  [-8.013615148875624 9.19747941708973 -9.013615148875624]
  [-8.013615148875624 0.9863848511243756 -8.30252058291027]]

 [[-8.80252058291027 10.441124715818022 -9.013615148875624]
  [-8.013615148875624 9.69747941708973 -8.013615148875624]
  [-9.558875284181978 0.9863848511243756 -8.013615148875624]]

 [[-8.80252058291027 10.441124715818022 -9.013615148875624]
  [-8.80252058291027 9.69747941708973 -9.013615148875624]
  [-8.013615148875624 0.9863848511243756 -7.013615148875624]]]


New Param INDICES (not direct values):
P1: 0 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 3
Delta_Q for state 0 is: 0.16666666666666785
New action value (Q):    -9.666666666666668
Q-table after update for state 0:

[[[  9.          -9.66666667  -9.        ]
  [  9.          -8.5        -10.        ]
  [  9.           0.          -9.        ]]

 [[  9.5        -10.         -10.        ]
  [  9.          -9.          -9.        ]
  [ 10.           0.          -9.        ]]

 [[  9.5        -10.         -10.        ]
  [  9.5         -9.         -10.        ]
  [  9.           0.          -8.        ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 3
Delta_Q for state 1 is: 0.16666666666666785
New action value (Q):    -9.666666666666668
Q-table after update for state 1:

[[[ -9.          -9.66666667   9.        ]
  [ -9.          -8.5         10.        ]
  [ -9.           0.           9.        ]]

 [[ -9.5        -10.          10.        ]
  [ -9.          -9.           9.        ]
  [-10.           0.           9.        ]]

 [[ -9.5        -10.          10.        ]
  [ -9.5         -9.          10.        ]
  [ -9.           0.           8.        ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 3
Delta_Q for state 2 is: 0.16666666666666785
```

```
New action value (Q):    9.666666666666668
Q-table after update for state 2:

[[[ -9.           9.66666667  -9.        ]
  [ -9.           8.5        -10.        ]
  [ -9.           0.          -9.        ]]

 [[ -9.5         10.         -10.        ]
  [ -9.           9.          -9.        ]
  [-10.           0.          -9.        ]]

 [[ -9.5         10.         -10.        ]
  [ -9.5          9.         -10.        ]
  [ -9.           0.          -8.        ]]]

in_a_row_st2 +1, total 3 becase correct and same
State 0 Converged
State 1 Converged
State 2 Converged
running 'break' on converge

in_a_row_st0 3
in_a_row_st1 16
in_a_row_st2 3
final time_step: 49



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

Great job! The system terminated successfully at itter: 49.
Click on the next cell below and hit 'shift + enter' to continue

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

Section 2O

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

In [9]:
```
# SECTION 20


time_step_20_str = ucb1.ucb1_algor(num_of_states=num_of_states, state_descri
                                   current_user_ID_str=current_user_ID_str, sect
```

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

STARTING NEW LOOP
------------------------------------------------------------
------------------------------------------------------------



(Hidden loop layer):
Time Step: 01
state_idx_set: {0, 1, 2}
current_state_index: 0

N_array in loop at time 1:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 1]]]

action value:
 [[[ 1. -1. -3.]
  [ 2.  0. -3.]
  [ 3.  2. -3.]]

 [[ 2. -1. -3.]
  [ 2.  0. -3.]
  [ 4.  2. -3.]]

 [[ 2. -1. -3.]
  [ 3.  0. -3.]
  [ 5.  3. -3.]]]

uncertainty:
 [[[0.0 0.0 0.0]
  [0.0 0.0 0.0]
  [0.0 0.0 0.0]]

 [[0.0 0.0 0.0]
  [0.0 0.0 0.0]
  [0.0 0.0 0.0]]

 [[0.0 0.0 0.0]
  [0.0 0.0 0.0]
  [0.0 0.0 0.0]]]
```

```
action value with uncertainty
 [[[1.0 -1.0 -3.0]
  [2.0 0.0 -3.0]
  [3.0 2.0 -3.0]]

 [[2.0 -1.0 -3.0]
  [2.0 0.0 -3.0]
  [4.0 2.0 -3.0]]

 [[2.0 -1.0 -3.0]
  [3.0 0.0 -3.0]
  [5.0 3.0 -3.0]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 8



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

(Hidden state 0 layer):
Reward_signal (R):       8.0
N value for state 0 is 2
Delta_Q for state 0 is: 1.5
New action value (Q):    6.5
Q-table after update for state 0:

[[[ 1.  -1.  -3. ]
  [ 2.   0.  -3. ]
  [ 3.   2.  -3. ]]

 [[ 2.  -1.  -3. ]
  [ 2.   0.  -3. ]
  [ 4.   2.  -3. ]]

 [[ 2.  -1.  -3. ]
  [ 3.   0.  -3. ]
  [ 6.5  3.  -3. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -8.0
N value for state 1 is 2
Delta_Q for state 1 is: 2.5
New action value (Q):    -5.5
Q-table after update for state 1:

[[[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-3.   0.   2. ]]

 [[-3.   0.   4. ]
  [-3.   1.   5. ]
  [-3.   0.   3. ]]

 [[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-5.5  0.   2. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -8.0
N value for state 2 is 2
Delta_Q for state 2 is: 2.5
```

```
New action value (Q):    -5.5
Q-table after update for state 2:

[[[ 0.   3.   0. ]
  [-3.   2.  -3. ]
  [-3.   1.  -3. ]]

 [[ 0.   5.   0. ]
  [-3.   3.  -3. ]
  [-3.   1.  -3. ]]

 [[ 0.   4.   0. ]
  [-3.   2.  -3. ]
  [-5.5  1.  -3. ]]]

in_a_row_st0 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 02
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 2:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [2 1 1]]]

action value:
 [[[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-3.   0.   2. ]]

 [[-3.   0.   4. ]
  [-3.   1.   5. ]
  [-3.   0.   3. ]]
```

```
 [[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-5.5  0.   2. ]]]

uncertainty:
 [[[0.41627730557884884 0.41627730557884884 0.41627730557884884]
  [0.41627730557884884 0.41627730557884884 0.41627730557884884]
  [0.41627730557884884 0.41627730557884884 0.41627730557884884]]

 [[0.41627730557884884 0.41627730557884884 0.41627730557884884]
  [0.41627730557884884 0.41627730557884884 0.41627730557884884]
  [0.41627730557884884 0.41627730557884884 0.41627730557884884]]

 [[0.41627730557884884 0.41627730557884884 0.41627730557884884]
  [0.41627730557884884 0.41627730557884884 0.41627730557884884]
  [0.29435250562886867 0.41627730557884884 0.41627730557884884]]]

action value with uncertainty
 [[[-2.583722694421151 0.41627730557884884 2.416277305578849]
  [-2.583722694421151 1.416277305578849 3.416277305578849]
  [-2.583722694421151 0.41627730557884884 2.416277305578849]]

 [[-2.583722694421151 0.41627730557884884 4.4162773055788485]
  [-2.583722694421151 1.416277305578849 5.4162773055788485]
  [-2.583722694421151 0.41627730557884884 3.416277305578849]]

 [[-2.583722694421151 0.41627730557884884 2.416277305578849]
  [-2.583722694421151 1.416277305578849 3.416277305578849]
  [-5.2056474943711315 0.41627730557884884 2.416277305578849]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 2
Delta_Q for state 0 is: 3.0
New action value (Q):    -6.0
Q-table after update for state 0:

[[[ 1.  -1.  -3. ]
  [ 2.   0.  -3. ]
  [ 3.   2.  -3. ]]

 [[ 2.  -1.  -3. ]
  [ 2.   0.  -6. ]
  [ 4.   2.  -3. ]]

 [[ 2.  -1.  -3. ]
  [ 3.   0.  -3. ]
  [ 6.5  3.  -3. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       9.0
N value for state 1 is 2
Delta_Q for state 1 is: 2.0
New action value (Q):    7.0
Q-table after update for state 1:

[[[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-3.   0.   2. ]]

 [[-3.   0.   4. ]
  [-3.   1.   7. ]
  [-3.   0.   3. ]]

 [[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-5.5  0.   2. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 2
Delta_Q for state 2 is: 3.0
```

```
New action value (Q):    -6.0
Q-table after update for state 2:

[[[ 0.   3.   0. ]
  [-3.   2.  -3. ]
  [-3.   1.  -3. ]]

 [[ 0.   5.   0. ]
  [-3.   3.  -6. ]
  [-3.   1.  -3. ]]

 [[ 0.   4.   0. ]
  [-3.   2.  -3. ]
  [-5.5  1.  -3. ]]]

in_a_row_st1 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 03
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 3:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 1 1]
  [1 1 2]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [2 1 1]]]

action value:
 [[[ 0.   3.   0. ]
  [-3.   2.  -3. ]
  [-3.   1.  -3. ]]

 [[ 0.   5.   0. ]
  [-3.   3.  -6. ]
  [-3.   1.  -3. ]]
```

```
 [[ 0.   4.   0. ]
  [-3.   2.  -3. ]
  [-5.5  1.  -3. ]]]

uncertainty:
 [[[0.5240735369841025 0.5240735369841025 0.5240735369841025]
  [0.5240735369841025 0.5240735369841025 0.5240735369841025]
  [0.5240735369841025 0.5240735369841025 0.5240735369841025]]

 [[0.5240735369841025 0.5240735369841025 0.5240735369841025]
  [0.5240735369841025 0.5240735369841025 0.3705759518418778]
  [0.5240735369841025 0.5240735369841025 0.5240735369841025]]

 [[0.5240735369841025 0.5240735369841025 0.5240735369841025]
  [0.5240735369841025 0.5240735369841025 0.5240735369841025]
  [0.3705759518418778 0.5240735369841025 0.5240735369841025]]]

action value with uncertainty
 [[[0.5240735369841025 3.5240735369841025 0.5240735369841025]
  [-2.4759264630158975 2.5240735369841025 -2.4759264630158975]
  [-2.4759264630158975 1.5240735369841025 -2.4759264630158975]]

 [[0.5240735369841025 5.524073536984103 0.5240735369841025]
  [-2.4759264630158975 3.5240735369841025 -5.629424048158122]
  [-2.4759264630158975 1.5240735369841025 -2.4759264630158975]]

 [[0.5240735369841025 4.524073536984103 0.5240735369841025]
  [-2.4759264630158975 2.5240735369841025 -2.4759264630158975]
  [-5.129424048158122 1.5240735369841025 -2.4759264630158975]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 2
Delta_Q for state 0 is: 4.5
New action value (Q):    -5.5
Q-table after update for state 0:

[[[ 1.  -1.  -3. ]
  [ 2.   0.  -3. ]
  [ 3.   2.  -3. ]]

 [[ 2.  -5.5 -3. ]
  [ 2.   0.  -6. ]
  [ 4.   2.  -3. ]]

 [[ 2.  -1.  -3. ]
  [ 3.   0.  -3. ]
  [ 6.5  3.  -3. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 2
Delta_Q for state 1 is: 5.0
New action value (Q):    -5.0
Q-table after update for state 1:

[[[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-3.   0.   2. ]]

 [[-3.  -5.   4. ]
  [-3.   1.   7. ]
  [-3.   0.   3. ]]

 [[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-5.5  0.   2. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 2
Delta_Q for state 2 is: 2.5
```

```
New action value (Q):    7.5
Q-table after update for state 2:

[[[ 0.   3.   0. ]
  [-3.   2.  -3. ]
  [-3.   1.  -3. ]]

 [[ 0.   7.5  0. ]
  [-3.   3.  -6. ]
  [-3.   1.  -3. ]]

 [[ 0.   4.   0. ]
  [-3.   2.  -3. ]
  [-5.5  1.  -3. ]]]

in_a_row_st2 back to zero



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 04
state_idx_set: {0, 1, 2}
current_state_index: 0

N_array in loop at time 4:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 2 1]
  [1 1 2]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [2 1 1]]]

action value:
 [[[ 1.  -1.  -3. ]
  [ 2.   0.  -3. ]
  [ 3.   2.  -3. ]]

 [[ 2.  -5.5 -3. ]
  [ 2.   0.  -6. ]
  [ 4.   2.  -3. ]]
```

```
 [[ 2.  -1.  -3. ]
  [ 3.   0.  -3. ]
  [ 6.5  3.  -3. ]]]

uncertainty:
 [[[0.5887050112577373 0.5887050112577373 0.5887050112577373]
  [0.5887050112577373 0.5887050112577373 0.5887050112577373]
  [0.5887050112577373 0.5887050112577373 0.5887050112577373]]

 [[0.5887050112577373 0.41627730557884884 0.5887050112577373]
  [0.5887050112577373 0.5887050112577373 0.41627730557884884]
  [0.5887050112577373 0.5887050112577373 0.5887050112577373]]

 [[0.5887050112577373 0.5887050112577373 0.5887050112577373]
  [0.5887050112577373 0.5887050112577373 0.5887050112577373]
  [0.41627730557884884 0.5887050112577373 0.5887050112577373]]]

action value with uncertainty
 [[[1.5887050112577374 -0.41129498874226267 -2.4112949887422626]
  [2.5887050112577374 0.5887050112577373 -2.4112949887422626]
  [3.5887050112577374 2.5887050112577374 -2.4112949887422626]]

 [[2.5887050112577374 -5.0837226944211515 -2.4112949887422626]
  [2.5887050112577374 0.5887050112577373 -5.5837226944211515]
  [4.588705011257737 2.5887050112577374 -2.4112949887422626]]

 [[2.5887050112577374 -0.41129498874226267 -2.4112949887422626]
  [3.5887050112577374 0.5887050112577373 -2.4112949887422626]
  [6.9162773055788485 3.5887050112577374 -2.4112949887422626]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       9.0
N value for state 0 is 3
Delta_Q for state 0 is: 0.8333333333333339
New action value (Q):    7.333333333333334
Q-table after update for state 0:

[[[ 1.         -1.         -3.        ]
  [ 2.          0.         -3.        ]
  [ 3.          2.         -3.        ]]

 [[ 2.         -5.5        -3.        ]
  [ 2.          0.         -6.        ]
  [ 4.          2.         -3.        ]]

 [[ 2.         -1.         -3.        ]
  [ 3.          0.         -3.        ]
  [ 7.33333333  3.         -3.        ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 3
Delta_Q for state 1 is: 1.166666666666667
New action value (Q):    -6.666666666666667
Q-table after update for state 1:

[[[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-3.          0.          2.        ]]

 [[-3.         -5.          4.        ]
  [-3.          1.          7.        ]
  [-3.          0.          3.        ]]

 [[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-6.66666667  0.          2.        ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 3
Delta_Q for state 2 is: 1.166666666666667
```

```
New action value (Q):    -6.666666666666667
Q-table after update for state 2:

[[[ 0.          3.          0.        ]
  [-3.          2.         -3.        ]
  [-3.          1.         -3.        ]]

 [[ 0.          7.5         0.        ]
  [-3.          3.         -6.        ]
  [-3.          1.         -3.        ]]

 [[ 0.          4.          0.        ]
  [-3.          2.         -3.        ]
  [-6.66666667  1.         -3.        ]]]

in_a_row_st0 +1, total 1 becase correct and same



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 05
state_idx_set: {0, 1, 2}
current_state_index: 2

N_array in loop at time 5:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 2 1]
  [1 1 2]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [3 1 1]]]

action value:
 [[[ 0.          3.          0.        ]
  [-3.          2.         -3.        ]
  [-3.          1.         -3.        ]]

 [[ 0.          7.5         0.        ]
  [-3.          3.         -6.        ]
  [-3.          1.         -3.        ]]
```

```
 [[ 0.          4.          0.        ]
  [-3.          2.         -3.        ]
  [-6.66666667  1.         -3.        ]]]

uncertainty:
 [[[0.6343181205897598 0.6343181205897598 0.6343181205897598]
  [0.6343181205897598 0.6343181205897598 0.6343181205897598]
  [0.6343181205897598 0.6343181205897598 0.6343181205897598]]

 [[0.6343181205897598 0.44853064449852537 0.6343181205897598]
  [0.6343181205897598 0.6343181205897598 0.44853064449852537]
  [0.6343181205897598 0.6343181205897598 0.6343181205897598]]

 [[0.6343181205897598 0.6343181205897598 0.6343181205897598]
  [0.6343181205897598 0.6343181205897598 0.6343181205897598]
  [0.36622373767435534 0.6343181205897598 0.6343181205897598]]]

action value with uncertainty
 [[[0.6343181205897598 3.63431812058976 0.6343181205897598]
  [-2.36568187941024 2.63431812058976 -2.36568187941024]
  [-2.36568187941024 1.63431812058976 -2.36568187941024]]

 [[0.6343181205897598 7.9485306444985255 0.6343181205897598]
  [-2.36568187941024 3.63431812058976 -5.5514693555014745]
  [-2.36568187941024 1.63431812058976 -2.36568187941024]]

 [[0.6343181205897598 4.63431812058976 0.6343181205897598]
  [-2.36568187941024 2.63431812058976 -2.36568187941024]
  [-6.300442928992312 1.63431812058976 -2.36568187941024]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 3
Delta_Q for state 0 is: 1.5
New action value (Q):    -7.0
Q-table after update for state 0:

[[[ 1.         -1.          -3.        ]
  [ 2.          0.          -3.        ]
  [ 3.          2.          -3.        ]]

 [[ 2.         -7.          -3.        ]
  [ 2.          0.          -6.        ]
  [ 4.          2.          -3.        ]]

 [[ 2.         -1.          -3.        ]
  [ 3.          0.          -3.        ]
  [ 7.33333333  3.          -3.        ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 3
Delta_Q for state 1 is: 1.666666666666667
New action value (Q):    -6.666666666666667
Q-table after update for state 1:

[[[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-3.          0.          2.        ]]

 [[-3.         -6.66666667  4.        ]
  [-3.          1.          7.        ]
  [-3.          0.          3.        ]]

 [[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-6.66666667  0.          2.        ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 3
Delta_Q for state 2 is: 0.8333333333333339
```

```
New action value (Q):    8.333333333333334
Q-table after update for state 2:

[[[ 0.          3.          0.        ]
  [-3.          2.         -3.        ]
  [-3.          1.         -3.        ]]

 [[ 0.          8.33333333  0.        ]
  [-3.          3.         -6.        ]
  [-3.          1.         -3.        ]]

 [[ 0.          4.          0.        ]
  [-3.          2.         -3.        ]
  [-6.66666667  1.         -3.        ]]]

in_a_row_st2 +1, total 1 becase correct and same



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 06
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 6:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 3 1]
  [1 1 2]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [3 1 1]]]

action value:
 [[[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-3.          0.          2.        ]]

 [[-3.         -6.66666667  4.        ]
  [-3.          1.          7.        ]
  [-3.          0.          3.        ]]
```

```
 [[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-6.66666667  0.          2.        ]]]

uncertainty:
 [[[0.6692830995229252 0.6692830995229252 0.6692830995229252]
  [0.6692830995229252 0.6692830995229252 0.6692830995229252]
  [0.6692830995229252 0.6692830995229252 0.6692830995229252]]

 [[0.6692830995229252 0.3864107776736279 0.6692830995229252]
  [0.6692830995229252 0.6692830995229252 0.47325461820621134]
  [0.6692830995229252 0.6692830995229252 0.6692830995229252]]

 [[0.6692830995229252 0.6692830995229252 0.6692830995229252]
  [0.6692830995229252 0.6692830995229252 0.6692830995229252]
  [0.3864107776736279 0.6692830995229252 0.6692830995229252]]]

action value with uncertainty
 [[[-2.330716900477075 0.6692830995229252 2.669283099522925]
  [-2.330716900477075 1.669283099522925 3.669283099522925]
  [-2.330716900477075 0.6692830995229252 2.669283099522925]]

 [[-2.330716900477075 -6.280255888993039 4.669283099522925]
  [-2.330716900477075 1.669283099522925 7.473254618206211]
  [-2.330716900477075 0.6692830995229252 3.669283099522925]]

 [[-2.330716900477075 0.6692830995229252 2.669283099522925]
  [-2.330716900477075 1.669283099522925 3.669283099522925]
  [-6.280255888993039 0.6692830995229252 2.669283099522925]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 3
Delta_Q for state 0 is: 1.0
New action value (Q):    -7.0
Q-table after update for state 0:

[[[ 1.         -1.         -3.        ]
  [ 2.          0.         -3.        ]
  [ 3.          2.         -3.        ]]

 [[ 2.         -7.         -3.        ]
  [ 2.          0.         -7.        ]
  [ 4.          2.         -3.        ]]

 [[ 2.         -1.         -3.        ]
  [ 3.          0.         -3.        ]
  [ 7.33333333  3.         -3.        ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       9.0
N value for state 1 is 3
Delta_Q for state 1 is: 0.666666666666667
New action value (Q):    7.666666666666667
Q-table after update for state 1:

[[[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-3.          0.          2.        ]]

 [[-3.         -6.66666667  4.        ]
  [-3.          1.          7.66666667]
  [-3.          0.          3.        ]]

 [[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-6.66666667  0.          2.        ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 3
Delta_Q for state 2 is: 1.0
```

```
New action value (Q):    -7.0
Q-table after update for state 2:

[[[ 0.          3.          0.        ]
  [-3.          2.         -3.        ]
  [-3.          1.         -3.        ]]

 [[ 0.          8.33333333  0.        ]
  [-3.          3.         -7.        ]
  [-3.          1.         -3.        ]]

 [[ 0.          4.          0.        ]
  [-3.          2.         -3.        ]
  [-6.66666667  1.         -3.        ]]]

in_a_row_st1 +1, total 1 becase correct and same



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 07
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 7:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 3 1]
  [1 1 3]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [3 1 1]]]

action value:
 [[[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-3.          0.          2.        ]]

 [[-3.         -6.66666667  4.        ]
  [-3.          1.          7.66666667]
  [-3.          0.          3.        ]]
```

```
 [[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-6.66666667  0.          2.        ]]]

uncertainty:
 [[[0.6974794170897292 0.6974794170897292 0.6974794170897292]
  [0.6974794170897292 0.6974794170897292 0.6974794170897292]
  [0.6974794170897292 0.6974794170897292 0.6974794170897292]]

 [[0.6974794170897292 0.4026899292109784 0.6974794170897292]
  [0.6974794170897292 0.6974794170897292 0.4026899292109784]
  [0.6974794170897292 0.6974794170897292 0.6974794170897292]]

 [[0.6974794170897292 0.6974794170897292 0.6974794170897292]
  [0.6974794170897292 0.6974794170897292 0.6974794170897292]
  [0.4026899292109784 0.6974794170897292 0.6974794170897292]]]

action value with uncertainty
 [[[-2.3025205829102706 0.6974794170897292 2.6974794170897294]
  [-2.3025205829102706 1.6974794170897292 3.6974794170897294]
  [-2.3025205829102706 0.6974794170897292 2.6974794170897294]]

 [[-2.3025205829102706 -6.263976737455689 4.697479417089729]
  [-2.3025205829102706 1.6974794170897292 8.069356595877645]
  [-2.3025205829102706 0.6974794170897292 3.6974794170897294]]

 [[-2.3025205829102706 0.6974794170897292 2.6974794170897294]
  [-2.3025205829102706 1.6974794170897292 3.6974794170897294]
  [-6.263976737455689 0.6974794170897292 2.6974794170897294]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 4
Delta_Q for state 0 is: 0.5
New action value (Q):    -7.5
Q-table after update for state 0:

[[[ 1.         -1.         -3.        ]
  [ 2.          0.         -3.        ]
  [ 3.          2.         -3.        ]]

 [[ 2.         -7.         -3.        ]
  [ 2.          0.         -7.5       ]
  [ 4.          2.         -3.        ]]

 [[ 2.         -1.         -3.        ]
  [ 3.          0.         -3.        ]
  [ 7.33333333  3.         -3.        ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       9.0
N value for state 1 is 4
Delta_Q for state 1 is: 0.33333333333333304
New action value (Q):    8.0
Q-table after update for state 1:

[[[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-3.          0.          2.        ]]

 [[-3.         -6.66666667  4.        ]
  [-3.          1.          8.        ]
  [-3.          0.          3.        ]]

 [[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-6.66666667  0.          2.        ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 4
Delta_Q for state 2 is: 0.5
```

```
New action value (Q):    -7.5
Q-table after update for state 2:

[[[ 0.          3.          0.        ]
  [-3.          2.         -3.        ]
  [-3.          1.         -3.        ]]

 [[ 0.          8.33333333  0.        ]
  [-3.          3.         -7.5       ]
  [-3.          1.         -3.        ]]

 [[ 0.          4.          0.        ]
  [-3.          2.         -3.        ]
  [-6.66666667  1.         -3.        ]]]

in_a_row_st1 +1, total 2 becase correct and same



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 08
state_idx_set: {0, 1, 2}
current_state_index: 1

N_array in loop at time 8:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 3 1]
  [1 1 4]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [3 1 1]]]

action value:
 [[[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-3.          0.          2.        ]]

 [[-3.         -6.66666667  4.        ]
  [-3.          1.          8.        ]
  [-3.          0.          3.        ]]
```

```
 [[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-6.66666667  0.          2.        ]]]

uncertainty:
 [[[0.7210134433004415 0.7210134433004415 0.7210134433004415]
  [0.7210134433004415 0.7210134433004415 0.7210134433004415]
  [0.7210134433004415 0.7210134433004415 0.7210134433004415]]

 [[0.7210134433004415 0.41627730557884884 0.7210134433004415]
  [0.7210134433004415 0.7210134433004415 0.36050672165022074]
  [0.7210134433004415 0.7210134433004415 0.7210134433004415]]

 [[0.7210134433004415 0.7210134433004415 0.7210134433004415]
  [0.7210134433004415 0.7210134433004415 0.7210134433004415]
  [0.41627730557884884 0.7210134433004415 0.7210134433004415]]]

action value with uncertainty
 [[[-2.2789865566995586 0.7210134433004415 2.7210134433004414]
  [-2.2789865566995586 1.7210134433004414 3.7210134433004414]
  [-2.2789865566995586 0.7210134433004415 2.7210134433004414]]

 [[-2.2789865566995586 -6.2503893610878185 4.721013443300442]
  [-2.2789865566995586 1.7210134433004414 8.360506721650221]
  [-2.2789865566995586 0.7210134433004415 3.7210134433004414]]

 [[-2.2789865566995586 0.7210134433004415 2.7210134433004414]
  [-2.2789865566995586 1.7210134433004414 3.7210134433004414]
  [-6.2503893610878185 0.7210134433004415 2.7210134433004414]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 1 (Beeps per Loop - BPL)
P3: 2 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       -9.0
N value for state 0 is 5
Delta_Q for state 0 is: 0.2999999999999998
New action value (Q):    -7.8
Q-table after update for state 0:

[[[ 1.         -1.         -3.        ]
  [ 2.          0.         -3.        ]
  [ 3.          2.         -3.        ]]

 [[ 2.         -7.         -3.        ]
  [ 2.          0.         -7.8       ]
  [ 4.          2.         -3.        ]]

 [[ 2.         -1.         -3.        ]
  [ 3.          0.         -3.        ]
  [ 7.33333333  3.         -3.        ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       9.0
N value for state 1 is 5
Delta_Q for state 1 is: 0.20000000000000107
New action value (Q):    8.200000000000001
Q-table after update for state 1:

[[[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-3.          0.          2.        ]]

 [[-3.         -6.66666667  4.        ]
  [-3.          1.          8.2       ]
  [-3.          0.          3.        ]]

 [[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-6.66666667  0.          2.        ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 5
Delta_Q for state 2 is: 0.2999999999999998
```

```
New action value (Q):    -7.8
Q-table after update for state 2:

[[[ 0.          3.           0.        ]
  [-3.          2.          -3.        ]
  [-3.          1.          -3.        ]]

 [[ 0.          8.33333333   0.        ]
  [-3.          3.          -7.8       ]
  [-3.          1.          -3.        ]]

 [[ 0.          4.           0.        ]
  [-3.          2.          -3.        ]
  [-6.66666667  1.          -3.        ]]]

in_a_row_st1 +1, total 3 becase correct and same
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 09
state_idx_set: {0, 2}
current_state_index: 0

N_array in loop at time 9:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 3 1]
  [1 1 5]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [3 1 1]]]

action value:
 [[[ 1.         -1.          -3.         ]
  [ 2.          0.          -3.        ]
  [ 3.          2.          -3.        ]]

 [[ 2.         -7.          -3.        ]
  [ 2.          0.          -7.8       ]
  [ 4.          2.          -3.        ]]
```

```
 [[ 2.         -1.         -3.        ]
  [ 3.          0.         -3.        ]
  [ 7.33333333  3.         -3.        ]]]

uncertainty:
 [[[0.7411519036837556 0.7411519036837556 0.7411519036837556]
  [0.7411519036837556 0.7411519036837556 0.7411519036837556]
  [0.7411519036837556 0.7411519036837556 0.7411519036837556]]

 [[0.7411519036837556 0.42790425110221986 0.7411519036837556]
  [0.7411519036837556 0.7411519036837556 0.33145320765805086]
  [0.7411519036837556 0.7411519036837556 0.7411519036837556]]

 [[0.7411519036837556 0.7411519036837556 0.7411519036837556]
  [0.7411519036837556 0.7411519036837556 0.7411519036837556]
  [0.42790425110221986 0.7411519036837556 0.7411519036837556]]]

action value with uncertainty
 [[[1.7411519036837557 -0.2588480963162444 -2.2588480963162443]
  [2.7411519036837557 0.7411519036837556 -2.2588480963162443]
  [3.7411519036837557 2.7411519036837557 -2.2588480963162443]]

 [[2.7411519036837557 -6.57209574889778 -2.2588480963162443]
  [2.7411519036837557 0.7411519036837556 -7.468546792341949]
  [4.741151903683756 2.7411519036837557 -2.2588480963162443]]

 [[2.7411519036837557 -0.2588480963162444 -2.2588480963162443]
  [3.7411519036837557 0.7411519036837556 -2.2588480963162443]
  [7.761237584435554 3.7411519036837557 -2.2588480963162443]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       9.0
N value for state 0 is 4
Delta_Q for state 0 is: 0.4166666666666661
New action value (Q):    7.75
Q-table after update for state 0:

[[[ 1.   -1.   -3.  ]
  [ 2.    0.   -3.  ]
  [ 3.    2.   -3.  ]]

 [[ 2.   -7.   -3.  ]
  [ 2.    0.   -7.8 ]
  [ 4.    2.   -3.  ]]

 [[ 2.   -1.   -3.  ]
  [ 3.    0.   -3.  ]
  [ 7.75  3.   -3.  ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 4
Delta_Q for state 1 is: 0.583333333333333
New action value (Q):    -7.25
Q-table after update for state 1:

[[[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-3.          0.          2.        ]]

 [[-3.         -6.66666667  4.        ]
  [-3.          1.          8.2       ]
  [-3.          0.          3.        ]]

 [[-3.          0.          2.        ]
  [-3.          1.          3.        ]
  [-7.25        0.          2.        ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 4
Delta_Q for state 2 is: 0.583333333333333
```

```
New action value (Q):    -7.25
Q-table after update for state 2:

[[[ 0.          3.           0.        ]
  [-3.          2.          -3.        ]
  [-3.          1.          -3.        ]]

 [[ 0.          8.33333333  0.        ]
  [-3.          3.          -7.8       ]
  [-3.          1.          -3.        ]]

 [[ 0.          4.           0.        ]
  [-3.          2.          -3.        ]
  [-7.25        1.          -3.        ]]]

in_a_row_st0 +1, total 2 becase correct and same
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 10
state_idx_set: {0, 2}
current_state_index: 2

N_array in loop at time 10:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 3 1]
  [1 1 5]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [4 1 1]]]

action value:
 [[[ 0.          3.           0.        ]
  [-3.          2.          -3.        ]
  [-3.          1.          -3.        ]]

 [[ 0.          8.33333333  0.        ]
  [-3.          3.          -7.8       ]
  [-3.          1.          -3.        ]]
```

```
 [[ 0.          4.           0.        ]
  [-3.          2.          -3.        ]
  [-7.25        1.          -3.        ]]]

uncertainty:
 [[[0.7587135646925732 0.7587135646925732 0.7587135646925732]
  [0.7587135646925732 0.7587135646925732 0.7587135646925732]
  [0.7587135646925732 0.7587135646925732 0.7587135646925732]]

 [[0.7587135646925732 0.4380434808130777 0.7587135646925732]
  [0.7587135646925732 0.7587135646925732 0.3393070212207556]
  [0.7587135646925732 0.7587135646925732 0.7587135646925732]]

 [[0.7587135646925732 0.7587135646925732 0.7587135646925732]
  [0.7587135646925732 0.7587135646925732 0.7587135646925732]
  [0.3793567823462866 0.7587135646925732 0.7587135646925732]]]

action value with uncertainty
 [[[0.7587135646925732 3.7587135646925733 0.7587135646925732]
  [-2.2412864353074267 2.7587135646925733 -2.2412864353074267]
  [-2.2412864353074267 1.7587135646925733 -2.2412864353074267]]

 [[0.7587135646925732 8.77137681414641 0.7587135646925732]
  [-2.2412864353074267 3.7587135646925733 -7.460692978779244]
  [-2.2412864353074267 1.7587135646925733 -2.2412864353074267]]

 [[0.7587135646925732 4.758713564692573 0.7587135646925732]
  [-2.2412864353074267 2.7587135646925733 -2.2412864353074267]
  [-6.870643217653713 1.7587135646925733 -2.2412864353074267]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 4
Delta_Q for state 0 is: 0.75
New action value (Q):    -7.75
Q-table after update for state 0:

[[[ 1.   -1.   -3.  ]
  [ 2.    0.   -3.  ]
  [ 3.    2.   -3.  ]]

 [[ 2.   -7.75 -3.  ]
  [ 2.    0.   -7.8 ]
  [ 4.    2.   -3.  ]]

 [[ 2.   -1.   -3.  ]
  [ 3.    0.   -3.  ]
  [ 7.75  3.   -3.  ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 4
Delta_Q for state 1 is: 0.833333333333333
New action value (Q):    -7.5
Q-table after update for state 1:

[[[-3.    0.    2.  ]
  [-3.    1.    3.  ]
  [-3.    0.    2.  ]]

 [[-3.   -7.5   4.  ]
  [-3.    1.    8.2 ]
  [-3.    0.    3.  ]]

 [[-3.    0.    2.  ]
  [-3.    1.    3.  ]
  [-7.25  0.    2.  ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 4
Delta_Q for state 2 is: 0.4166666666666661
```

```
New action value (Q):    8.75
Q-table after update for state 2:

[[[ 0.    3.    0.  ]
  [-3.    2.   -3.  ]
  [-3.    1.   -3.  ]]

 [[ 0.    8.75  0.  ]
  [-3.    3.   -7.8 ]
  [-3.    1.   -3.  ]]

 [[ 0.    4.    0.  ]
  [-3.    2.   -3.  ]
  [-7.25  1.   -3.  ]]]

in_a_row_st2 +1, total 2 becase correct and same
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------------
------------------------------------------------------------------



(Hidden loop layer):
Time Step: 11
state_idx_set: {0, 2}
current_state_index: 0

N_array in loop at time 11:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 4 1]
  [1 1 5]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [4 1 1]]]

action value:
 [[[ 1.   -1.   -3.  ]
  [ 2.    0.   -3.  ]
  [ 3.    2.   -3.  ]]

 [[ 2.   -7.75 -3.  ]
  [ 2.    0.   -7.8 ]
  [ 4.    2.   -3.  ]]
```

```
 [[ 2.   -1.   -3.  ]
  [ 3.    0.   -3.  ]
  [ 7.75  3.   -3.  ]]]

uncertainty:
 [[[0.7742569458516938 0.7742569458516938 0.7742569458516938]
  [0.7742569458516938 0.7742569458516938 0.7742569458516938]
  [0.7742569458516938 0.7742569458516938 0.7742569458516938]]

 [[0.7742569458516938 0.3871284729258469 0.7742569458516938]
  [0.7742569458516938 0.7742569458516938 0.3462582325951522]
  [0.7742569458516938 0.7742569458516938 0.7742569458516938]]

 [[0.7742569458516938 0.7742569458516938 0.7742569458516938]
  [0.7742569458516938 0.7742569458516938 0.7742569458516938]
  [0.3871284729258469 0.7742569458516938 0.7742569458516938]]]

action value with uncertainty
 [[[1.7742569458516937 -0.2257430541483062 -2.2257430541483063]
  [2.7742569458516937 0.7742569458516938 -2.2257430541483063]
  [3.7742569458516937 2.7742569458516937 -2.2257430541483063]]

 [[2.7742569458516937 -7.362871527074153 -2.2257430541483063]
  [2.7742569458516937 0.7742569458516938 -7.453741767404848]
  [4.774256945851694 2.7742569458516937 -2.2257430541483063]]

 [[2.7742569458516937 -0.2257430541483062 -2.2257430541483063]
  [3.7742569458516937 0.7742569458516938 -2.2257430541483063]
  [8.137128472925847 3.7742569458516937 -2.2257430541483063]]]


New Param INDICES (not direct values):
P1: 2 (Beats per Minute - BPM)
P2: 2 (Beeps per Loop - BPL)
P3: 0 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 0 --> state: Stuck         - robot 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 go
 back:
```

```
You entered: 9



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

(Hidden state 0 layer):
Reward_signal (R):       9.0
N value for state 0 is 5
Delta_Q for state 0 is: 0.25
New action value (Q):    8.0
Q-table after update for state 0:

[[[ 1.   -1.   -3.  ]
  [ 2.    0.   -3.  ]
  [ 3.    2.   -3.  ]]

 [[ 2.   -7.75 -3.  ]
  [ 2.    0.   -7.8 ]
  [ 4.    2.   -3.  ]]

 [[ 2.   -1.   -3.  ]
  [ 3.    0.   -3.  ]
  [ 8.    3.   -3.  ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -9.0
N value for state 1 is 5
Delta_Q for state 1 is: 0.35000000000000053
New action value (Q):    -7.6000000000000005
Q-table after update for state 1:

[[[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-3.   0.   2. ]]

 [[-3.  -7.5  4. ]
  [-3.   1.   8.2]
  [-3.   0.   3. ]]

 [[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-7.6  0.   2. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       -9.0
N value for state 2 is 5
Delta_Q for state 2 is: 0.35000000000000053
```

```
New action value (Q):    -7.6000000000000005
Q-table after update for state 2:

[[[ 0.    3.    0.  ]
  [-3.    2.   -3.  ]
  [-3.    1.   -3.  ]]

 [[ 0.    8.75  0.  ]
  [-3.    3.   -7.8 ]
  [-3.    1.   -3.  ]]

 [[ 0.    4.    0.  ]
  [-3.    2.   -3.  ]
  [-7.6   1.   -3.  ]]]

in_a_row_st0 +1, total 3 becase correct and same
State 0 Converged
State 1 Converged



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

STARTING NEW LOOP
------------------------------------------------------------
------------------------------------------------------------



(Hidden loop layer):
Time Step: 12
state_idx_set: {2}
current_state_index: 2

N_array in loop at time 12:
[[[1 1 1]
  [1 1 1]
  [1 1 1]]

 [[1 4 1]
  [1 1 5]
  [1 1 1]]

 [[1 1 1]
  [1 1 1]
  [5 1 1]]]

action value:
 [[[ 0.    3.    0.  ]
  [-3.    2.   -3.  ]
  [-3.    1.   -3.  ]]

 [[ 0.    8.75  0.  ]
  [-3.    3.   -7.8 ]
```

```
  [-3.    1.   -3.  ]]

 [[ 0.    4.    0.  ]
  [-3.    2.   -3.  ]
  [-7.6   1.   -3.  ]]]

uncertainty:
 [[[0.7881793339380322 0.7881793339380322 0.7881793339380322]
  [0.7881793339380322 0.7881793339380322 0.7881793339380322]
  [0.7881793339380322 0.7881793339380322 0.7881793339380322]]

 [[0.7881793339380322 0.3940896669690161 0.7881793339380322]
  [0.7881793339380322 0.7881793339380322 0.3524845138291894]
  [0.7881793339380322 0.7881793339380322 0.7881793339380322]]

 [[0.7881793339380322 0.7881793339380322 0.7881793339380322]
  [0.7881793339380322 0.7881793339380322 0.7881793339380322]
  [0.3524845138291894 0.7881793339380322 0.7881793339380322]]]

action value with uncertainty
 [[[0.7881793339380322 3.7881793339380323 0.7881793339380322]
  [-2.2118206660619677 2.7881793339380323 -2.2118206660619677]
  [-2.2118206660619677 1.7881793339380323 -2.2118206660619677]]

 [[0.7881793339380322 9.144089666969016 0.7881793339380322]
  [-2.2118206660619677 3.7881793339380323 -7.44751548617081]
  [-2.2118206660619677 1.7881793339380323 -2.2118206660619677]]

 [[0.7881793339380322 4.788179333938032 0.7881793339380322]
  [-2.2118206660619677 2.7881793339380323 -2.2118206660619677]
  [-7.247515486170811 1.7881793339380323 -2.2118206660619677]]]


New Param INDICES (not direct values):
P1: 1 (Beats per Minute - BPM)
P2: 0 (Beeps per Loop - BPL)
P3: 1 (Amplitude of Pitch Change)

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:
```

```
You entered: 2 --> state: 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 go
 back:
```

```
You entered: 10



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

(Hidden state 0 layer):
Reward_signal (R):       -10.0
N value for state 0 is 5
Delta_Q for state 0 is: 0.4499999999999993
New action value (Q):    -8.2
Q-table after update for state 0:

[[[ 1.  -1.  -3. ]
  [ 2.   0.  -3. ]
  [ 3.   2.  -3. ]]

 [[ 2.  -8.2 -3. ]
  [ 2.   0.  -7.8]
  [ 4.   2.  -3. ]]

 [[ 2.  -1.  -3. ]
  [ 3.   0.  -3. ]
  [ 8.   3.  -3. ]]]



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

(Hidden state 1 layer):
Reward_signal (R):       -10.0
N value for state 1 is 5
Delta_Q for state 1 is: 0.5
New action value (Q):    -8.0
Q-table after update for state 1:

[[[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-3.   0.   2. ]]

 [[-3.  -8.   4. ]
  [-3.   1.   8.2]
  [-3.   0.   3. ]]

 [[-3.   0.   2. ]
  [-3.   1.   3. ]
  [-7.6  0.   2. ]]]



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

(Hidden state 2 layer):
Reward_signal (R):       10.0
N value for state 2 is 5
Delta_Q for state 2 is: 0.25
```

```
New action value (Q):    9.0
Q-table after update for state 2:

[[[ 0.   3.   0. ]
  [-3.   2.  -3. ]
  [-3.   1.  -3. ]]

 [[ 0.   9.   0. ]
  [-3.   3.  -7.8]
  [-3.   1.  -3. ]]

 [[ 0.   4.   0. ]
  [-3.   2.  -3. ]
  [-7.6  1.  -3. ]]]

in_a_row_st2 +1, total 3 becase correct and same
State 0 Converged
State 1 Converged
State 2 Converged
running 'break' on converge

in_a_row_st0 3
in_a_row_st1 3
in_a_row_st2 3
final time_step: 12
```

Great job! The system terminated successfully at itter: 12.
Click on the next cell below and hit 'shift + enter' to continue

---

Section 3

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]:
```
sect3_load_str = current_user_ID_str + "_sect20_step" + time_step_20_str


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:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 9

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 2 --> state: 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 go
 back:

You entered: 10

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 0 --> state: Stuck         - robot 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 go
 back:


Please enter a valid integer in the range 0 to 10 or type 'back' to go bac
k...

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 go
 back:
```

```
You entered: 9
```

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

---

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:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 0 --> state: Stuck         - robot 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 go
 back:

You entered: 9

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 1 --> state: Successful    - robot has 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 go
 back:
```

```
You entered: 9

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

Robot sound is playing....

What state is the robot in:

[0]: Stuck              - robot needs your help
[1]: Successful         - robot has completed it's task
[2]: Progressing        - robot is working and doesn't need help
[3]: None of the above


To replay the sound: leave the input empty and hit 'enter'...
Select a state between [0 to 3]:

You entered: 2 --> state: 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 go
 back:

You entered: 9




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

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

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

Save the Output

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

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

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.,


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 [ ]:
```
%whos
```