

IATL Cover Sheet for Assessed Work 2025-26

Student ID Number:	<u>5538969</u>
Year of Study:	<u>3</u>
Module Name:	<u>Serious Tabletop Game Design and Development</u>
Module Code:	<u>IL315</u>
Module Convenor(s):	<u>Devon Allcoat and Chris Evans</u>
How many words did you use? (If applicable)	<u>/</u>
Assignment Title:	<u>rule book</u>

When you submit your assignment and IATL Coversheet on Tabula, you will be asked to complete an Academic Integrity Declaration which has been approved by the University's Academic Quality and Standards Committee, October 2023.

In addition, please complete this [IATL Coversheet](#) which supplements the declaration you will make on Tabula.

1. [DECLARATION OF AI-USE IN THIS ASSIGNMENT](#)

Your [rule book](#)

for [Serious Tabletop Game Design and Development](#)

has been badged according to the IATL AI 'Traffic Light' Policy as Amber

This means, for this assignment:

- You may consult AI tools (e.g., ChatGPT) for idea generation or drafting, but you must:
 - o Follow the guidance in the IATL Undergraduate Handbook.
 - o Complete and submit an AI Declaration Form with your IATL Coversheet on Tabula.
- Ensure all ideas and text are properly attributed and meet University standards for academic integrity.

Please confirm:

- ☒ Where a generative Artificial Intelligence such as ChatGPT has been used I confirm I have abided by both the University guidance and specific requirements as set out in the IATL Student Handbook and Assignment Brief.
- ☒ I am aware of the 'traffic light' expectations of AI-use for this assignment.

- ☒ I have clearly acknowledged the use of any generative Artificial Intelligence in my submission, my reasoning for using it and which generative AI (or AIs) I have used. Except where indicated the work is otherwise entirely my own.

Please note your submission will not be assessed unless all the above boxes are checked, so make sure you have read and understood each section.

2. [ETHICS APPROVAL](#)

If your work involves working with human participants, you will have had to seek [Ethics Approval](#) for your assignment. You must attach the approved documents and confirmation of approval letter into Tabula with your assignment.

Delete as applicable:

- My project involves human participants / No
- I have applied for Ethics Approval / No
- I have submitted my approved Ethics application (application form, participant information leaflet and consent form template) and confirmation of full approval letter into Tabula with my assignment // Not applicable

3. [PROOFREADING](#)

I have used a proofreader or proofreading service, paid or unpaid, to support the submission of this assignment / No

4. [LATE PENALTIES](#)

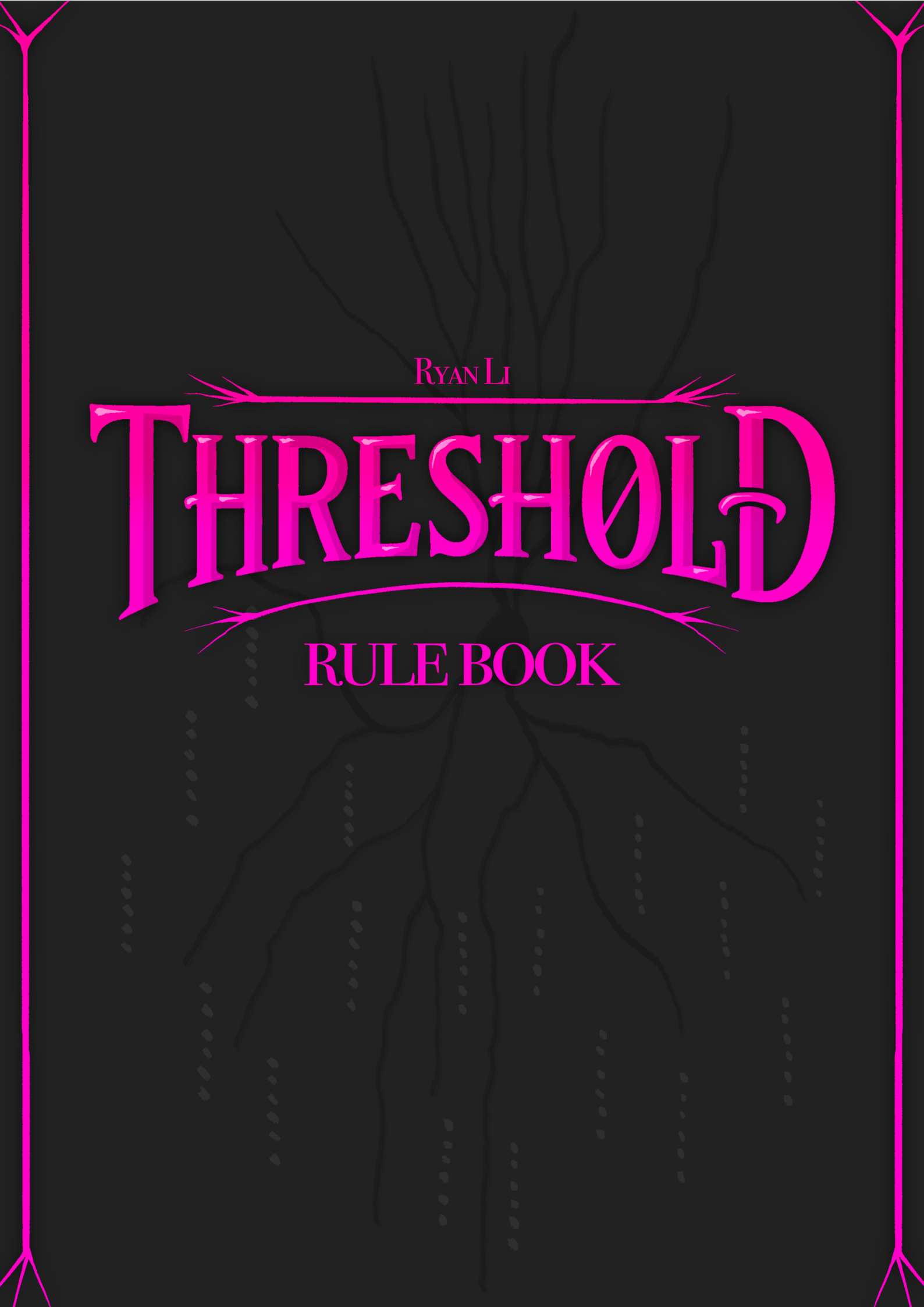
Failure to do your assessed work by the specified deadline will mean that your submission is LATE. Please remember that you MUST print out the electronic receipt you will receive for your online essay submission and keep for reference.

5. [YOUR SIGNATURE](#)

Signed:* Ryan Li

Date: 29/01/2026

*You may type your name



RYAN LI

THRESHOLD

RULE BOOK

Dear players,

To get started quickly, follow the structure of this rulebook. If you don't know how to play *Threshold*, begin with the setup and round overview on pages 2 - 4 (pink borders). Then read the game rules on pages 5 - 6 (green borders) and start playing. The glossary on pages 7 - 9 (blue borders) includes detailed, alphabetically organised definitions and clarifications. Please consult it at any time if questions arise during play.

- Ryan Li

NOTE TO FACILITATORS

Threshold is a competitive card game designed for small group learning and discussion. It comes with 4 game modes and is intended to be played multiple times in a single session, giving players the chance to explore the full range of mechanics the game offers. It is suitable for A-level students and neuroscience undergraduates interested in mathematical modelling.

The mechanics of *Threshold* is inspired by the University of Warwick Life Sciences module LF259 *Neurobiology* and Eugene M. Izhikevich's *Dynamical Systems in Neuroscience*. Through play, players interact with simplified models of neural dynamics and build intuition for concepts such as *excitability*, *equilibria*, *stability*, *thresholds*, and *attractor behaviour*.

To encourage *critical thinking*, each player gets a *mission* at the start of a session and works on it during play. These sit outside the core gameplay loop, and players will use the game as a tool to build, test, and refine their answers. The game comes with 13 *missions* that together support 2 main learning goals:

- Compare the two core dichotomies in neural dynamics: *monostable* versus *bistable*, and *integrator* versus *resonator*.
- Create and interpret *phase portraits* to understand the structure and stability of trajectories in phase space.

GAME COMPONENTS

33 influence cards	13 mission cards
13 $\times +1$ cards	2 parameter cards
13 $\times -1$ cards	1 state card
7 $\times$ noise cards	16 prediction tiles
17 drive cards	8 of each kind
7 $\times +1$ cards	8 position tokens
7 $\times +2$ cards	1 priority token
3 $\times 0$ cards	

SETTING UP THE GAME

Give each player 1 resting and 1 spike *prediction* token★, give *priority*★ to the youngest player, and shuffle the *influence* cards★. Place the *parameter* cards★ near the centre as a quick reference, flipped to the selected game mode.

In **integrator** modes, shuffle the *drive* cards★ and do NOT use *position* tokens★. In **resonator** modes, assign *position* tokens and do NOT use *drive* cards. In **bistable** games, place the *state* card★ near the centre to easily track the current State output; this is not used in **monostable** games. Detailed setup instructions for each mode are provided in later sections.

START OF SESSION

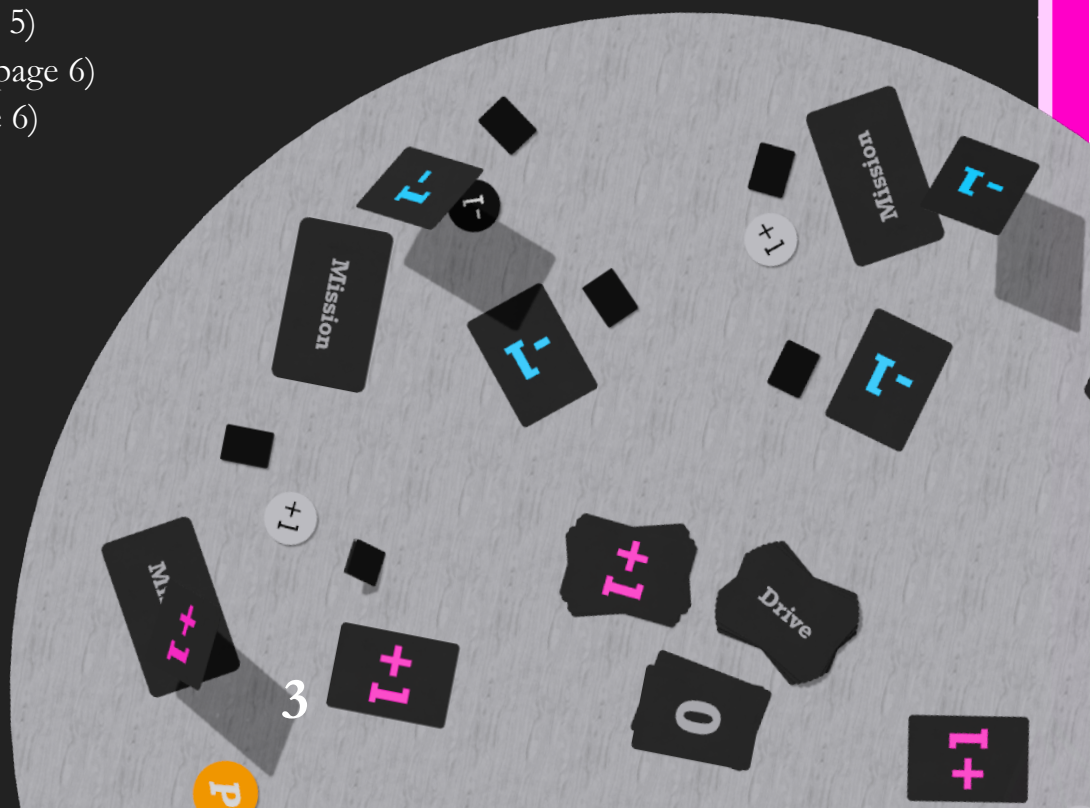
At the start of session, give each player 1 *mission* card★ with an objective to complete by the end. A session may include multiple games across different modes. Complete each game in a single mode before switching. Playing multiple games in different modes is recommended, as some missions are more accessible when players have experience with different modes.

There are **13** available missions. Examples are shown below; for the full list, see *pages 7 - 8*.

- “A round begins by setting the Count to a default value, e.g., 0. Explain what biological or dynamical mechanisms return the system to this baseline and what drives state transitions in bistable systems.”
- “Compare subthreshold oscillations in resonators with sustained oscillations in bistable spiking systems and explain the dynamical mechanisms underlying their differences.”
- “The illustrated neuron model lacks a fixed firing threshold and exhibits graded excursion amplitudes. Evaluate how this challenges the classical threshold concept and discuss its physiological relevance.”

There are **4** available game modes. Refer to the pages listed below for detailed rules and round structure or see the following page for an overview.

- Monostable Integrator (page 5)
- Bistable Integrator (page 5)
- Monostable Resonator (page 6)
- Bistable Resonator (page 6)



ROUND OVERVIEW

Each game is played over a series of rounds. While individual game modes have their own tweaks and changes, all rounds follow a similar structure:

1. Priority

- The *priority* token determines reveal order of *influence* and rotates counterclockwise each round, except in the first round where it is given to the youngest player.

2. Count★

- A round begins by setting its Count. In some modes, this depends on the previous round's State output.

3. Drive / Position

- In **integrator** modes, a *drive* card is revealed to decide the round's contribution to its Count.
- In **resonator** modes, each player is given a *position* that augments the size of their *influence*, which apply ONLY when that player reveals an *influence* card.

4. Prediction

- Players secretly predict the round's State output by placing a *prediction* token face down.

5. Submit Your Influence

- Each player chooses one *influence* card and places it face down.

6. Reveal Your Influence

- Starting with the *priority* player, *influence* cards are revealed sequentially counterclockwise.
- Non-numerical effects are ALWAYS resolved immediately.
- Numerical effects are either summed to the Count after all reveals (**integrator** modes) or added immediately to the Count (**resonator** modes).

7. Output

- The round's State output is determined by whether its Count reaches a mode-specific Threshold★, either after all *influence* cards are revealed or immediately upon reaching it.

8. Scoring

- Players reveal their *prediction* tokens and gain 1 point for a correct prediction.

9. Ending the round

- Submitted *influence* cards are either discarded or reshuffled and redistributed, depending on the game mode and the round's State output.

THE ROUNDS IN DETAIL

Here you can find step-by-step instructions for how to play each game mode.

Monostable Integrator

Game start

Each player receives **3** *influence* cards.

First round

1. Set the Count = **0**.
2. Give *priority* to the youngest player.
3. Flip the top card of the *drive* pile and place it on the table.
This is the round's only contribution to the Count.
4. Each player secretly predicts whether the State output will be spike or resting using a *prediction* token.
5. Each player places **1** *influence* card face down in front of them.

Resolution and scoring

6. Starting with the *priority* player, players reveal *influence* cards one by one.
Non-numerical effects resolve immediately when revealed. Numerical effects are applied to the Count ONLY after all influence cards have been revealed.
7. If Count ≥ 3 , the output is a spike. Otherwise, it is resting.
8. Reveal *prediction* tokens. Players gain **1** point for a correct prediction and gain or lose nothing for an incorrect one.
9. Discard all submitted *influence* cards. This ends the round.

Subsequent rounds

1. Set Count = **0**.
2. Rotate *priority* counterclockwise.
3. Flip the next *drive* card onto the previous.
This becomes the round's only contribution to the Count.
4. Repeat prediction, resolution and scoring steps.

Game end

The game ends after **3** rounds, when all *influence* cards have been played.

The player with the most points wins.

Players may then start a new game or proceed to missions.

Bistable Integrator

Game start

Each player receives **4** *influence* cards.

First round

1. Set Count = **0**. The initial state is resting.
2. Give *priority* to the youngest player.
3. Each player secretly predicts spike or resting.
4. Each player places **1** *influence* card face down.

Resolution and scoring

5. Starting with *priority*, reveal *influence* cards one by one.
Resolve non-numerical effects immediately. Apply numerical effects ONLY after all cards are revealed.
6. If $2 \leq \text{Count} \leq 4$, the output is a spike. Otherwise, it is resting.
7. Reveal *prediction* tokens. Players gain **1** point for correct predictions.
8. If the output was a spike, gather all submitted *influence* cards, reshuffle, and redistribute them.
9. If the output was resting, discard all submitted *influence* cards.

Subsequent rounds

1. If the previous output was a spike, set Count = **3**. If it was resting, set Count = **0**.
2. Rotate *priority* counterclockwise.
3. Repeat prediction, resolution and scoring steps.

Game end

The game ends when all *influence* cards are used OR after **11** rounds, whichever comes first.

The player with the most points wins.

Monostable Resonator

Game start

Each player receives **3** *influence* cards.

First round

1. Set Count = **0**.
2. Give *priority* to the youngest player.
3. The *priority* player chooses a *position*, which are then assigned counterclockwise in alternating order.
4. A player's *position* is applied ONLY when their *influence* card is revealed.
5. Each player secretly predicts spike or resting.
6. Each player places **1** *influence* card face down.

Resolution and scoring

7. Starting with *priority*, reveal *influence* cards one by one.
ALL effects, numerical and non-numerical, resolve immediately to the Count.
8. If Count ≥ 4 at ANY point, the output becomes a spike and the round ends immediately.
If Threshold is not reached, the output is resting.
9. Reveal *prediction* tokens. Players gain **1** point for correct predictions.
10. Discard all *influence* cards submitted this round, revealed or unrevealed.

Subsequent rounds

1. Set Count = **0**.
2. Rotate *priority* counterclockwise.
3. Reassign *positions* using the same method as in the first round.
4. Repeat prediction, resolution and scoring steps.

Game end

The game ends after **3** rounds, when all *influence* cards have been played.

The player with the most points wins.

END OF SESSION

Players reveal their *mission* cards. In any order, players may present responses or lead discussion. Some missions are verbal, while others involve drawing. No points are awarded.

Players may exchange *mission* cards if desired. Players are encouraged to discuss responses collaboratively to connect concepts and reinforce learning objectives.

Bistable Resonator

Game start

Each player receives **4** *influence* cards.

First round

1. Set Count = **0**. The initial state is resting.
2. Give *priority* to the youngest player.
3. Assign *positions* using the same method as in **Monostable Resonator**.
4. Each player secretly predicts spike or resting.
5. Each player places **1** *influence* card face down.

Resolution and scoring

6. Starting with *priority*, reveal *influence* cards one by one.
ALL effects resolve immediately to the Count.
7. If Count ≤ -3 OR Count ≥ 3 at ANY point, the output becomes a spike and the round ends immediately.
Otherwise, the output is resting.
8. Reveal *prediction* tokens. Players gain **1** point for correct predictions.
9. If the output was a spike, gather all submitted *influence* cards, reshuffle, and redistribute them.
10. If the output was resting, discard all submitted *influence* cards.

Subsequent rounds

1. If the previous output was a spike, set Count = **-5**. If it was resting, set Count = **0**.
2. Rotate *priority* counterclockwise.
3. Reassign *positions*.
4. Repeat prediction, resolution and scoring steps.

Game end

The game ends when all *influence* cards are used OR after **11** rounds, whichever comes first.

The player with the most points wins.

GLOSSARY

Count

The numerical variable that accumulates influence during a round. The count is set at the start of each round and modified by drive, influence, and position. In monostable games, the initial count is always 0. In bistable games, the initial count of subsequent rounds depends on the previous round's state output. Whether and when the count reaches a mode-specific threshold determines the round's state output.

Drive

An external input used only in integrator modes that biases the count for the round. A drive card is revealed at the start of each round and contributes to the count when the first influence card is revealed.

There are three types of drive cards: +1, +2, and 0, which increase the count accordingly or apply no change.



Influence

An action card selected by players to modify the count or disrupt resolution. Influence cards are placed face down and revealed one at a time in priority order. Effects may be numerical or non-numerical and resolve according to the current game mode.

+1 / -1 cards

+1 and -1 cards change the count directly:

- +1 increases the count by 1.
- -1 decreases the count by 1.

In integrator modes, all +1 and -1 effects resolve after all influence cards are revealed. In resonator modes, +1 and -1 effects resolve immediately when revealed.

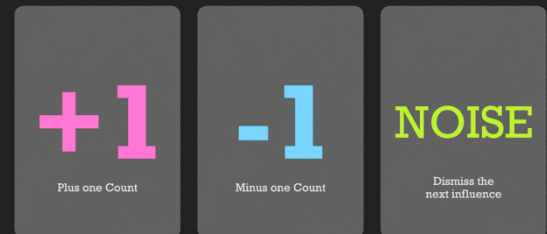
Noise cards

Noise cards represent non-numerical disruptive effects. When revealed, a noise card:

- resolves immediately, regardless of game mode.
- cancels the numerical effect of the next unrevealed influence card only.

If a noise card is revealed immediately after another noise card, its cancelling effect is carried forward to the next revealed influence card until a numerical effect is dismissed. If a noise card is revealed at the end of a round, it has no effect.

Noise cards also cancel the effect of position tokens.



Mission

Each player receives 1 mission to work on, using the game mechanics to come up with a solution or response. Before the end of the session, players reveal their missions and lead a short discussion or demonstration of their understanding. There are 13 available missions:

1. *Describe* the defining dynamical characteristics of a resonator system.
- *subthreshold oscillations*
2. *Identify* the features of a monostable integrator that correspond to the classical neuron model with all-or-none action potentials.
- *a single stable resting state*
3. *Explain* how firing thresholds relate to unstable equilibria in dynamical systems and define what is meant by an unstable equilibrium.
- *an unstable equilibrium repels nearby trajectories*
4. A round begins by setting the count to a default value (for example, 0). *Explain* what biological or dynamical mechanisms return the

system to this baseline and suggest what drives state transitions in bistable systems.

- *leak currents*

5. *Explain* the functional value of bistability and give examples of physiological systems or phenomena governed by bistable dynamics.

- *cortical state transitions*

6. Given that excitatory inputs depolarise, and inhibitory inputs hyperpolarise the membrane potential, *suggest* how inhibitory input can nevertheless trigger spiking in a neuron model.

- *post-inhibitory rebound*

7. The neuron fires only within a specific stimulation frequency range.



Interpret this frequency dependence and *suggest* dynamical mechanisms that may account for it.

- *resonance*

8. *Compare* subthreshold oscillations in resonators with sustained oscillations in bistable spiking systems and explain the dynamical mechanisms underlying their differences.

- *damped oscillations*

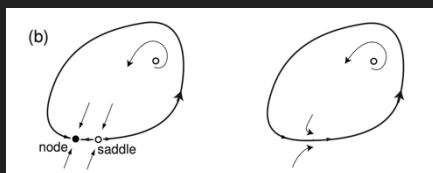
9. *Compare* and illustrate the dynamical differences between monostable and bistable neuronal circuits.

- *coexisting attractors*

10. *Apply* the concept of stable limit cycles to describe the spiking dynamics of a bistable neuron.

- *convergence*

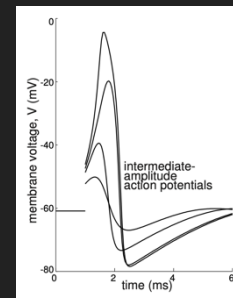
11. In a monostable integrator phase portrait, the stable equilibrium disappears.



Predict the resulting behaviour of the large trajectory.

- *trajectories no longer return to rest*

12. The illustrated neuron model lacks a fixed firing threshold and exhibits graded excursion amplitudes.



Evaluate how this challenges the classical threshold concept and discuss its physiological relevance.

- *a fixed firing threshold*

13. *Construct* a phase portrait for one game mode that corresponds to a biologically realistic neuronal dynamical system, and label key features such as equilibria and trajectories.

- *equilibria, separatrices, and limit cycles*

Parameter

A reference card that defines mode-specific rules and threshold. Parameter cards are placed near the centre of the table during setup and show the list of rules that governs state transitions for a selected game mode.

MONOSTABLE INTEGRATOR

EACH PLAYER GETS **3** CARDS
SYSTEM STARTS AT REST, $C = 0$
DRIVE CARDS ARE AT PLAY
INFLUENCES RESOLVE AT THE END!

AT ROUND'S END, IF:

$C \geq 3$ *Spike*
 $C < 3$ *Rest*

ALWAYS START $C = 0$

ALWAYS DISCARD
ALL SUBMITTED INFLUENCE

BISTABLE INTEGRATOR

EACH PLAYER GETS **4** CARDS
SYSTEM STARTS AT REST, $C = 0$
DRIVE CARDS ARE AT PLAY
INFLUENCES RESOLVE AT THE END!

AT ROUND'S END, IF:

$2 \leq C \leq 4$ *Spike*
NEXT START $C = 3$
RECYCLE CARDS

$C < 2$ OR $C > 4$ *Rest*
NEXT START $C = 0$
DISCARD CARDS

MONOSTABLE RESONATOR

EACH PLAYER GETS **3** CARDS
SYSTEM STARTS AT REST, $C = 0$
POSITION TOKENS ARE AT PLAY
INFLUENCES RESOLVE
AS THEY ARE REVEALED!

AT ANY POINT, IF:

$C \geq 4$ *Spike*
 $C < 4$ *Rest*

ALWAYS START $C = 0$

ALWAYS DISCARD
ALL SUBMITTED INFLUENCE

BISTABLE RESONATOR

EACH PLAYER GETS **4** CARDS
SYSTEM STARTS AT REST, $C = 0$
POSITION TOKENS ARE AT PLAY
INFLUENCES RESOLVE
AS THEY ARE REVEALED!

AT ANY POINT, IF:

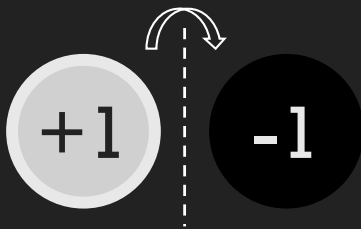
$C \leq 3$ OR $C \geq 3$ *Spike*
NEXT START $C = -5$
RECYCLE CARDS

$-3 < C < 3$ *Rest*
NEXT START $C = 0$
DISCARD CARDS

Position

A player-specific modifier used in resonator modes. Position determines the magnitude of a player's influence and apply only when that player reveals an influence card. They are reassigned at the start of each round.

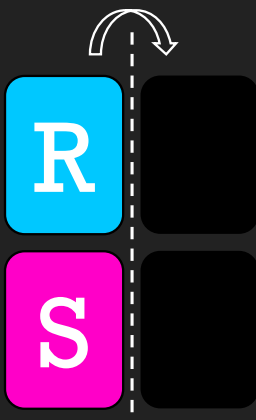
Position tokens have 2 faces: $+1$ and -1 . The face currently shown indicates the active effect. Players must account for this value when making their prediction and selecting their influence during the round.



Prediction

A hidden forecast made by each player regarding the upcoming state output (spike or resting). They are submitted before influence cards are revealed and scored after the round resolves.

Prediction tokens come in two types: r and s. At the start of each session, every player receives one of each token. R represents a resting state prediction, while s represents a spike state prediction.



Priority

The turn-order controller that determines the sequence in which influence cards are revealed. Priority rotates counterclockwise at the start of each round, except in the first round where it is given to the youngest player.

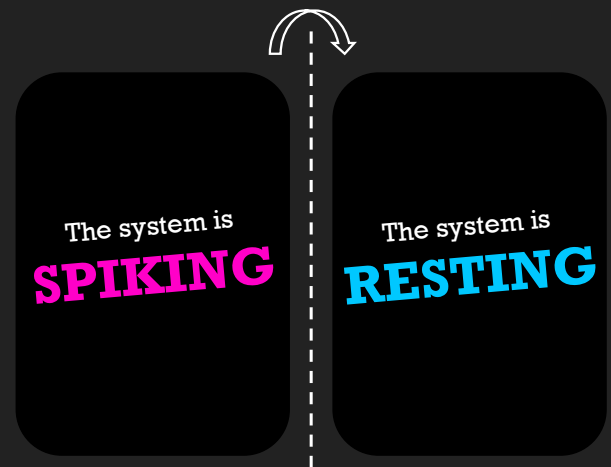
Use the priority token to keep track of which player currently holds priority.



State

The binary output of a round (spike or resting), determined by whether the count reaches a mode-specific threshold. The resulting state may affect scoring, card redistribution, and the initial count of subsequent rounds in bistable games.

Use the state card to keep track of the round's current state in bistable games.



Threshold

The spiking threshold is the numerical range the count must reach to generate a spike or transition into the spiking state. The thresholds for each mode are:

- Monostable integrator: $c \geq 3$
- Bistable integrator: $2 \leq c \leq 4$
- Monostable resonator: $c \geq 4$
- Bistable resonator: $c \leq -3$ or $c \geq 3$

These threshold ranges do not change based on the current state of the round.