

CODERMINDZ

CODING GAME FOR AI LEARNERS



RULEBOOK

AI - when you make a computer like a little brain

Neurons - they carry messages in the brain

Neural Network - where lots of neurons are connected together, similar to how the human brain works

Data - the collection of information



Welcome to Coder Mindz Neural Networks!

It is the year 2045, and you have just acquired a Bot. However, in a world full of Bots like Bo, Mo, Po, and Jo, you are still the master mind.

Show your skills - code and train your robot to help them recognize images. Your Bot needs to identify (infer) an image (robo-animals, neural data-set digits, robo-edibles, or robo-vehicles) by collecting data.

But watch out! Sometimes your Bot will get re-trained (back propagated) after being shot by a laser in this fun and exciting Neural Adventure.

Yes, welcome to the world of real AI!



GAME PARTS

- 1) Coder Mindz Code Cards
- 2) Coder Mindz Tokens
- 3) The Coder Mindz Game Board
- 4) A die
- 5) Wooden Botz

1) Coder Mindz Code Cards

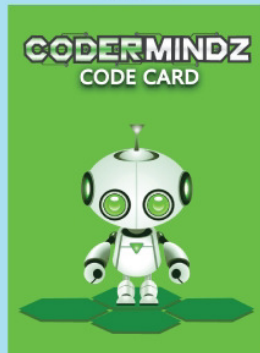
The game contains 4 colored decks of cards - **turquoise**, **red**, **purple**, and **green**.

Each deck has 54 cards.

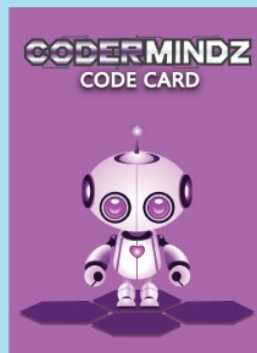
Bo



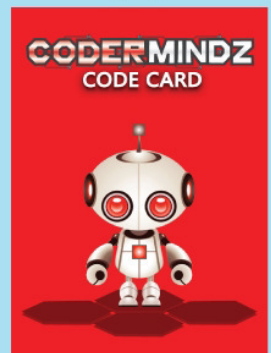
Mo



Jo

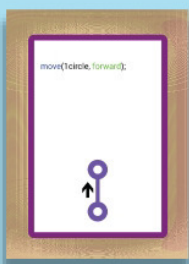


Po



The Basic Code Cards in each deck include:

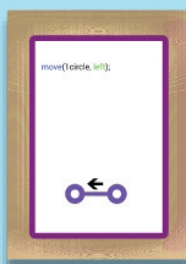
Move Forward
(8)



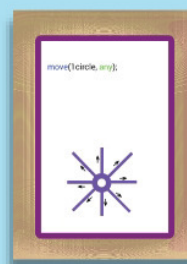
Move Right
(6)



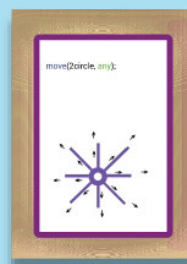
Move Left
(6)



Move Any
(6)



Move Any 2
(8)



Shoot
(1)



The Advanced Code Cards in each deck include:

Conditional
(2 of each type)

Loop, Iterations (2
of each type)

```
if ((right IS SAFE) or  
(right IS not BLOCKED)) {  
  move(1circle, right);  
}  
  
else {  
  move(1circle, left);  
}
```

```
if ((left IS SAFE) or  
(left IS not BLOCKED)) {  
  move(1circle, left);  
}  
  
else {  
  move(1circle, right);  
}
```

```
while((left not SAFE) or  
(left not BLOCKED)) {  
  move(1circle, left);  
}
```

```
while((right not SAFE) or  
(right not BLOCKED)) {  
  move(1circle, right);  
}
```

```
if (Sum of all bots  
on SAFE IS odd) {  
  move(2circle, any);  
}  
  
else {  
  move(1circle, any);  
}
```

Hint: odd = 1,3

```
if (Sum of all bots  
on SAFE IS even) {  
  move(2circle, any);  
}  
  
else {  
  move(1circle, any);  
}
```

Hint: even = 0,2,4

```
while((forward not SAFE) or  
(forward not BLOCKED)) {  
  move(1circle, forward);  
}
```

```
while((backward not SAFE) or  
(backward not BLOCKED)) {  
  move(1circle, backward);  
}
```

Function (3)

```
function () {  
  new card1;  
  new card2;  
  new card3;  
}
```

2) Coder Mindz Tokens

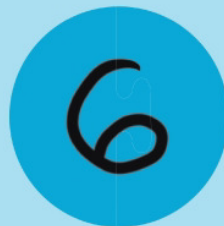
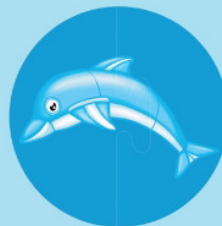
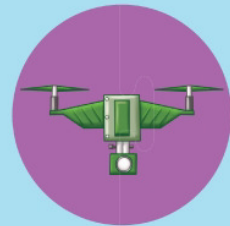
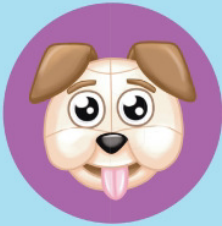
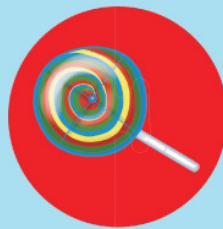
This game contains 16 tokens divided into 4 groups: Robo-Animals, Neural Dataset Digits, Robo-Edibles, Robo-Vehicles

Animals

Numbers

Edibles

Vehicles



SET-UP

When playing for the first time, detach the tokens from the cardboard parts sheet.

Each player chooses a Bot (game piece), and takes the matching color deck of Coder Mindz Code Cards. Place your colored bot on your colored START facing your colored END.

NOTES:

For basic levels, put the Conditional, Loop and Function Code cards aside. These cards will be used in advanced levels.

Each player's deck should contain only the Basic Code Cards - Move Forward, Move Left, Move Right, Move Any 1, and Move Any 2.

Shuffle these cards thoroughly and place them face down in a deck/pile. Place the SHOOT Code card face up to the right of these cards.

If there are fewer than 4 players, set aside the colored Botz that are not in use.

GAMEPLAY

1) Goal

On each level, program your Bot to land on the end point. In levels where there are images, collect the images and get to the end point.

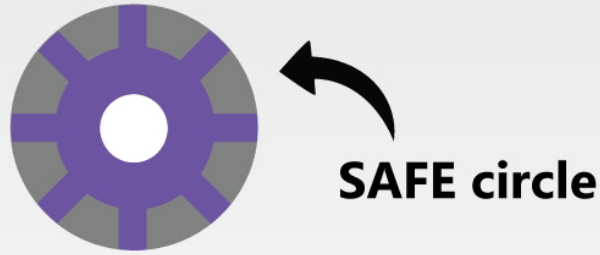
In the levels where there are SHOOT Code cards, you must use yours at any time before landing on the end point.

- Each code card allows a Bot to move to a different neuron.
- You must use the Code card you have drawn. In the event when movement is absolutely not possible, the Code card must be discarded.
- Each player has one SHOOT Code card. In the levels when the SHOOT Code card is used, you can shoot any opponent's Bot so long as you are either:
 - 1) in their line of sight, or
 - 2) the opponent bot is not on a SAFE circle, and no SAFE or BLOCKED circles are in between your Bot and theirs.

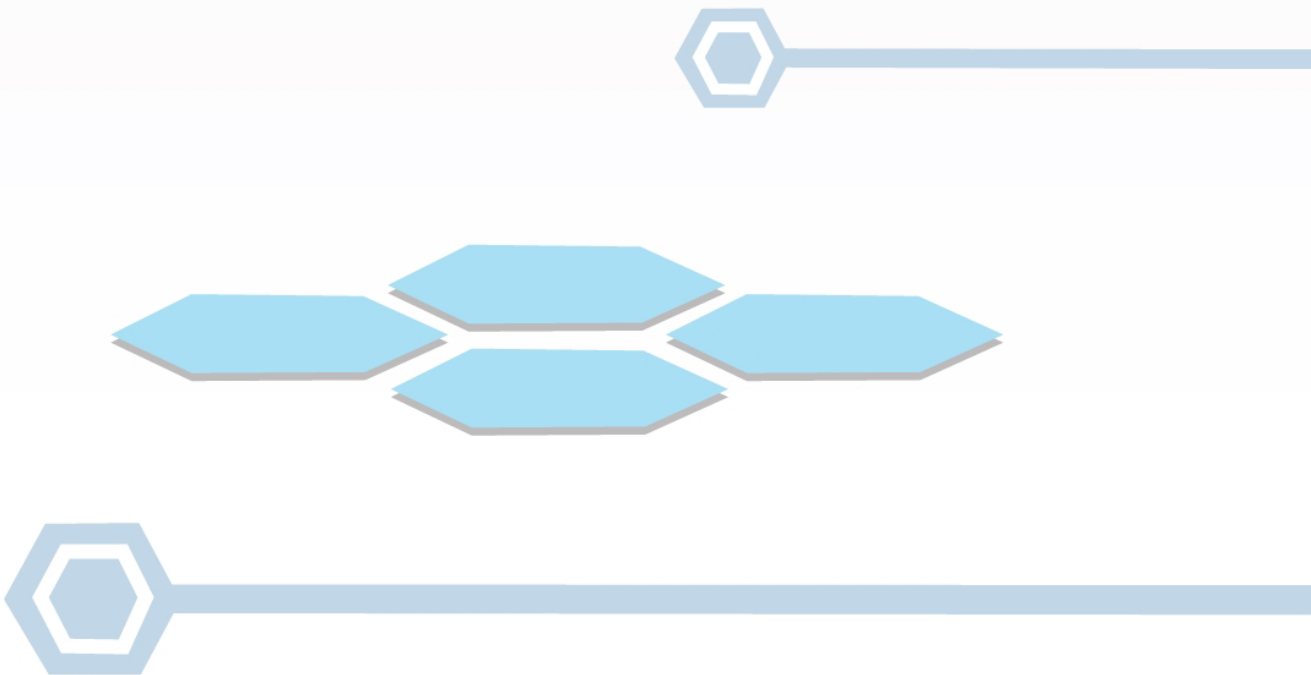
After using your SHOOT Code card, move it to the code pile. This card can only be used once per game.



-The SAFE circles have grey rings around them. When you are on one of these spaces, no one can shoot you.

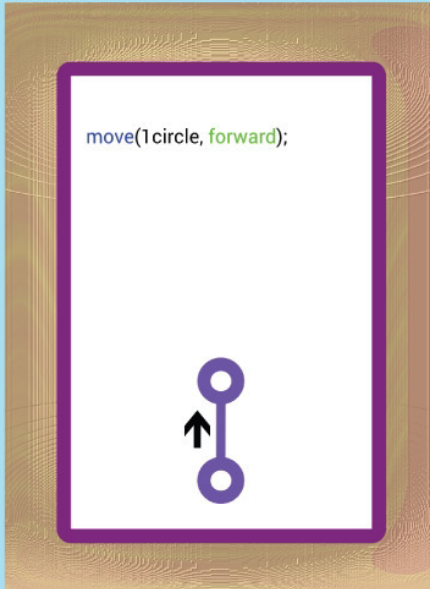


- The BLOCKED circles are the spaces with the image or Bot pieces on them.
- You cannot go onto someone else's START or END; it is a BLOCKED circle for all other players.
 - If you run out of Code cards, you can shuffle and reuse the cards in the code and discard pile.
- The player with the Bot who reaches its end point first wins! The other players keep playing to see who comes in second, third, and fourth.



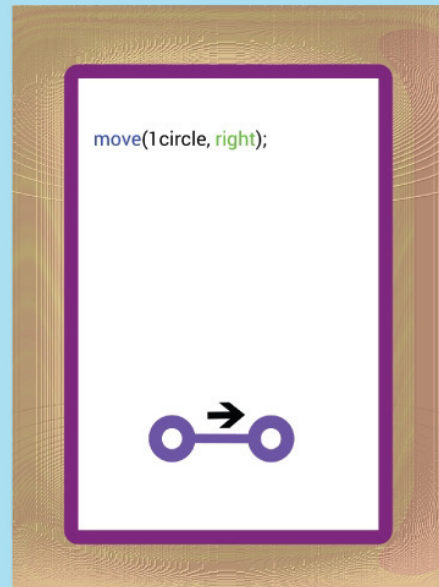
2) Bot Movement

Basic Code Cards



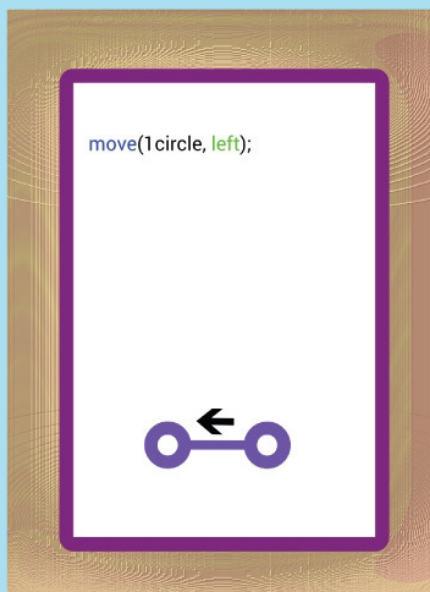
Move Forward

Move your Bot forward one circle towards your end point.



Move Right

Move your Bot one circle to the right.



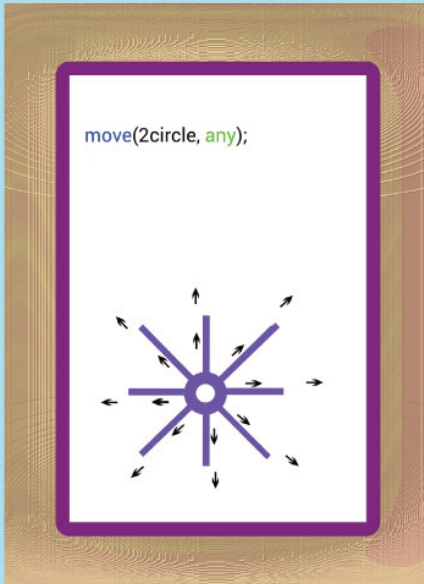
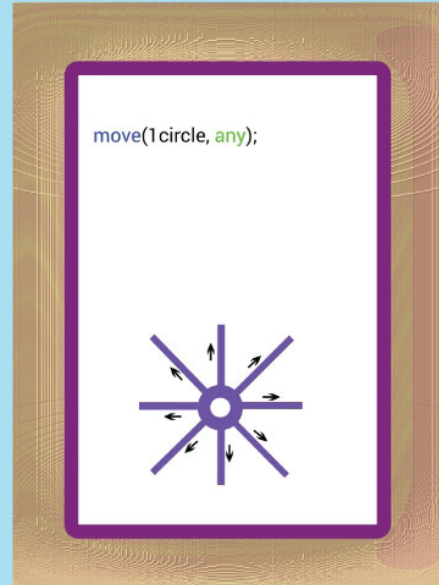
Move Left

Move your Bot one circle to the left.

Move Any 1

Move your Bot one circle to any connected UNBLOCKED circle.

You can move left, right, forward, backward, or diagonally.



Move Any 2

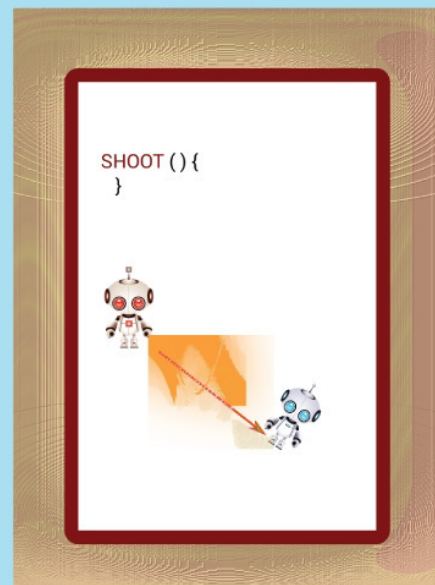
Move your Bot two circles to any connected UNBLOCKED circle.

You can move left, right, forward, backward, or diagonally.

Your Bot can even stay in the same place by moving forward and then moving backward.

SHOOT

Use this Code card to SHOOT another Bot if it is in your line of sight, with no SAFE or BLOCKED circle in between. The "shot" Bot moves back to its START, but your Bot does not move.

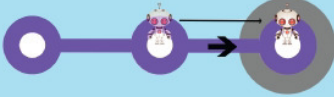


Advanced Code Cards

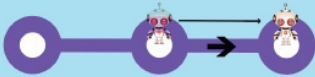
Conditional

"If" condition for moving to the right:

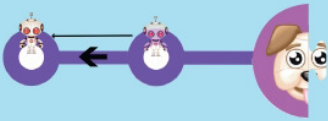
(right is SAFE): move right



(right is not BLOCKED): move right



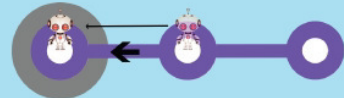
"Else" condition: move left



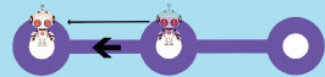
```
if ((right IS SAFE) or  
    (right IS not BLOCKED)) {  
    move(1 circle, right);  
}  
  
else {  
    move (1 circle, left);  
}
```

"If" condition for moving to the left:

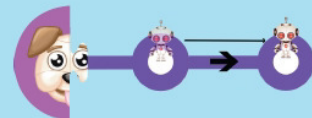
(left is SAFE): move left



(left is not BLOCKED): move left



"Else" condition: move right



```
if ((left IS SAFE) or  
    (left IS not BLOCKED)) {  
    move(1 circle, left);  
}  
  
else {  
    move (1 circle, right);  
}
```

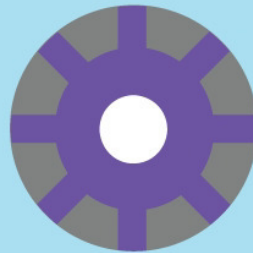


```
if (Sum of all bots
    on SAFE IS odd) {
    move(2circle, any);
}

else {
    move(1circle, any);
}
```

Hint : odd = 1,3

Count the number of Bots on a SAFE Circle, including your Bot. If the number of Bots is even (0,2,4) then the "If Condition" is true. So move your Bot towards any two circles. Else, move towards any one circle.



Count the number of Bots on a SAFE Circle, including your Bot. If the number of Bots is odd (1,3) then the "If Condition" is true. So move your Bot towards any two circles. Else, move towards any one circle.

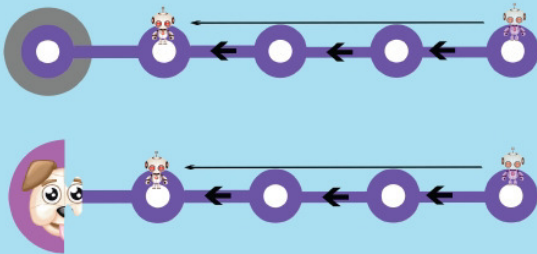
```
if (Sum of all bots
    on SAFE IS even) {
    move(2circle, any);
}

else {
    move(1circle, any);
}
```

Hint : even = 0,2,4

Loop

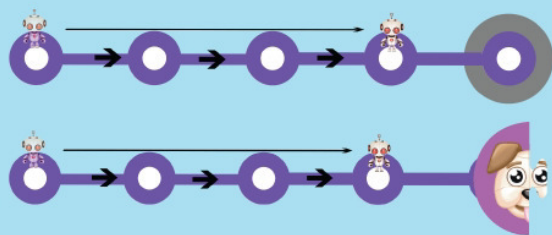
When the circle to the left of your Bot is not SAFE or not BLOCKED, keep moving left. At the end of your turn, stop one circle before a SAFE or BLOCKED circle.



```
while((left not SAFE) or  
(left not BLOCKED)) {  
  move(1 circle, left);  
}
```

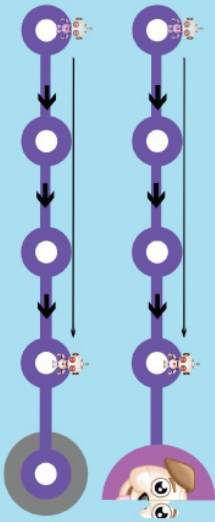
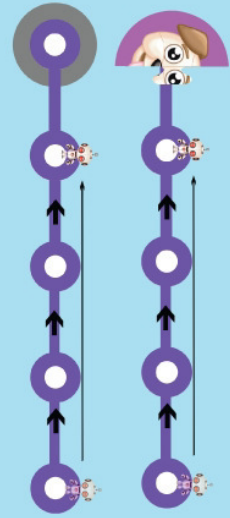
```
while((right not SAFE) or  
(right not BLOCKED)) {  
  move(1 circle, right);  
}
```

When the circle to the right of your Bot is not SAFE or not BLOCKED, keep moving right. At the end of your turn, stop one circle before a SAFE or BLOCKED circle.




```
while((forward not SAFE) or  
(forward not BLOCKED)) {  
  move(1 circle, forward);  
}
```

When the circle in front of your Bot is not SAFE or not BLOCKED, keep moving forward. At the end of your turn, stop one circle before a SAFE or BLOCKED circle.



When the circle behind your Bot is not SAFE or not BLOCKED, keep moving backward. At the end of your turn, stop one circle before a SAFE or BLOCKED circle.

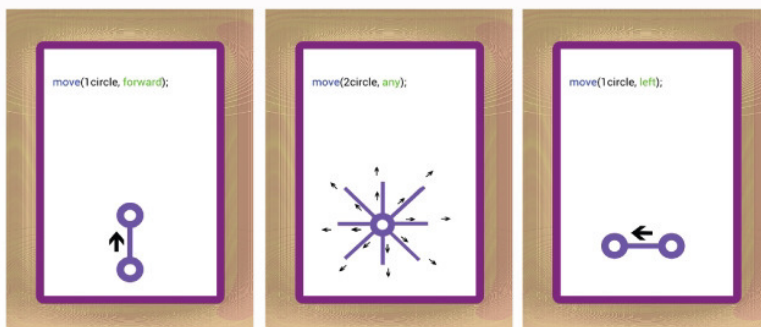
```
while((backward not SAFE) or  
(backward not BLOCKED)) {  
  move(1 circle, backward);  
}
```

Function

```
function () {  
  new card1;  
  new card2;  
  new card3;  
}
```

For the first Function, draw 3 new Basic Code cards, create a Function, and keep it for the current game. When you draw a Function Code card again, you can reuse it. If the move doesn't work, you will need to discard it.

```
function () {  
  new card1;  
  new card2;  
  new card3;  
}
```



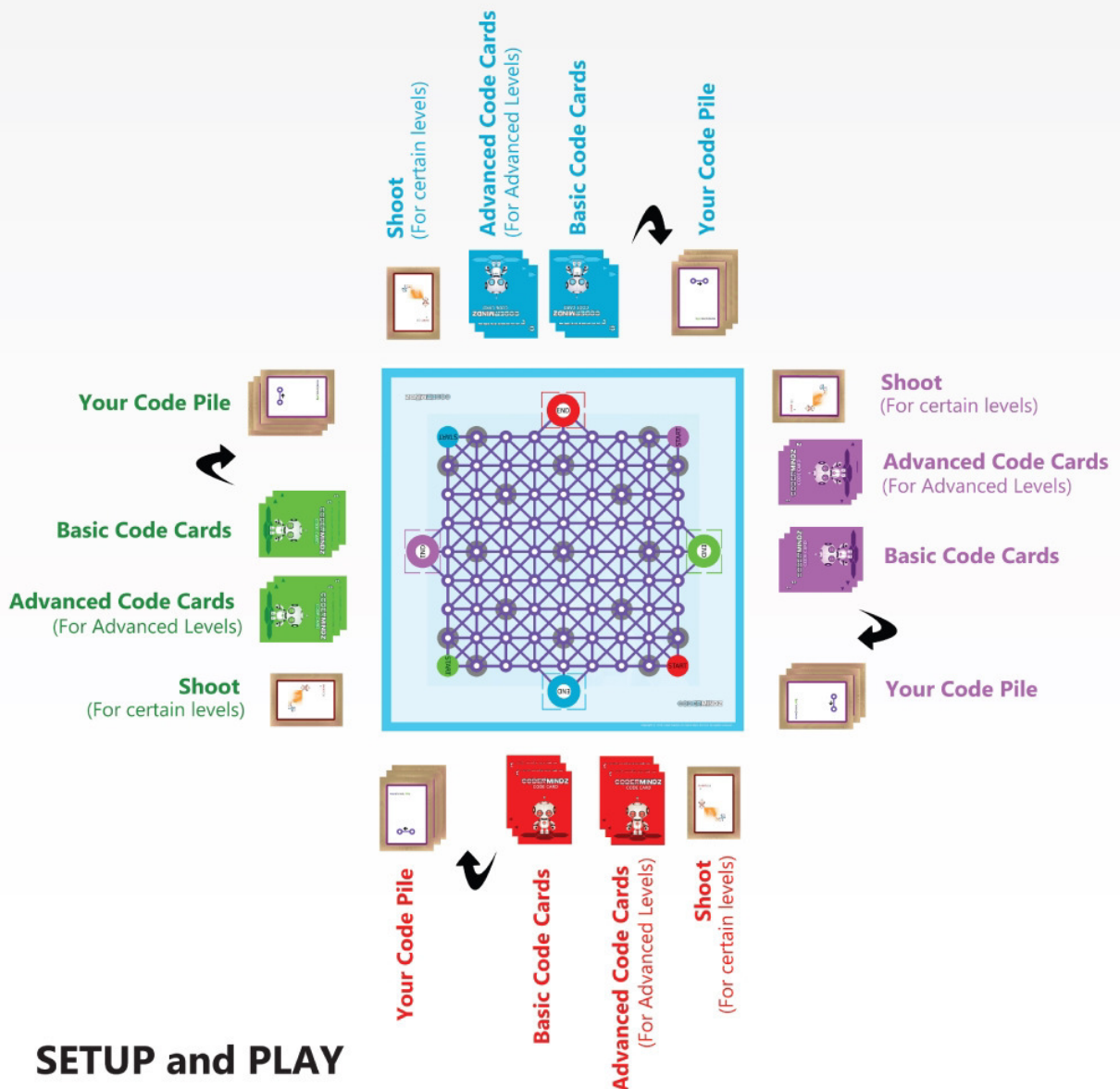
Function Code

Create once and reuse
on the next drawn
Function Code card

3) To Play

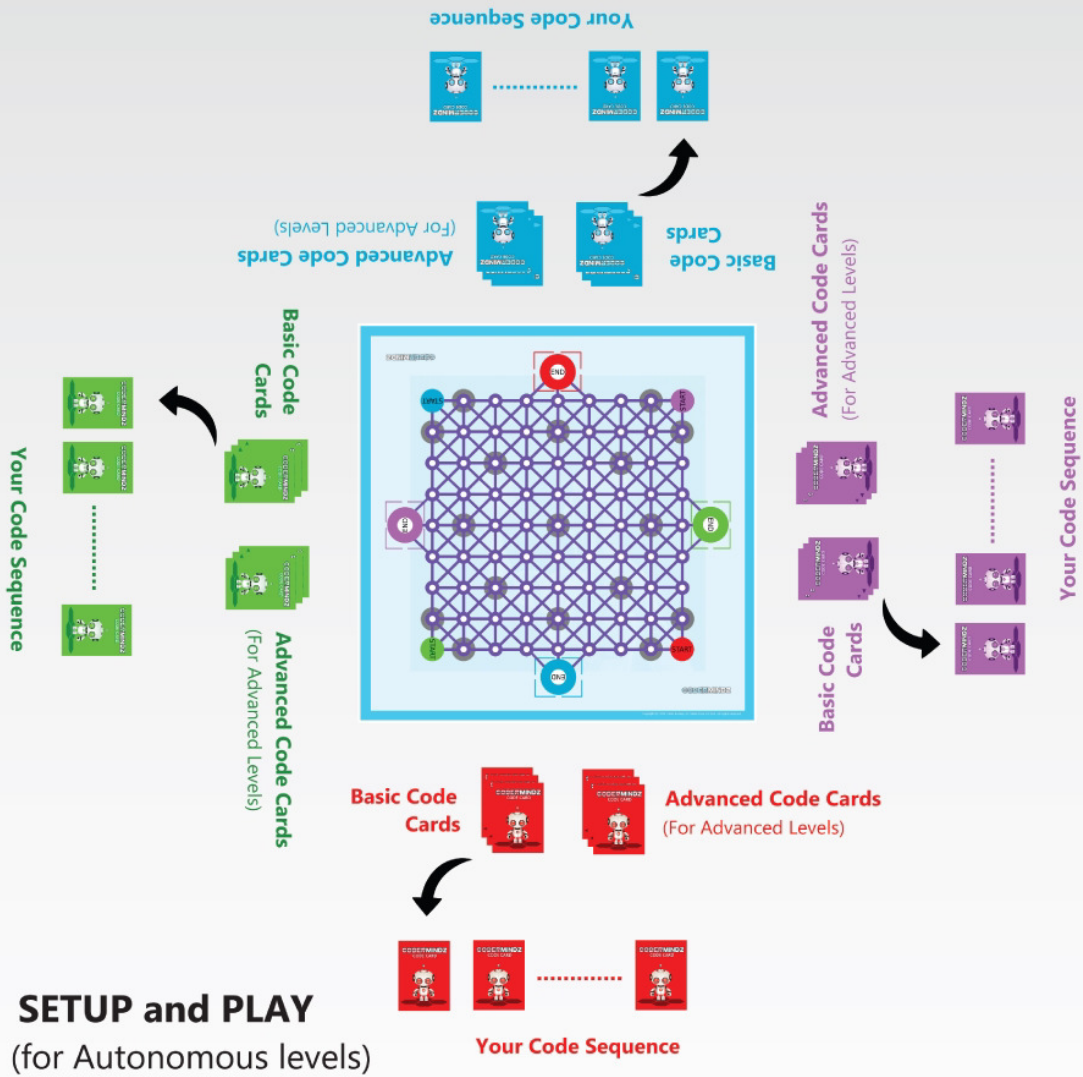
Levels of the Game

1) Training	2) Image Recognition	3) Autonomous
1.1 Basic	2.1 Inference	3.1 Basic
1.2 Advanced	2.2 Adaptive Learning	3.2 Advanced



SETUP and PLAY

(for Training and Image Recognition levels)



Coder Mindz is a turn-based game.



1. The player (on their turn) rolls the die once.
2. From their colored piles of Code cards, the player draws the number of cards as indicated by the die, and moves their Bot based on those cards.

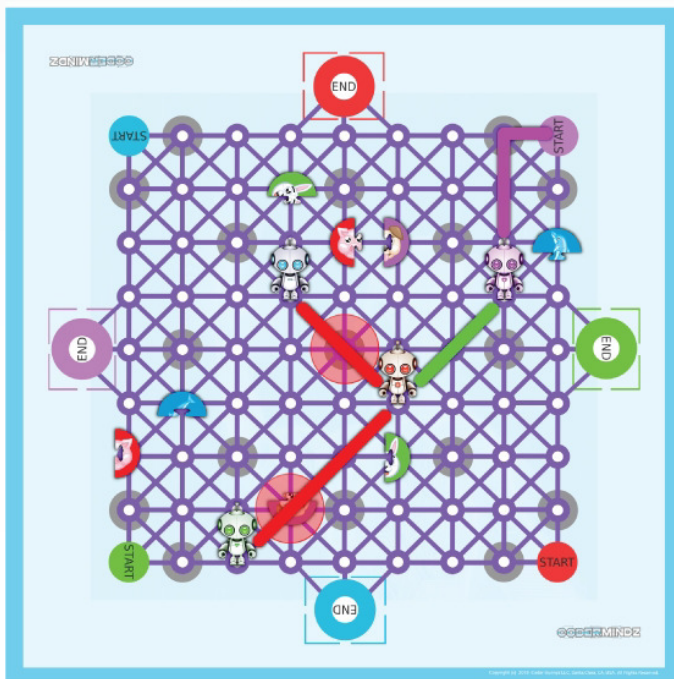
You can use your SHOOT Code card if there is another Bot in your line of sight, with no SAFE or BLOCKED in between. The SHOOT Code card will go into the code pile and the other Bot moves back to their color START. Your Bot doesn't move with SHOOT.

Note: Try to use your Code cards in a way that will form a sequence to let your Bot reach a SAFE circle, help them SHOOT opponents, or moves them towards their end point



3. The next player takes their turn. The next player is always the player seated to the left of the current player. Players play clockwise.

4. Keep taking turns until a player uses the SHOOT Code card and reaches their end point — that player wins! The rest of the players keep playing until all of their Botz have reached their end point.

-  Red Bot SHOOTs Purple Bot
-  Purple Bot goes back to their START point



An example of how the SHOOT Code card works.

-  Red Bot cannot SHOOT Green Bot or Blue Bot
-  Can SHOOT

1) TRAINING

1.1 Basic Training

Place the Basic Code cards in one pile, and set your SHOOT Code card face-up to the right of your card pile.

Roll the die, and draw the number of Code cards as indicated on the die.

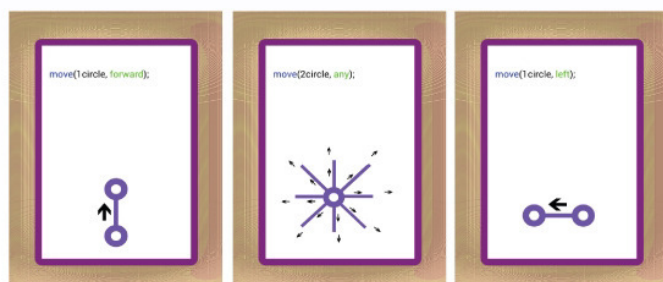
You must use all of the Code cards you drew. If you cannot use a Code card to move your Bot, then you must discard it.

Create a strategy for the best sequence to help your Bot move towards its end point.

You must use your SHOOT Code card at any time before landing on the end point. This level isn't complete until you use it.

Example of How to Strategically Use Code Cards

Lets say you roll a 3 and draw these three Code cards:



Since rearranging the cards and adding SHOOT make the best move, you can use the cards as:



1.2 Advanced Training

Put the Basic Code cards in one pile, and the Advanced Code cards in a second pile. Set the SHOOT Code card face-up to the side.

Roll the die, and draw the number of Code cards as indicated on the die.

You are allowed to draw only one Advanced Code card and Basic Code cards for the rest. If you roll a 1 you can draw either an Advanced Code card or a Basic Code card.

For the Function Code card, create a Function when you first draw it, and reuse that same sequence whenever you draw a Function Code card again. If you cannot move your Bot, then place the current Function Code card in the discard pile. (See Function for more details.)

Again, if you can't use a Code card, you must discard it.

The use of SHOOT Code cards are the same as they are in 1.1.

2) IMAGE RECOGNITION

2.1 Inference

For the Inference level, use only Basic Code cards - no SHOOT Code cards.

Select one image set from Animals, Digits, Edibles, Vehicles. Each player gets one image from that set only (with two pieces).

Each player places the pieces for the player to their right. Place the two pieces strategically so you'll have a better chance to win.

Start the game as in the Training levels, except that there is no SHOOT Code card used. In addition, you will need to collect both of the pieces in order to complete Image Recognition.

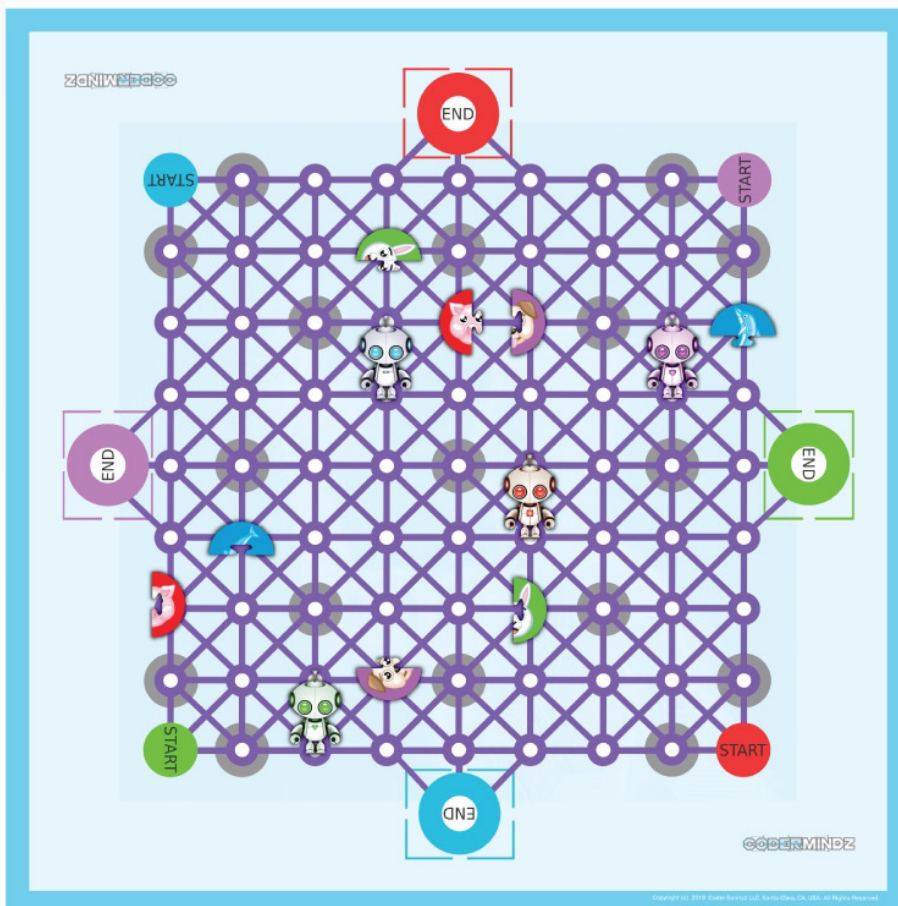
When you collect a piece, put it on your end point. After collecting both pieces, you will need to reach the end point.

Level Up - Advanced Variant : Use both Basic and Advanced Code cards. Everything else is the same as with Basic Code cards.

2.2 Adaptive Learning

The gameplay for this level is just like 2.1, but now you can retrain your Bot and use your SHOOT Code card.

The use of the SHOOT Code card is same as the Training Levels. Also, you can play this level with only Basic or with both Basic and Advanced Code Cards.



Note how the image tokens are placed on the gameboard in this gameplay example.

3) AUTONOMOUS

(see gameplay set-up on page 16)

3.1 Basic

For this level, use only Basic Code cards - no SHOOT Code cards.

Set up the image as in the Image Recognition level 2.1.

Roll the die, and draw the number of Code cards as indicated on the die, and place them face-down (so you can't see the move).

Do not move your Bot.

Keep repeating these actions on your turn, until you think your Bot has captured the images and reached its end point. The game pauses if anyone calls that they have reached the end point.

Now turn over the Code cards to show the Autonomous Code. Execute that code and move your Bot to see if they capture both image pieces and reach their end point.

If they don't, you must debug and fix your code. Put your image pieces back where you picked them up. You lose, and the game continues with the remaining players.

Repeat these steps until someone writes a correct Autonomous Code.

3.2 Advanced

This level is the same as 3.1, only now Advanced Code cards are also used, except for the Function Code cards. Set aside the Function Code cards (with black border) and place the Advanced Code cards pile to the right to Basic Code cards pile.

Set up the image tokens as in the basic level.

Roll the die, and draw the number of Code cards as indicated on the die, drawing at least one Advanced Code card and the rest as Basic Code cards. If you roll a 1, draw either a Basic or Advanced Code card.

Place your selected Code cards face-down (so you can't see the move).

Do not move your Bot.

Continue as in the basic level, until a player writes a correct Autonomous Code.

Special Case: For Conditional Code cards that indicate "the sum of bots (odd)" or "the sum of bot (even)", count only your Bot. You have to know where exactly your Bot is with the current partial code execution. So, if your Bot is on a SAFE circle, then the sum is odd. If your Bot is not on a SAFE circle, then the sum is even.

FAQ

How is the winner decided?

The Bot that reaches its END first is the first winner. The one that reaches second is the second winner, and so on. Every Bot who makes to the END is a winner.

How do I place my Bot at the beginning of the game?

The Bot is placed on its START with the Bot picture facing its END.

How do I decide which direction is my Bot's left, right and forward?

Once you have placed your Bot at its START, facing towards its color END, your left, right and forward are your Bot's left, right and forward. Since your Bot is always facing its END, your left, right and forward directions should remain the same throughout the game. Each player's left, right and forward will be different from the others.

How do I use the SHOOT Code card?

You can add the SHOOT Code card to the Code cards you draw, if you can SHOOT another Bot.

For example, you draw 3 Code cards. After using 2 Code cards, you are in position to SHOOT another Bot. So, you pick up your SHOOT Code card, use it, and then use your 3rd Code card.

Is it compulsory to use the SHOOT Code card in the levels where we can use them?

Yes, you must use the SHOOT Code card in the levels in which they are used. Otherwise, reaching the END is not valid.

What do I do when I pick an image?

You land on the image tokens, pick them up, and put them on your colored END.

Is it compulsory to collect your images in the Inference level?

Yes, you must collect your color images. Otherwise, reaching the END is not valid.

What happens if my Bot is blocked in all directions?

If your Bot cannot move, you need to skip your turn and discard your Code card(s).

Can I collect any of the color images?

No, you can only collect the images that are the same color as your Bot.

What do I do if I reach the END but still have Code cards left over from the last draw?

You can discard those cards.

Do I always have to use my Code cards?

Yes, you must. If you cannot use a card, then discard it. However, in the Autonomous level, you have the option to discard Code cards you don't want to use.

My 'while' Code card or 'if' Code card is not allowing me to move anywhere. What do I do?

If you absolutely cannot move, you must discard those card(s).

When I get a Function Code card for the first time, what do I do?

Draw 3 additional Basic Code cards and make a Function. The next time you draw a Function Code card, you can use that Function you made. Refer to page 14 (Function) for more details.

Do START and END count as SAFE (specifically for when “counting bots on SAFE”)?

No, only Bots on the grey circles are counted as SAFE.

Do I count my Bot when “counting bots on SAFE”?

Yes, you count all the Bots in play, including yours.

Does SHOOTing another Bot that is on its START count as a SHOOT?

Yes, it counts as a SHOOT. Since the Bot is already on its START, it remains there.

Do I have to use the Code cards in the sequence that they are drawn?

No. Once you draw your Code cards you should strategically rearrange them in a way that gives you the best results for your gameplay.

Can I go onto someone else’s START or END point?

No, you cannot go onto someone else’s START or END.

Can I jump over another Bot or an image token that’s not mine?

No, you cannot do that, because there is no Code card that allows you to do that.

Can I break the “Move Any 2” Code card to move 1 time, use SHOOT (if possible), and move 1 again?

No. SHOOT can only be used after you completely finish using “Move Any 2” or any other Code cards.

Can I draw more than 1 Advanced Code card on my turn?

No, you cannot. You can only draw 1.

My Code Card says “keep going left”, but I am at the edge. What do I do?

If you cannot move, you don't move. You just stop there. The same applies for instances where you cannot go right or forward due to being at the edge of the board.

Can image tokens be placed on SAFE circles?

Yes, they can be placed anywhere, except on the START and END points.

What if I run out of Code cards?

In the unlikely event that you run out of Code cards, shuffle and reuse the Code cards in your code and discard piles.

In the Autonomous level, I forgot where I am. What do I do?

If you forget where you are, just make your best guess and make your move.

Can I use my SHOOT Code card more than once in a game?

No. Once you use your SHOOT Code card once, it goes into your code pile. You cannot use it again.

Can a Bot be shot more than once?

Yes. Technically, you can be shot by one Bot, be sent to your START, then get shot and sent back to START again. Each time you are shot, you are sent back to your START.

What if everyone else has reached their END, and I haven't used my SHOOT Code card yet?

You cannot do much now. You are out of game at this point, and thus the game is over.

Can I SHOOT from a SAFE circle or my START point?

Yes, you can SHOOT from a SAFE circle or your START point.

What if I run out of Advanced (Conditional, Loop, or Function) Code cards?

In this case you can always use your Basic Code cards to continue the game.

Can I use Function Code cards in the Autonomous levels?

No, those are not used in this level and must be set aside.

Can 1 player make more than 1 Function in a single round?

No, there is only 1 Function per game, although each player can make a different Function. You can only use your Function, though.

So, can you explain again how we are learning AI concepts with this game?

Valid question. AI, or Artificial Intelligence, is an emerging field. The "intelligence" in machines is programmed by "training". Once trained, the machines can "infer" and start behaving "autonomously". Training involves back-propagation, which is retraining or fine tuning.

Using Bots and Code cards, this game sneakily introduces all those concepts which form the foundation of today's AI world. Learning coding and AI concepts helps you connect with real coding and AI.





CODERMINDZ

CODING GAME FOR AI LEARNERS

CONCEPTS YOU WILL LEARN WHEN PLAYING THIS GAME:

Training - learning by practicing

Back Propagation - learning by error

Inference - conclusion based on data and previous training

Adaptive Learning - fine tuning, learning on the go

Autonomous - being capable of doing something by oneself with training



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