

AI Learning Speed Study - Detailed Simple Report

⇒ How I Set Up the Experiment

The students (AI Players)

We created 8 different AI students to test:

- 4 AI players that play as X (go first)
- 4 AI players that play as O (go second)

The Teachers

Each AI student learned from a smart teacher that:

- Plays perfectly 90% of the time
- Makes small mistakes 10% of the time
- This gives students a challenge but lets them sometimes win

⇒ The Learning Speeds I Tested

1. Super Slow (0.01) - Like studying 1 page per day
2. Normal Speed (0.3) - Like studying 1 chapter per day
3. Fast (0.7) - Like studying 3 chapters per day
4. Super-Fast (0.99) - Like trying to read the whole book in one day

⇒ The Training Process

How Much Training Each AI Got

- 10,000 practice games against the smart teacher
- Every 10 practice games, we tested how well they learned
- Testing = Playing 100 games against random (bad) players
- Goal = Beat random players as much as possible

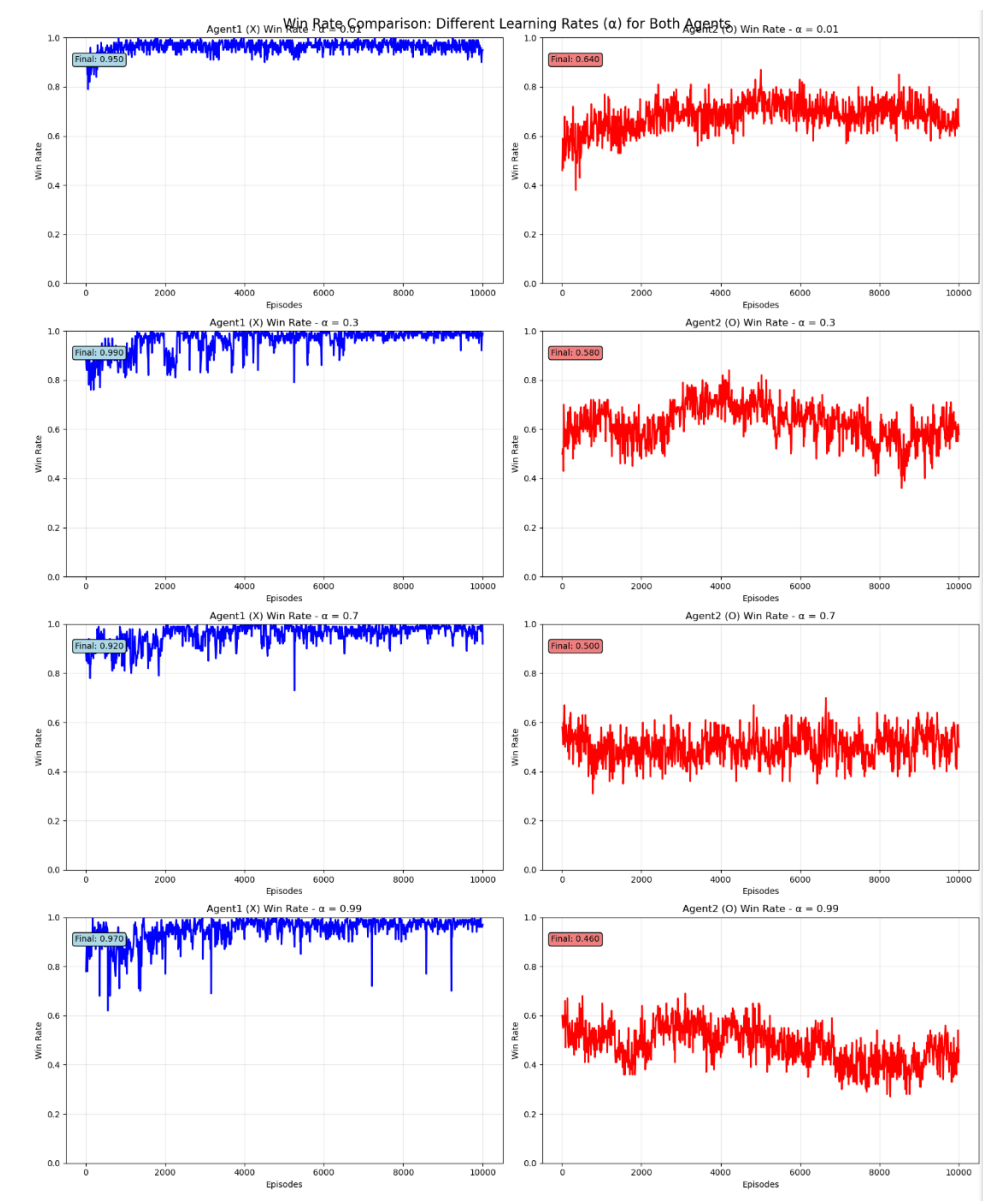
⇒ What I Measured

After all the training, I looked at:

Win Rate = How often they beat random players

Higher win rate = Better learning

The Results (What Happened)



Learning Speed	X Player (Goes First)	O Player (Goes Second)
Super Slow (0.01)	95% wins	64% wins 🏰
Normal (0.3)	99% wins 🏰	58% wins
Fast (0.7)	92% wins	50% wins
Super-Fast (0.99)	97% wins	46% wins

⇒ What These Numbers Mean:

X Players (Go First)

- Best: Normal speed (99% wins) - Almost perfect!
- Good: Super slow (95%) and Super-fast (97%)
- Worst: Fast speed (92%) - Still pretty good though

O Players (Go Second)

- Best: Super slow (64% wins) - Much harder for O players!
- Gets worse as learning speed increases
- Worst: Super-fast (46% wins) - Barely better than flipping a coin.

⇒ Why X Players Like Normal Speed Learning

X Players Have Advantages:

- Strategic Advantage: Controls game initiation
- Error Tolerance: Can recover from suboptimal moves
- Learning Complexity: Moderate (offensive patterns)

Normal Speed Works Because:

- Fast enough to learn good attacking moves
- Not so fast that they forget what works

⇒ Why O Players Need Slow Learning

O Players Have Challenges:




- Strategic Disadvantage: Must react to opponent
- Error Sensitivity: Limited recovery options
- Learning Complexity: High (defensive patterns)



Slow Speed Works Because:

- They have time to learn each defensive trick carefully

⇒ What Happens with Different Speeds?

1. Super Slow Learning (0.01)

-  Good: Remembers every lesson well
-  Good: Makes steady, reliable progress
-  Problem: Takes forever to learn everything

- Best for: Defensive O players who need to be careful
2. Normal Speed Learning (0.3)
-  Good: Learns quickly but not too quickly
 -  Good: Perfect balance of speed and memory
 -  Good: Doesn't forget old lessons while learning new ones
 - Best for: Attacking X players
3. Fast Learning (0.7)
-  Problem: Starts forgetting old lessons while learning new ones
 -  Problem: Gets confused between different strategies
 - Not great for: Either player type
4. Super-Fast Learning (0.99)
-  Bad: Learns and forgets things constantly
 -  Bad: Very unstable performance
 - Bad for: Both player types

⇒ The Big Discoveries

1. Position Matters More Than We Thought

- Going first vs going second = Completely different learning needs
- X players can handle faster learning because they control the game
- O players need slower learning because defense is complicated

2. Faster Isn't Always Better

- Medium speed often beats fast speed
- Very fast speed is almost always bad
- Like the story of the tortoise and the hare!

3. There's a Sweet Spot

- Too slow = Takes forever to get good
- Too fast = Forgets everything quickly
- Just right = Learns well and remembers