

# Quoridor: The Route to the Finish Line

By Chelsea Dowell and Allison Tolbert

## The Board

- ▶ 9x9 Board
- ▶ 2 to 4 Pawns
- ▶ 20 Fences

- ▶ Each player places his pawn in the center of his base line to begin the game.



## Background

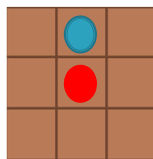
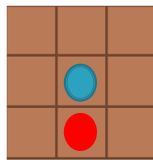
- ▶ The goal is to be the first player to reach the opposite side of the board.
- ▶ Your opponents are putting up fences to block your chances and slow you down.

## The Rules

- ▶ Each player in turn chooses to move his pawn or put up one of his fences.
- ▶ Pawns move 1 square at a time (front-back or left-right).
- ▶ Fence placements must allow at least one access route to the finish line for each pawn.
- ▶ Jumping occurs when 2 pawns are face-to-face:
  - 1) pawn may jump his opponent to land directly behind him
  - 2) pawn may jump his opponent diagonally left or right if there is a fence obstructing his movement forward.
- ▶ A player wins by reaching his finish line first.

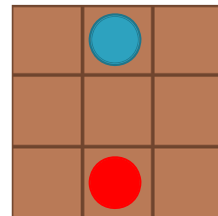
## The Rules

- ▶ Pawns
- ▶ Fences
- ▶ Jumping
- ▶ Winner



## 3x3 Game

- ▶ Before studying the complex strategies of the 9x9 game, we begin with the simplified 3x3 game with only two players.

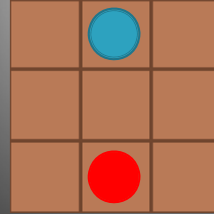


### Proposed Game Strategy

- ▶ Let there be two players, Player A and Player B, that move sequentially respectively and always move in their own best interest in order to win. Player B will always win if he applies the following strategies:
  - a. If Player A moves his pawn, then Player B should move along the shortest path to the finish line.
  - b. If Player A places a fence, then Player B should mirror Player A's fence placement.

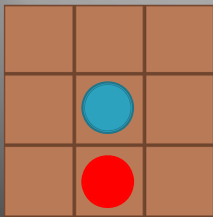
### Straight Forward

Blue is Player A and is moving downward.

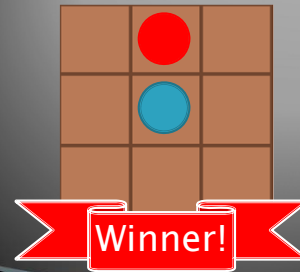


Red is Player B and is moving upward.

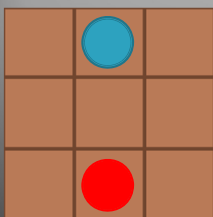
### Straight Forward



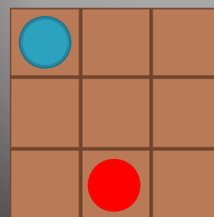
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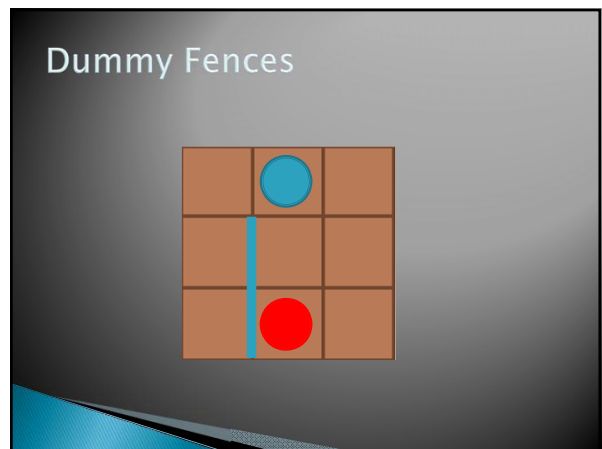
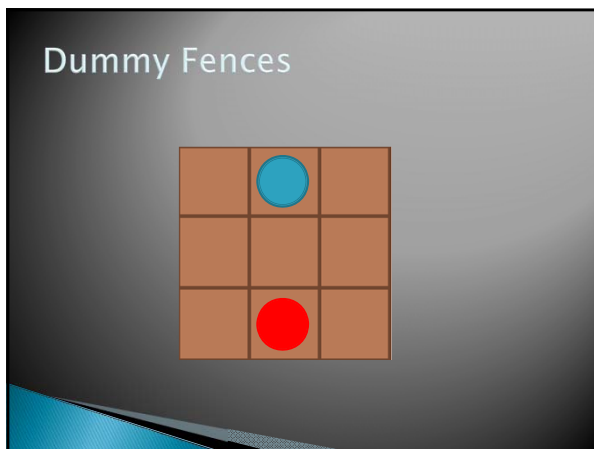
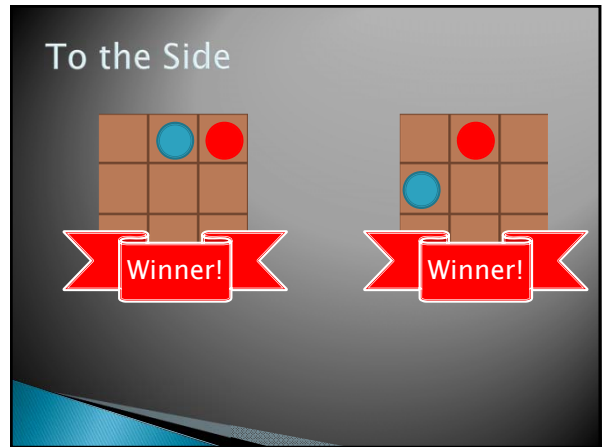
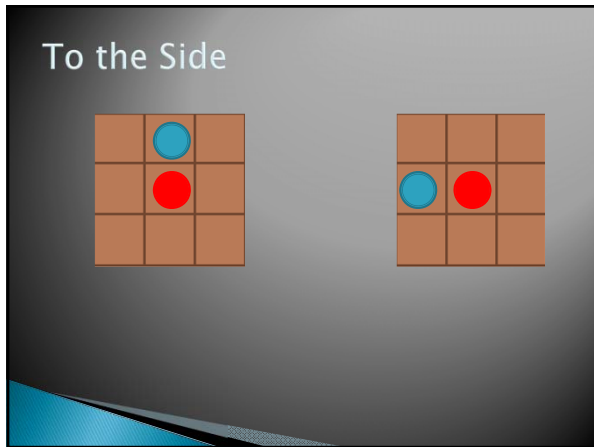
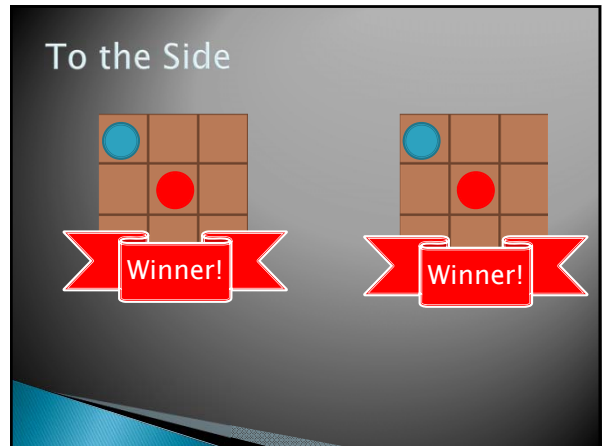
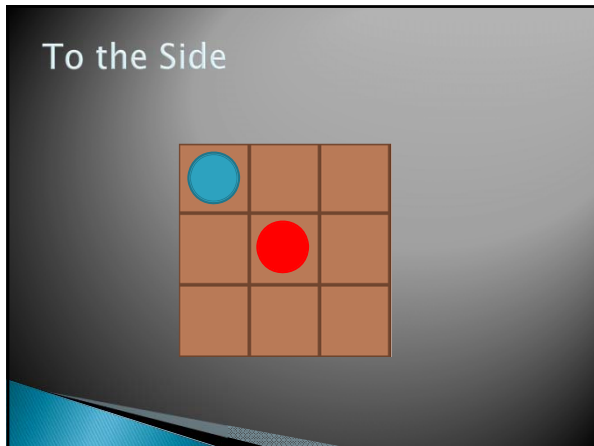


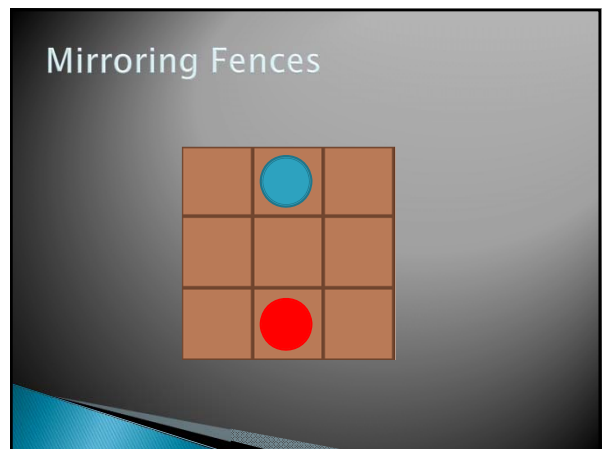
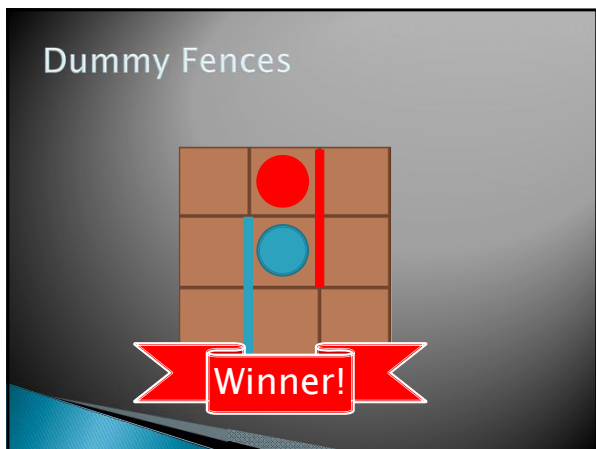
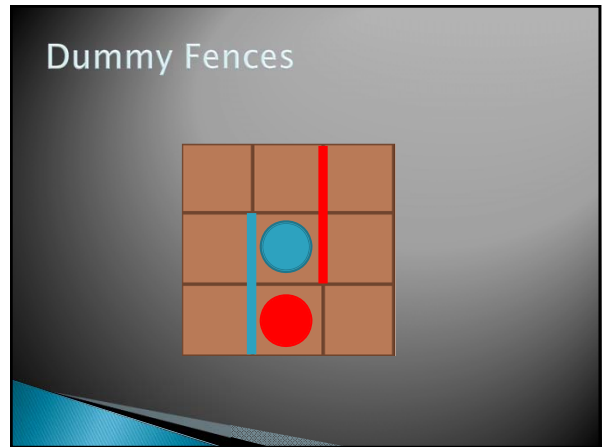
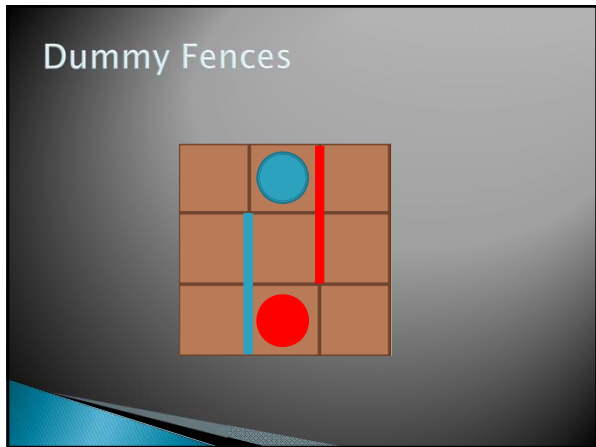
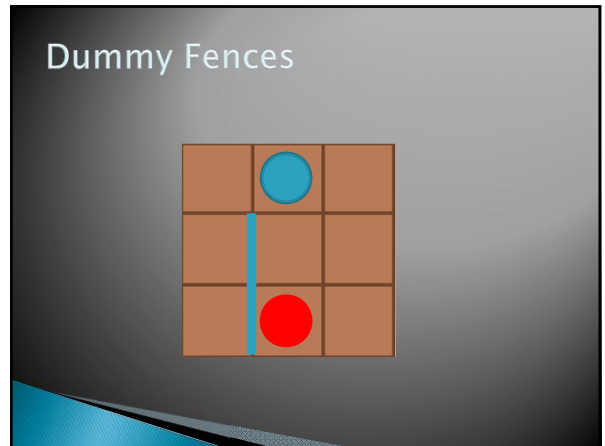
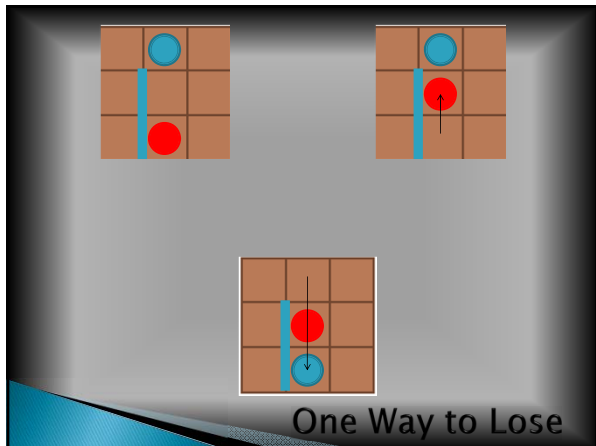
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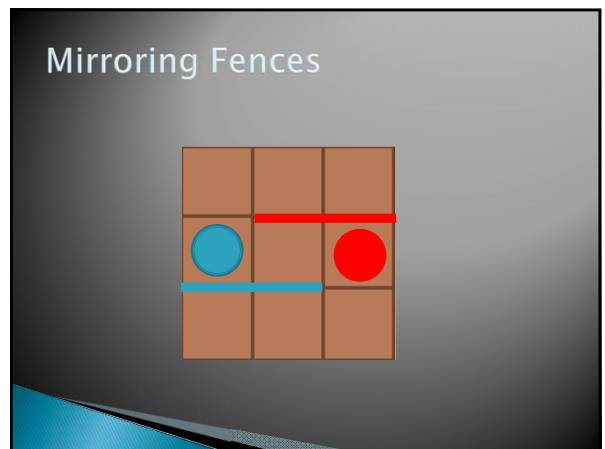
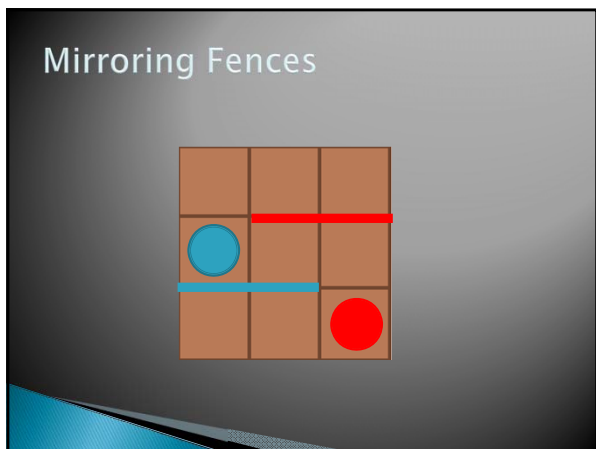
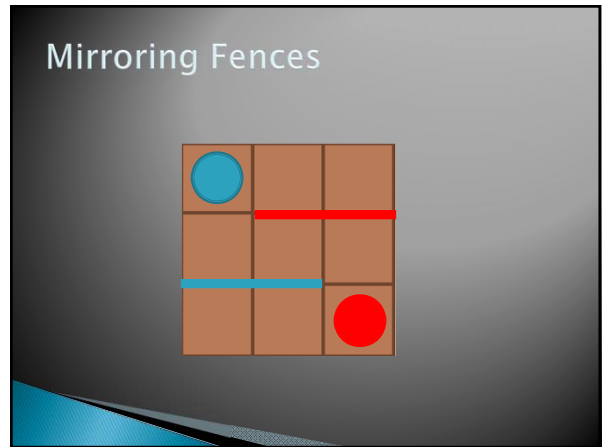
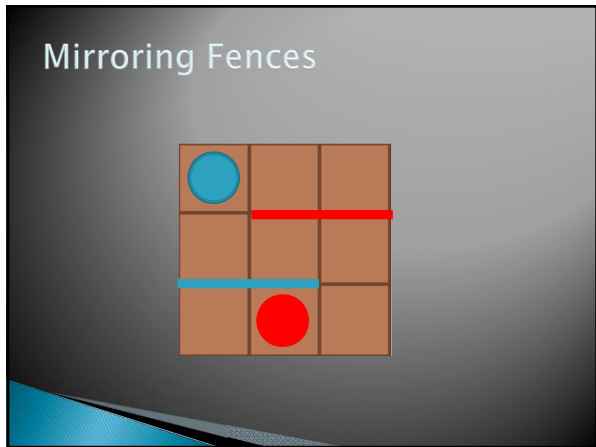
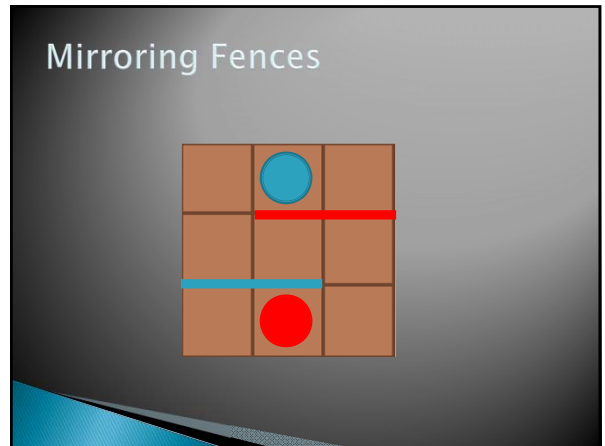
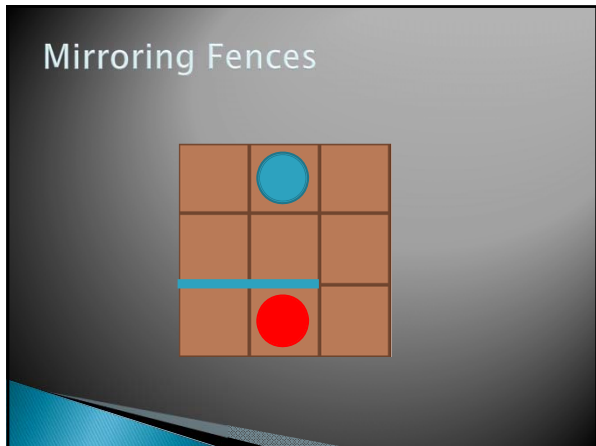


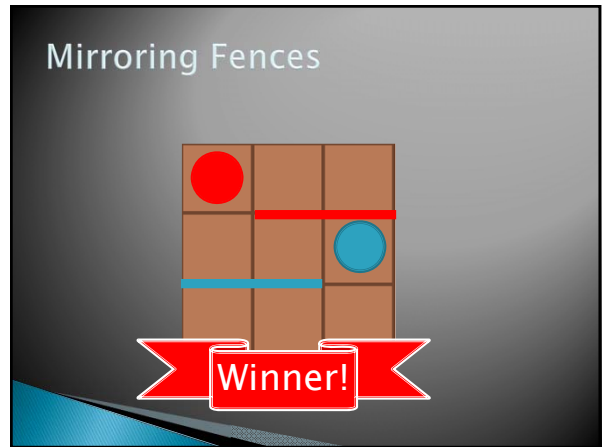
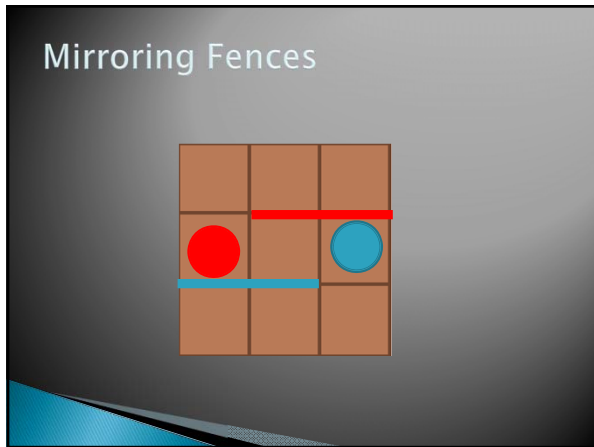
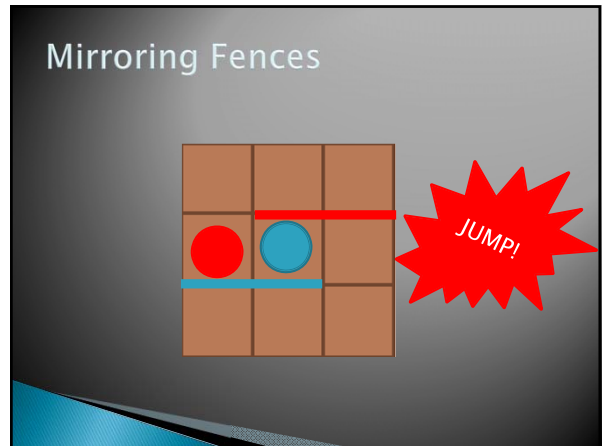
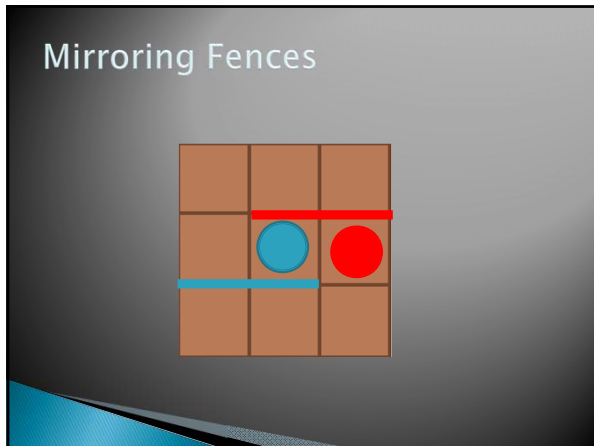
### To the Side











### Terminology

- ▶ Distance between pawns
- ▶ Distance to finish line

Distance Between = 1      Distance Between = 2      Distance to Finish = 2

### Proof

- ▶ Let there be two players, Player A and Player B,
- ▶ ... that move sequentially respectively
- ▶ ... and always move in their own best interest in order to win.

## Establishing the Base Case

- ▶ Let the number of spaces between each player and their finish lines be equal.
- ▶ Let the number of possible spaces between the players be 1.
- ▶ Then Player A will move into that space and Player B will jump him.
- ▶ This makes the distance between Player B and his finish line 1 less than the distance between Player A and his finish line.
- ▶ Thus Player B wins. ★

## Case One: Shortest Distance

- ▶ If Player A moves his pawn, then he has either:
  - a. Shortened the distance between the two by 1 space or...
  - b. Lengthened the distance between the two by 1 space.
- ▶ In each case, the distance between the two has changed from odd to even.

- ▶ Therefore Player B has the opportunity to either:
  - a. Gain the jump or ...
  - b. Move closer to the finish line if the jump is not an option.
- ▶ In each case, the distance between Player B and his finish line is 1 less than that of his opponent's.
- ▶ Thus Player B wins. ★

## Case Two: Mirroring Fences

- ▶ If Player A places fence, he has abstained from moving his pawn a space.
- ▶ Therefore he has not changed the number of spaces between the two from odd to even.

- ▶ If Player B moves his pawn a space, the two have switched roles and Player A will gain the jump.
- ▶ If Player B places another fence in the mirror image of his opponent's, then the number of spaces between the two remains odd and the distance to the finish lines remains equal.
- ▶ Player A has no more room to place a fence legally, so he must move his pawn making the spacing even.
- ▶ Thus Player B gains the jump and wins. ★

★★★ End of Proof ★★★

- ▶ We have shown that in every case Player B wins using our proposed game strategy. ★

## Future Research

- ▶ We have begun research on possible game strategy applications for the 5x5 board game.
- ▶ We hope to apply our current research to a universal game strategy for the 9x9 board game.

## Works Cited

*Quoridor Family Game*. Games Lore Limited, 2010. JPEG File. 18 Nov. 2010  
<<http://www.gameslore.com/acatalog/CSPQRDSM.jpg>>.

## Acknowledgements

- ▶ We would like to give a special thank you to Dr. Spivey for mentoring us through this entire process and allowing us the opportunity to conduct these studies.