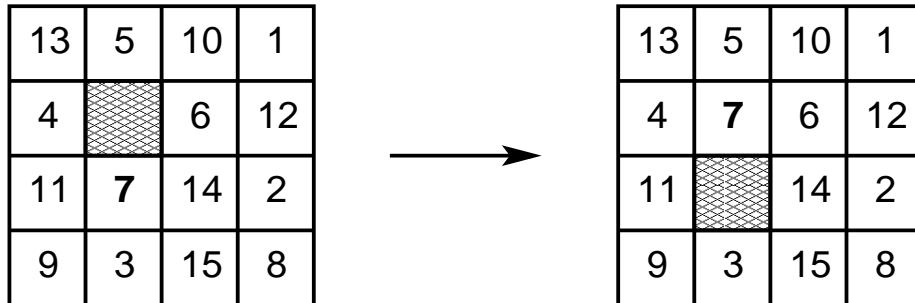
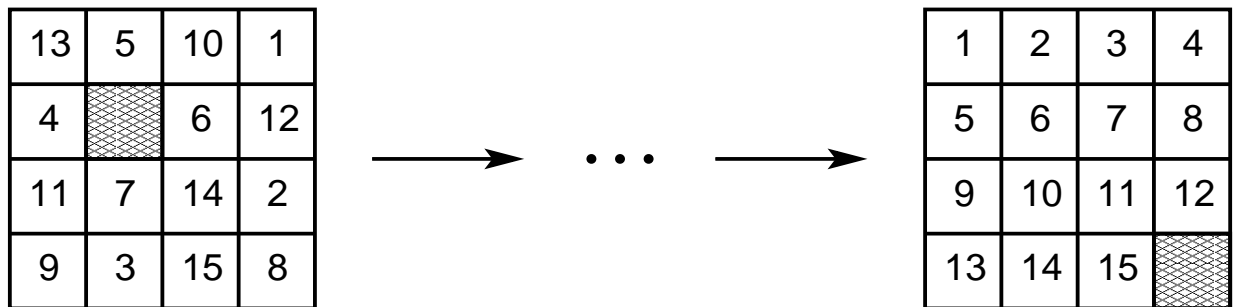


The Notorious 15-Puzzle

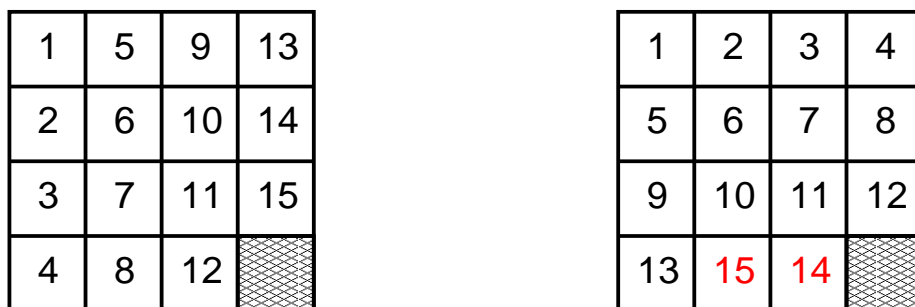
What you need: A puzzle in the form of a 4×4 grid with fifteen little numbered tiles that can slide around. (Available at toy stores, or as a Java applet, e.g., at <http://www.javaonthebrain.com/java/puzz15/>.)



How to play: Slide the tiles around. You win if you can get them all in order, with the empty square at the bottom right:



Once you've solved the puzzle, can you swap the rows and columns? Or just switch two of the tiles?



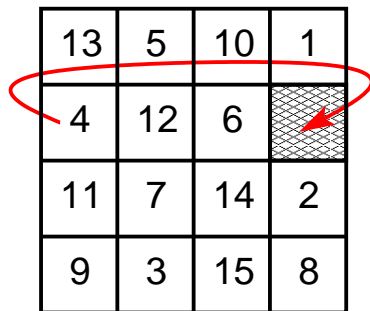
Research Questions

Strategy and Structure

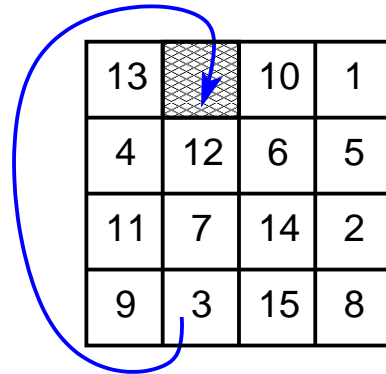
- How many possible starting positions are there?
- Is it always possible to win the game?
- If not, then when is it possible?
- On average, how many moves does it take to win?

Variants

- What happens if you change the size of the game board? (3×3 , 5×5 , 3×5 , 2×2 , 2×5 , ...)
- What happens if you change the shape of the game board?
 - *Cylinder*: you can move tiles between the left- and right-hand columns.
 - *Torus*: you can move tiles between the left- and right-hand columns, and between the top and bottom rows.



13	5	10	1
4	12	6	
11	7	14	2
9	3	15	8



13		10	1
4	12	6	5
11	7	14	2
9	3	15	8

- Are there other interesting game boards?

Related Puzzles

- How is the 15-puzzle like Rubik's Cube?