Looper

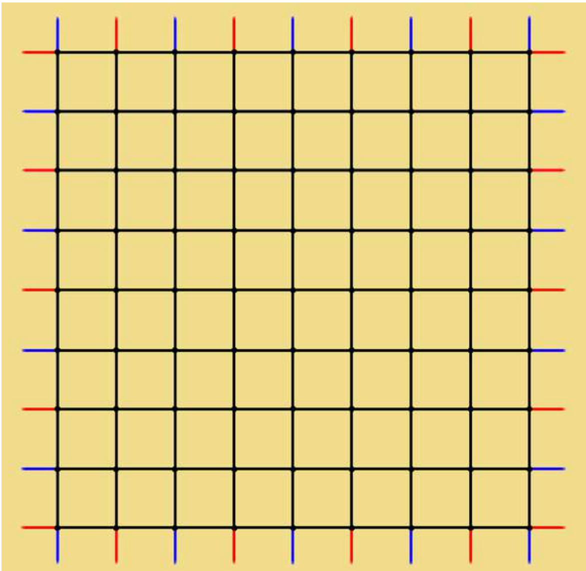
Basic idea:

Looper is a connection game that is played on a toroidal board represented by a square grid. Only orthogonally adjacent cells count as adjacent. (Thus, there are no diagonal connections.)

On each turn, a player places 1,2 or 3 black stones on any vacant intersection. Alternatively, on his/her turn, instead of playing a stone a player may announce "take", after which the opponent continues placement with white stones and the taker with black stones, alternately playing single stones onto empty intersections.

Black wins by making a global loop. White wins by preventing this. A global loop is a string of connected stones that circles the torus (either horizontally, vertically, or both horizontally and vertically) and connects back to itself.

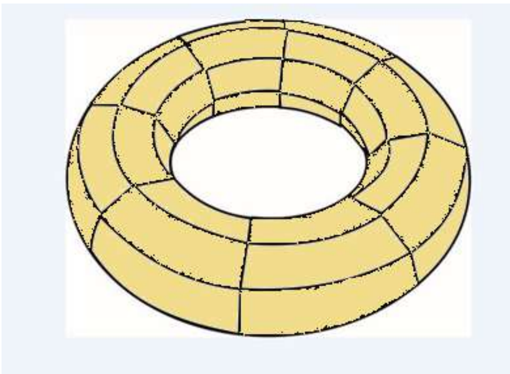
The Looper board:



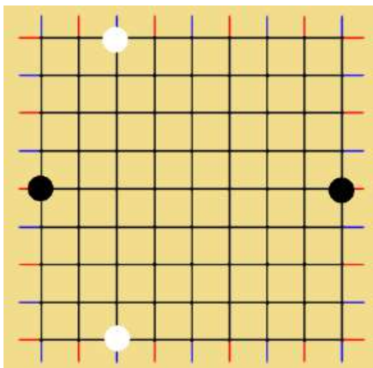
A looper board is a 2D representation of a 3D torus. Points (i.e. intersections) on the top row are adjacent to corresponding points on the bottom row, and points on the leftmost column are adjacent to corresponding points on the rightmost column.

The blue and red lines help players keep track of these adjacencies. For instance, a stone on the top row with a red line emerging vertically from it is adjacent to a stone on the bottom row that occupies the corresponding point with a red line emerging from it. In other words, you should imagine that the colored line “wraps around” to connect with its counterpart on the opposite side of the board.

This sort of adjacency makes the 2D grid functionally equivalent to a 3D torus. This fact can be appreciated by imagining the grid rolled up top-to-bottom much like a child’s paper toy telescope. Then imagine bending the two ends of the telescope together to make a doughnut (i.e. torus) shape.



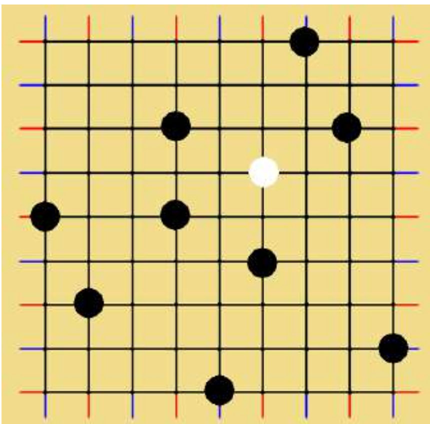
A 3D Looper board



On this board, the two black stones are adjacent, and the two white stones are adjacent.

Game Play in Detail

Game play takes place in two distinct phases, the "chicken ballot" phase and the head-to-head phase. In the chicken ballot phase, both players play black stones to the grid. On their turn a player can choose to play 1, 2, or 3 black stones. When a player judges that there are sufficient black stones on the board to give Black a good chance of winning, that player says "Take" instead of playing any black stones to the board. This signifies that that player will play the side of black for the rest of the game, and the opponent will play the side of white.



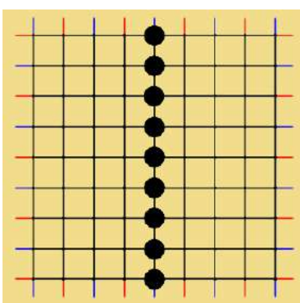
An example of a board after the shout of "Take" and the first placement by White

After the shout of "Take," the head-to-head phase begins. The opponent starts by playing a *single* white stone to any empty point. The taker follows by playing a *single* black stone to any empty point. Play alternates in this fashion, with single stones being played on a turn, until the game is won by a player.

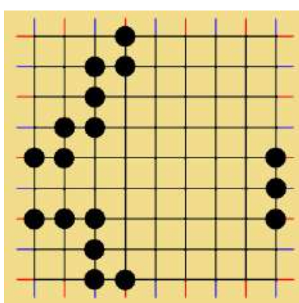
Black wins by creating a "global loop" and White wins by preventing Black from creating a global loop. As noted earlier, a global loop is a string of connected stones that circles the torus (either horizontally, vertically, or both horizontally and vertically) and connects back to itself.

Global Loops

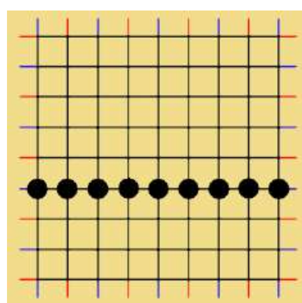
There are four distinct types of global loops: vertical, horizontal, rising spiral, and falling spiral.



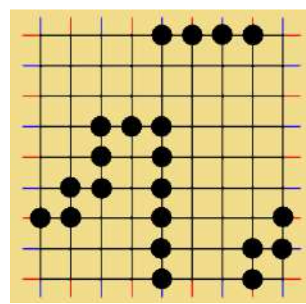
Vertical Loop



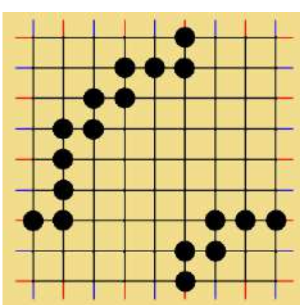
Vertical Loop



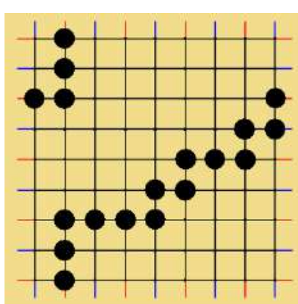
Horizontal Loop



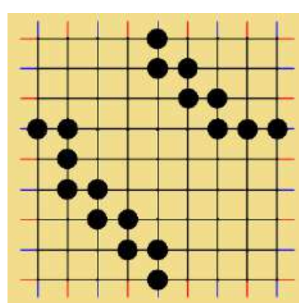
Horizontal Loop



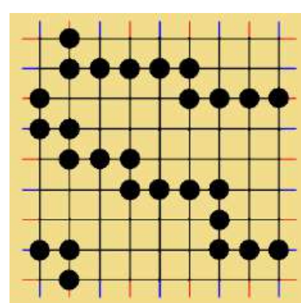
Rising Spiral



Rising Spiral



Falling Spiral

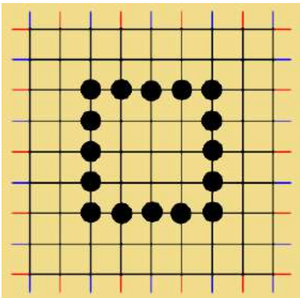
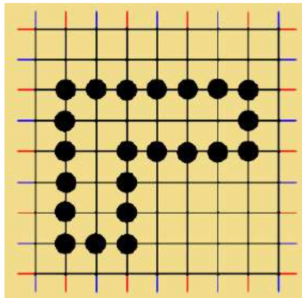
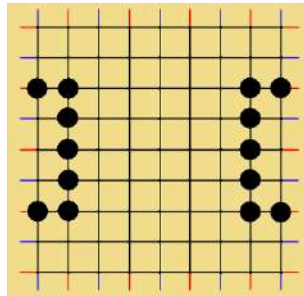
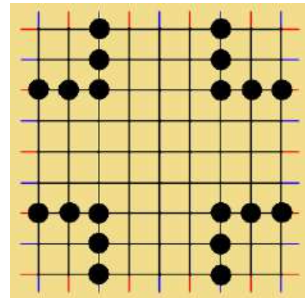


Falling Spiral

Non-winning Loops

Note that loops that do not circle the torus are not winning loops. These are known as "contractible loops" since it is theoretically possible to shrink them down in size until they disappear. By contrast, global loops cannot shrink down to nothing since the physical torus-shaped board limits their ability to shrink.

Below are examples of contractible loops:

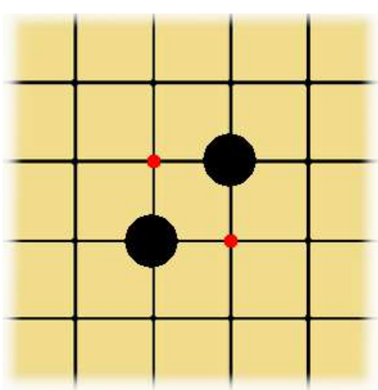
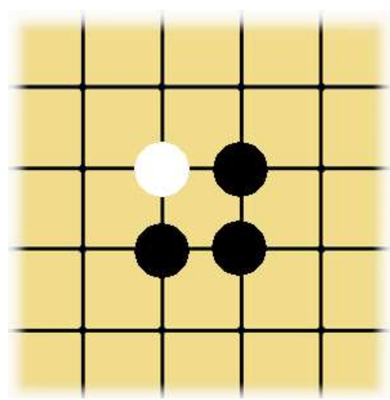
(For a formal definition of *global loop* versus *contractible loop*, see the appendix to these rules.)

Black Tactics

Key to tactics in Looper is the notion of an "indirect connection." These are shapes of black stones that, while not yet orthogonally connected, are such that they can become orthogonally connected no matter what stones White plays on their turn. Below are two examples.

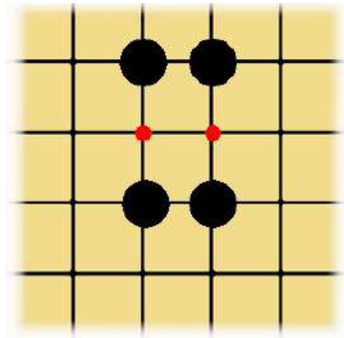
"The Open Diagonal"

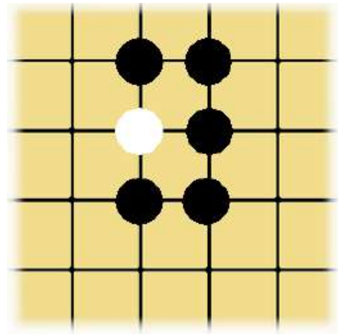
Diagonally opposite stones are not connected, but so long as both intersections in the cross-diagonal are open (i.e. the red dots in the diagram below), then the black stones can connect. If White plays in one of the cross-diagonal intersections, then Black simply plays in the other.

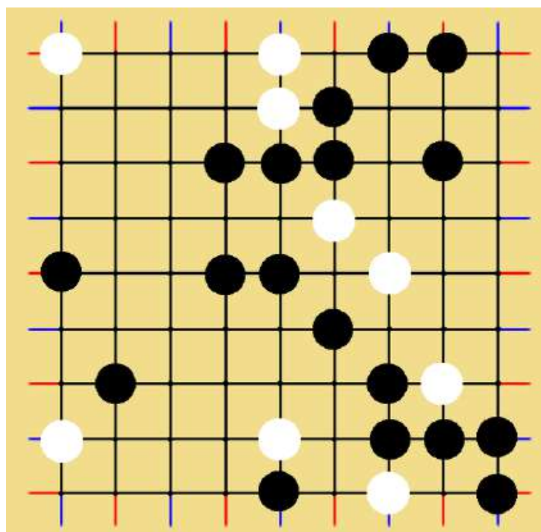
"The Bamboo Joint"

Two lines of orthogonally adjacent stones are connected if there is a line of empty intersections between them (i.e. the red dots in the diagram below). In case of a threat from White, Black connects by playing at the interior intersection at which White does not play.

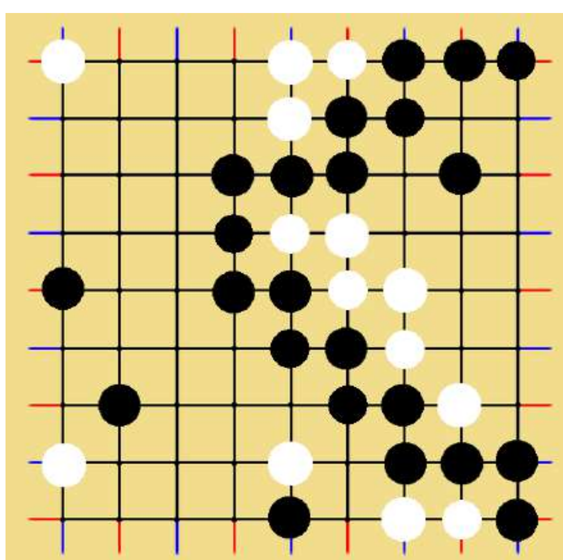




In the game board below, owing to indirect connections, Black is guaranteed a win via a vertical global loop. (Note that this win results from the same board in the "take" example above.) The most difficult indirect connection to see is the one that crosses the upper/lower board seam. The stone in the upper right (on the red indicator line) and the stone on the lower right (on the blue indicator line) together form an open diagonal.



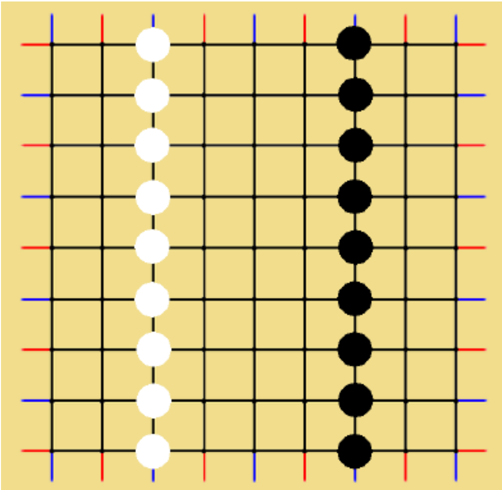
Here is the same board in which a white stone that threatens to cut each indirect connection has in each case been answered by a black stone, so that now the winning black loop is solidly connected:

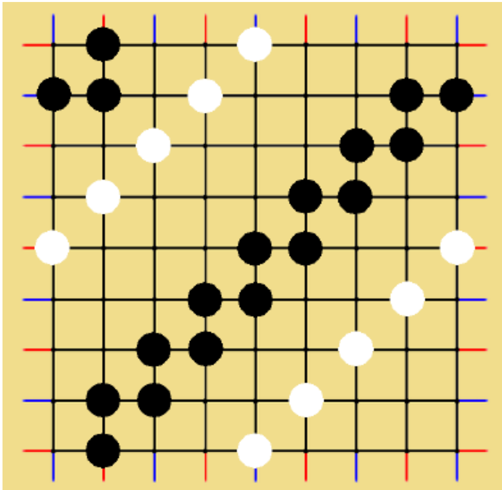


White tactics

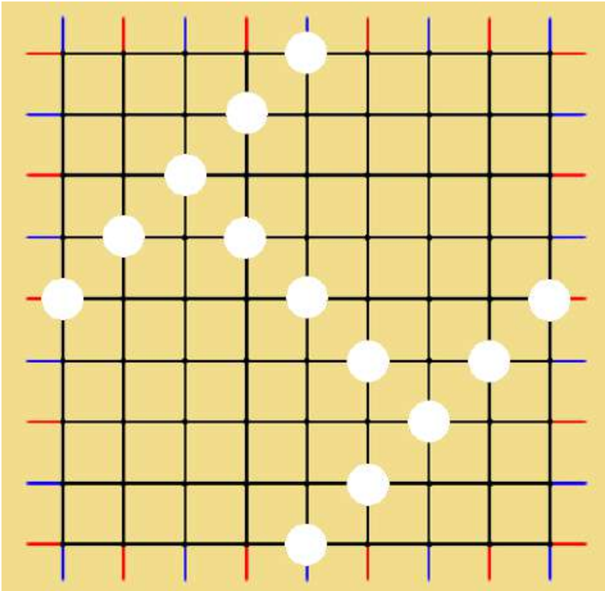
White's goal is to prevent Black from making a global loop. By way of conceptualizing a victory, White may find it useful to imagine that the board in fact has 8-way connectivity (i.e. orthogonal and diagonal adjacency). Then White will win if on such a board White makes simultaneous global loops of any *two* of the four possible loop types (vertical, horizontal, rising spiral, falling spiral).

Making one global loop using white stones is not enough, since a white loop of type X still permits a type X win for Black, as in the examples below with a vertical loop and a rising spiral loop:





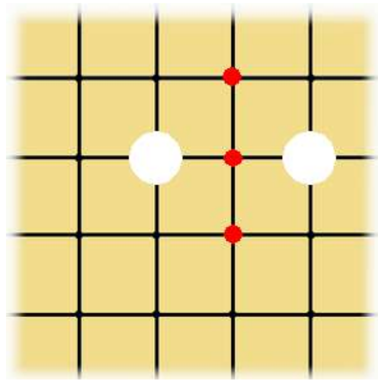
However, if White makes *both* loops simultaneously, then Black cannot making a winning loop:



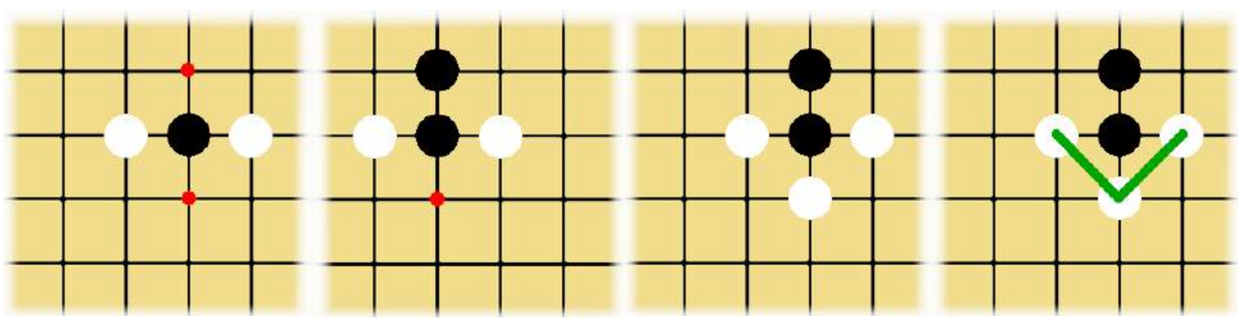
Thus described, White's task might seem much harder than Black's task, since Black's task requires that only one global loop be constructed. However, the fact that White can in essence conceptualize the board as possessing 8-way connectivity for white stones gives White great tactical flexibility. For instance, White has all the types of indirect connections that Black has, plus a number of new and more powerful types of indirect connections. Some examples follow.

“The One Point Leap”

White can jump a point so long as any TWO of the three intermediate intersections are empty.

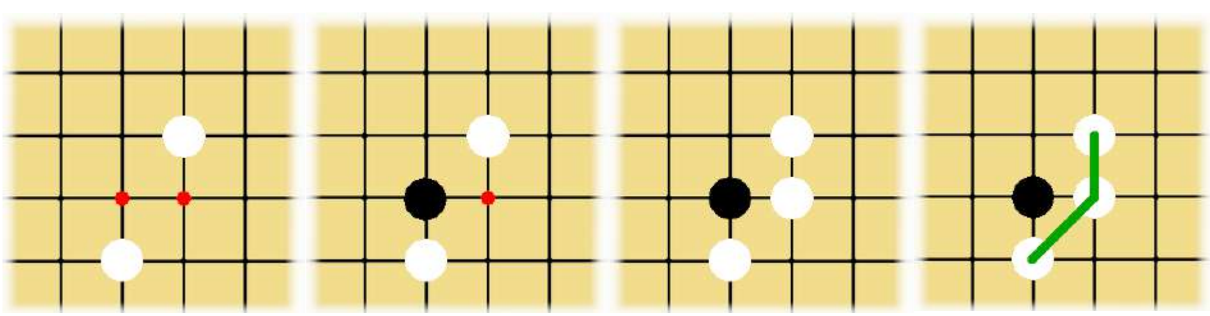


Below is an example with only two of the three intermediate intersections open initially. This is still an indirect connection for White, since if Black plays at one of the two open intersections, then White simply plays at the remaining intersection.

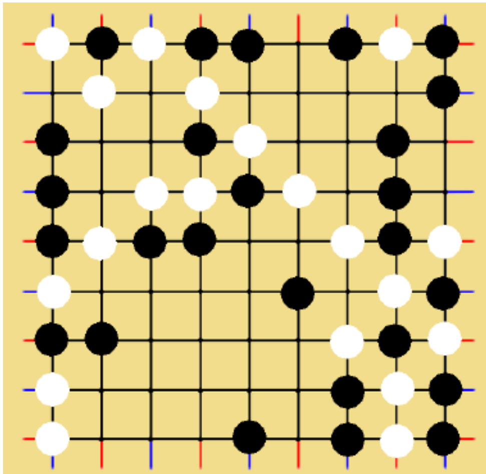


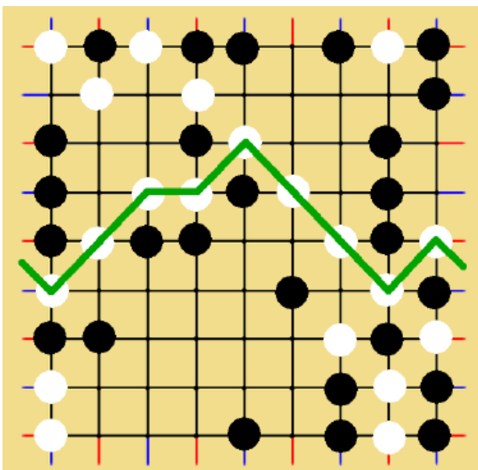
“The Knight’s Move”

White stones that are a “knight’s move” apart are indirectly connected if the two intervening intersections are open. If Black plays at one of these intersections, then White plays at the other.

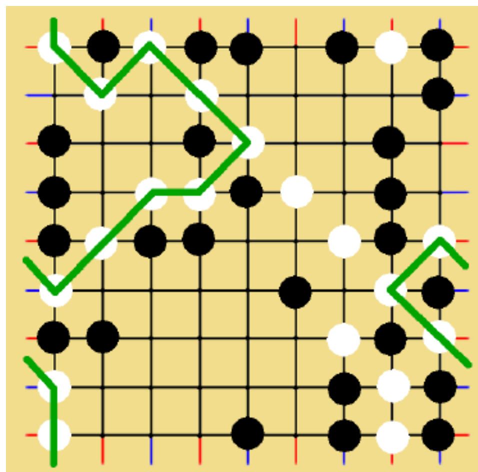


Below is an example of a White victory. (This is an extension of the same board as the "take" example earlier.) White has constructed (visualizing the board as possessing 8-way connectivity for White) a simultaneous horizontal loop and vertical loop, thereby denying Black any hope of a winning loop.



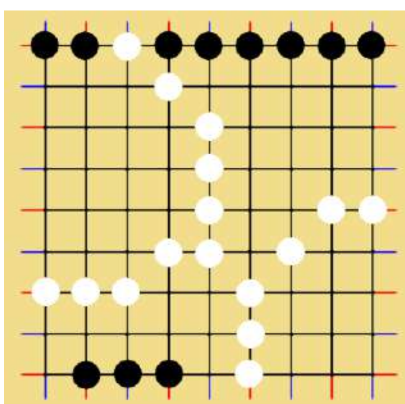


The horizontal loop marked



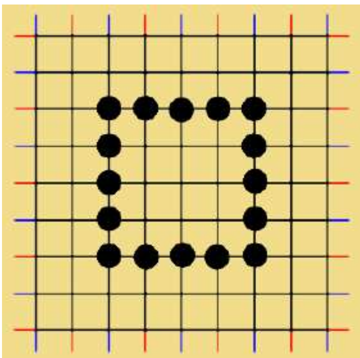
The vertical loop marked

Note that it is *not* enough for White just to connect the four 2D sides of the Looper board. For instance, in the board below White has connected all four 2D sides (imagining the board as 8-way connective), but Black has still made a winning horizontal loop (orthogonally connected).

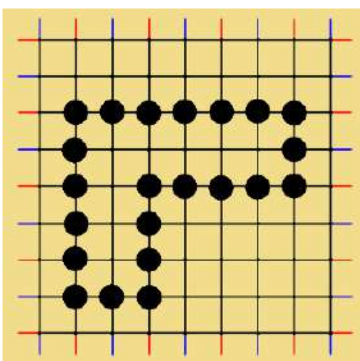


APPENDIX: Global versus Contractible Loops

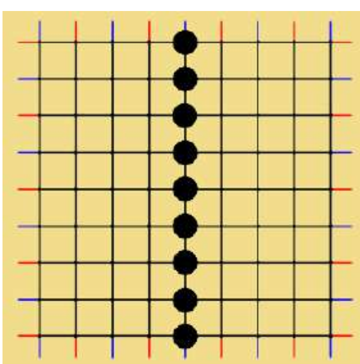
The difference between a global loop and a contractible loop is easy to spot in practice, but tricky to define formally. Key to defining these loops is the idea of traveling from stone to adjacent stone and returning to the starting stone. This is possible in both global loops and contractible loops, of course. In a contractible loops, in a trip around the loop, the number of north steps will always equal the number of south steps, and the number of east steps will always equal the number of west steps. By contrast, in a global loop, one of these pairs (north/south, east/west) will have a different number of steps.



One travels around this contractible loop, starting from the northwest corner, by moving 4 steps east, then 4 steps south, then 4 steps west, then 4 steps north. Thus the number of steps in each direction is the same.



A trip around this contractible loop requires in total 6 steps east, 6 steps west, 5 steps south, 5 steps north. Thus the number of west steps equals the number of east steps, and the number of north steps equals the number of south steps.



Traveling around this global loop requires that one only move 9 steps north and 0 steps south, or 9 steps south and 0 steps north. In either case the number north / south steps is not equal.

On the next page, formal definitions of each type of loop are offered.

Formal Definitions:

- A set of stones forms a *contractible loop* if and only if that set (or a subset of it) is such that the following is true: starting from one of the stones, one can move from adjacent stone to adjacent stone and return to the starting stone, in a way that makes the number of eastward steps equal to the number of westward steps *and* the number of northward steps equal to the number of southward steps.

- A set of stones forms a *global loop* if and only if that set (or a subset of it) is such that the following is true: starting from one of the stones, one can move from adjacent stone to adjacent stone and return to the starting stone, in a way that makes *either* the number of eastward steps unequal to the number of westward steps, *or* the number of northward steps unequal to the number of southward steps (or both).

(These formal definitions are due to BGG user aquoiboniste, in this post.)

Looper Designer: Craig Duncan

The following page contains a printable Looper game board.