SLITHER

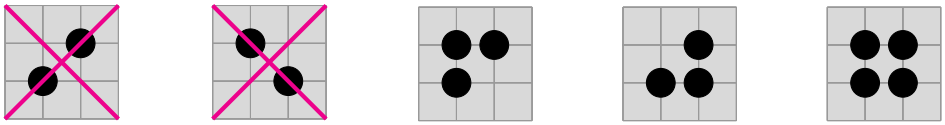
Corey Clark (2010)

The game takes place on a board with 9×9 intersections.
Initially, the board is empty. Black has the first turn. The swap rule is used.

Each turn consists of one or two actions on stones of that player's colour:

1. The player **may move** a stone to an empty adjacent point, orthogonally or diagonally.
2. The player **must place** a stone on an empty point, if possible.

After a complete turn, the following **diagonal rule** has to be met: if two same-colour stones are diagonally adjacent, then at least one of the two common adjacent intersections has to contain a stone of that colour.
A player has to pass if unable to carry out a complete turn.



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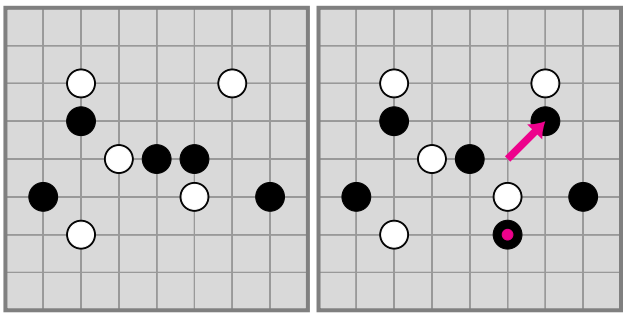
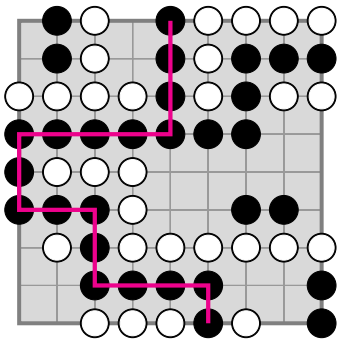
The game is won by forming orthogonal groups connecting opposite borders:

- White **wins** with a white group connecting the left and rights borders.
- Black **wins** with a black group connecting the upper and lower borders.



Black's turn: before after.
A player may move one stone to an adjacent empty point and must place a new stone on an empty point.

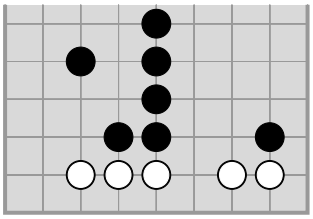


Blacks wins by connecting the top and bottom rows. White needs a horizontal connection.

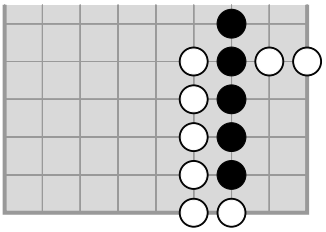
SLITHER's appeal is the black and white groups growing and squirming across the board, like worms. Movement is slow, yet the game is surprisingly dynamic. This makes the game stand out among modern square conncection games which are almost always pure placement.

On the other hand, SLITHER has been called out for how hard it is to assess moves. This might be a sign of low clarity, yet I argue that SLITHER is interesting rather than opaque. I believe the sentiment comes from the unusual movement and placement combination. Let's try to lift the fog a little.

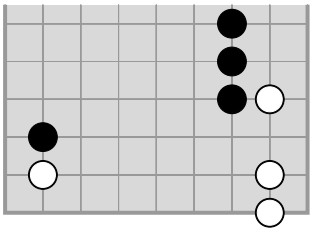
Three local connection problems: *Black to play and reach the bottom!*
To get a feeling for SLITHER's rules, consider these problems on local shapes in isolation: in each diagram, Black's chain dangling from above is supposed to connect to the bottom.



Problem 1.



Problem 2.



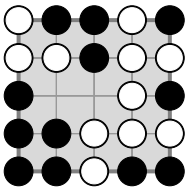
Problem 3.

Rules

An inept swap rule. First off, SLITHER is unusual in that the swap rule is useless: the Chooser should always switch, regardless of where the first stone goes. This is because there is no bad place for that stone — it can move towards an active region later on, and there is enough time to do so in the opening phase.

The designer's ADVANCED SLITHER variant addresses the pie rule's ineptitude with a restriction on movement: a piece may only move if it its group is adjacent to an opposing stone. The value of this change is debated among players.

Stalemate. Second, there are indeed positions in which a player cannot carry out a turn. Such positions are extremely unlikely to occur in actual games. The diagram shows a small, contrived example.
However, it has been proven that in any position, at least one side has a turn **??**. This is why the passing rule makes sense. Examples like this one, artificial as they are, show that in SLITHER, your own stones can come back to bite you — if the bottom white stone weren't there, White could win! This is a nifty feature, and the discussion starts with the simplest cases.



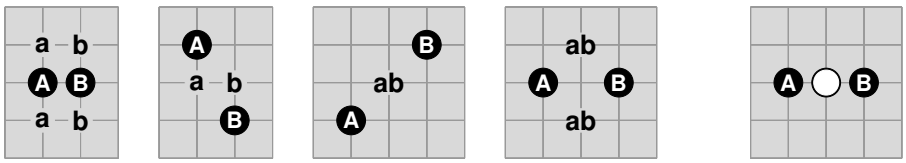
White has no turn, and must pass.

[A] Édourard Bonnet, Florian Jamain, Abdallah Saffine: *Draws, Zugzwangs, and PSPACE-Completeness in the Slither Connection Game*, In Proceedings of the 14th International Conference Advances in Computer Games (ACG 2015).

Other board sizes. SLITHER scales well. Once past the beginner stage, players might try the 13×13 board, although size 9×9 lasts a long while. I reckon that the large Go board (19×19) is too big for all but the most dedicated SLITHER enthusiasts. However, some players have spoken out for 15×15 boards.

Patterns

How the diagonal rule restricts movement. Nearby same-coloured pieces restrain movement and placement. If the local shape looks like in one of the following four positions then the diagonal rule affects the movement options of two stones:

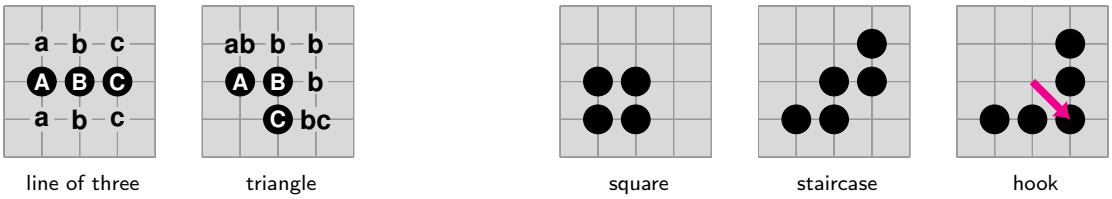


In each diagram, the stone Ⓐ *cannot* move to points marked *a* due to the presence of Ⓑ, unless supported by an adjacent placement; likewise Ⓑ cannot move to *b* on its own. Except for the first diagram, Black cannot place a stone on the marked points either without movement.

In the two diagrams with *ab* points, the only way to get a stone to these pointe is by combined movement and adjacent placement; moreover, doing so produces a triangle. Thus, *ab* points are annoying sources of inflexibility, and these two shapes are serious liabilities. Now the two stones on the same line could be readily connected with a single placement but this just means that White's cut —shown in the final diagram— has high priority.

By contrast, the first two diagrams have no *ab* points, so that any point around Ⓐ and Ⓑ can be reached via movement, although sometimes by only one of the stones. In particular, the knight's jump configuration has just one each of *a* and *b*, making it the most flexible among two stone patterns. This is why the knight's jump is popular in the opening.

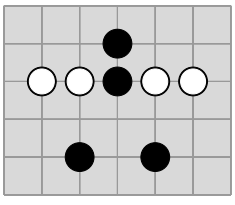
Before long, more tightly packed configurations will arise, like those:



The triangle's central piece Ⓑ is particularly inflexible! Thus, triangles are a cumbersome pattern which should only be played for a tangible purpose. One way to improve a triangle is to add another stone, forming a square. This shape is inefficient for immediate connecting or blocking, but it does enable flexible movement later on.

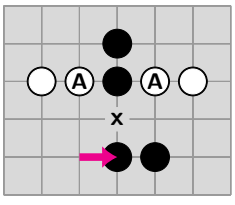
Even worse than a single triangle is a staircase, a sequence of several triangles in a row. These shapes do occur in games but they impose annoying liabilities for later. Sometimes you don't have an urgent movement to make; then you can use the move to fix a staircase into a hook shape — but of course only if the destination isn't occupied by an opposing stone.

Gaining tempo. Some local shapes allow you to set up connection threat with a *single* action (either movement or placement) such that your opponent has to defend with *both* actions. That way, you can use other other action freely and gain a tempo.



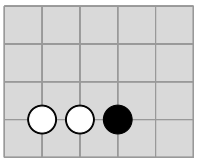
In this position, Black's movement threatens a vertical connection in the next turn. White can only defend by spending both actions near *x*. Thus Black gets a free placement anywhere on the board.

This works because of White's bad shape with Ⓐ.

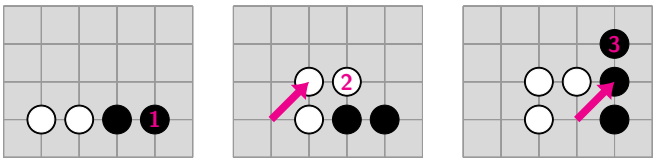


Tactical heuristics

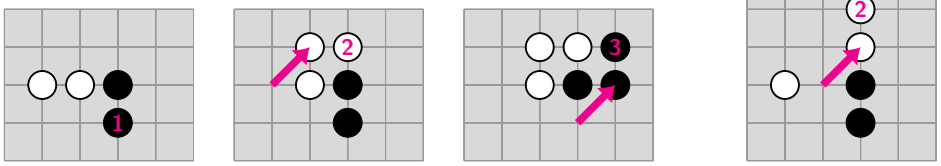
Block along with the opponent. This may look counterintuitive at first but no matter which way your opponent bends around the defending pair, proper movement and placement lead to a solid three line obstacle, now with attacking potential — in *your* connection direction. If you play in your own winning direction then your opponent can block you instead:



Black to play



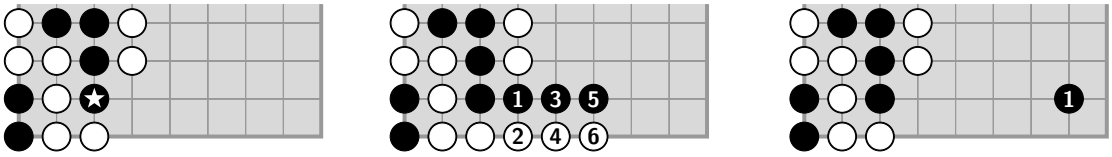
Versatile: Black blocks in White's direction



Blocking in Black's direction: this is what Black might expect but . . .

. . . this could happen.

Ladders. These are positions with forced local replies that can spread out over the whole board — this is tactical not because of small scope but because of unbranched development. Ladders also exist in SLITHER with the restriction that only the placements are fixed. The marked black group in the first diagram below is currently unable to link to the bottom border.

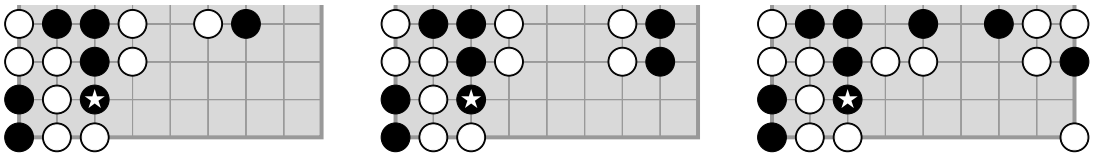


The white ladder prevents Black's group from reaching the bottom.

Breaking the ladder

Trying to do so anyway forces the placement sequence shown in the middle diagram. Not only does this fail, each move here helps White. The movement actions are still free but there are no nearby black stones that could be moved towards the ladder, so Black is better off not starting it. Instead, Black might place a stone somewhere else in double duty, one of them as a *ladder breaker* (last diagram).

Three ladder problems: *Black to play. Can Black ✪ reach the bottom?*

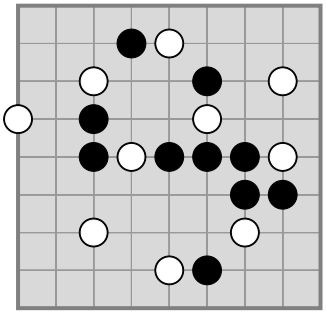


Problem 4. Problem 5. Problem 6.

Strategic heuristics

Avoid empty rows and columns. As in all connection games, a single stone in the way of a prospective link forces a cumbersome detour around it. Therefore, it is generally a good idea to use the early game for distributing your stones evenly across the board. That way, no column (for black connections) or row (for white connections) is particularly cheap to claim at the outset.

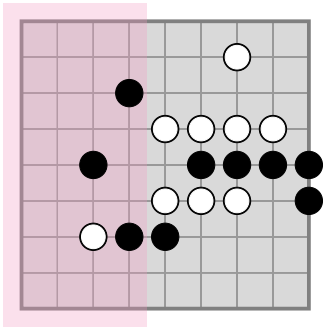
Remembering that the knight's jump is flexible regarding the diagonal rule, a transition from early to mid game might look like in the adjacent position.



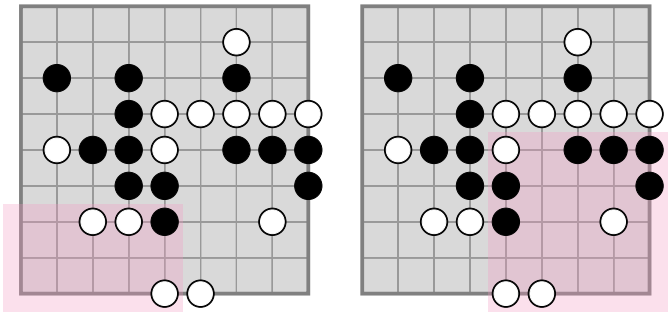
Here, close fighting has begun. White's stones are spread out evenly, using many knight's jumps. By contrast, Black has started to form a connection. Black's longest group is horizontal despite Black's ultimate aim of a vertical connection.

Of course, tactical considerations may once again trump equable spreading in the beginning. Close fighting can set in early on during SLITHER matches.

Local dominance. A feature common to many board games: once a particular area of the board comes into focus, it is crucial who has more stones in that region. Each subsequent turn may affect the local balance, immediately through placement and conditionally through movement of a close enough stone.

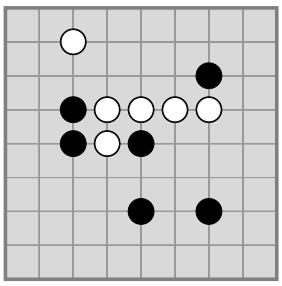


It is White's turn but this game is lost: the marked region is dominated by Black.

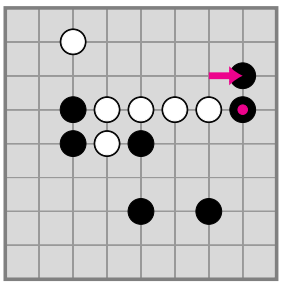


It is Black's turn: the lower left part is dominated by White, whereas the lower right part is dominated by Black. Therefore, Black will play towards the bottom right.

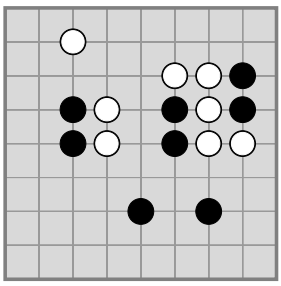
Leaning attacks. (*Open Door Trick*)
Stones can be bound not just through diagonal prohibition but also more indirectly: they may be an important piece for a prospective connection, or may constitute an essential block. In either case, forcing the opponent's stones to overload on duties can be key to success.



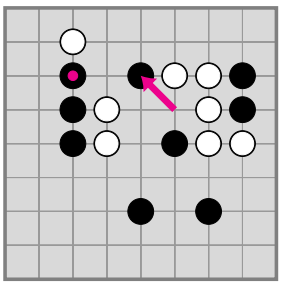
Black to play. The white wall is perfect and without cracks.



Black threatens to connect the top right to the bottom.



Three turns later: Black has lost the local fight.

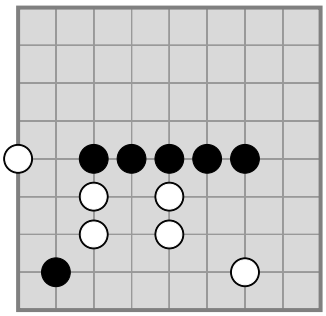


But now Black can fight on the left; White's wall has a crack.

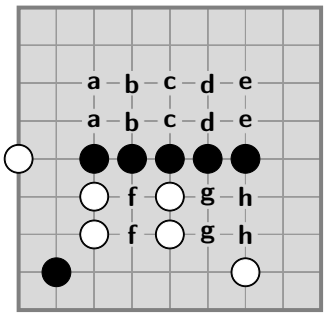
Building a perpendicular wall. (*The Reverse Way*)

Standard terminology in connection games: broadside.

As mentioned before, playing in your opponent's direction often blocks efficiently. The same principle works on a strategic level, by building a straight, central line along the opponent's connection direction. The basic idea is that movement off the wall together with proper placement can create pairs of stones around the spine. This concept is familiar from many connection games, such as HEX, but may be even more important in SLITHER due to movement. The following diagram from an actual game illustrates the thrust:



Black's central perpendicular wall of five.



In one turn, Black can get two stones on any two points with same label, e.g. *a*,*a*.

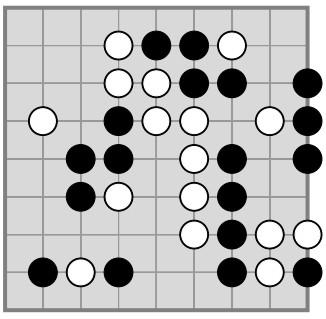
If in this position Black manages to cover two such pairs, one above and one below the line, e.g. *f, f* and *d, d*, then that will be a solid connection of length five along Black's connection direction.

Other heuristics. It can be hard to anticipate and to make turns where movement and placement are far apart. This can be a blind spot.

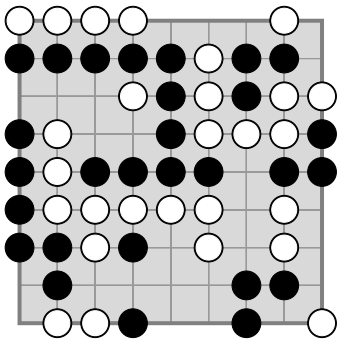
A familiar concept in connection games: *defence builds offence*. So whenever unsure about where to reinforce one's own connection, it might be best to hamper the opponent's position instead.

Unlike many other connection games, no single stone is ever totally shut out from a game because movement may break up any constellation. Especially in longer, board-filling matches this happens frequently and is part of SLITHER's appeal. Therefore, try to make moves that bring seemingly inactivated stones back into play. Efficiency in this regard can be decisive. A diagram would be nice!

Three full-board problems: *White to play and win!*



Problem 7.



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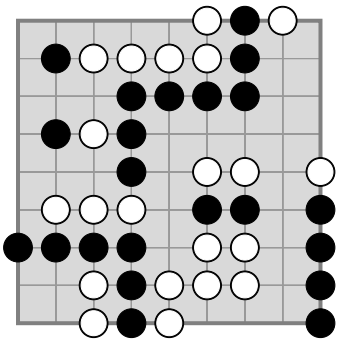

Problem 9.

Solutions to the problems

1. ***e4-f3/f2***. Next **e2-f1/g1, f2-e1/e2** or **g2-f1/e1, h3-g2/g1**.
2. ***i1***. White's placement **h1** is forced, possibly with the move **i5-h4**. Black then wins with **g2-h3/i3**.
3. ***b3-c2/g2***. (Problem by Ralf Gering.)
   1... **b2-c1/g1 2**. **c3-d2/f2, c1-d1/f1 3**. **d2-d1/e2, h4-g3/h3 4**. **g2-f3/f4**.
   1... **h4-g3/h3 2**. **g2-f3/f4, b2-c1/f1 3**. **c2-d1/e3, c1-c2/e1 4**. **e3-d2/d3, f1-e1/e3 5**. **f3-f4/e4**.
   2... **b2-b3/f1 3**. **c2-d2/e2, c3-c2/e1 4**. **g4-f5/d1, c2-c3/e2 5**. **f2-e3/d3**.
4. ***g4-f3/d2***, and **f4-e3/d1** is followed by **f3-e2/e1**.
5. ***h3-g2/d2***. If **g3-f2/d1** then **2**. **h4-g3/e2, f2-f1/e1 3**. **g3-f2/f1**.
6. ***i3-h2/d2***. White's placement at **d1** is forced and there are two natural choices for the movement. Whether White plays **e3-f2/d1** or **g3-h2/d1**, Black **h2-g1/e2**, White **f2-f1/e1**, Black **g4-g3/g2** wins.
7. White ***f5-g6/h8***. If next Black **h7** then White **i3-h4/g5** wins; if **i5** then **g8-h7/i8**.
8. ***d7-c6/a1***. White's central group is safely connected to the right. The solution ensures the link to the left border with either **c6-b7/a7** or **c2** and Black cannot prevent both.
9. ***c6-b5/h5***. White's weakest area is the right-hand side, so the placement **h5** is mandatory. Both sides have bad shape around **d5** which is why White does not have to play there immediately, and has time to move on the left.

   Black may threaten a connection with **b6-a5/a4**; this is refuted by **c8-b7/b6**, **b8-a7/a6**, **d8-c7/a9**.

   If Black resolves the central deadlock with **d5-e4/e3**, White replies **c4-d5/e5** and Black cannot cut because of bad shape. Black's **b6-a5/a4** is resolved similarly as in the previous line, by **d4-c5/b6**, **b8-a7/a6**, **c8-b7/a9**.

   Black's sharpest resistance is to try gaining a tempo with **f6-e5** or **f6-e3**; either threatens to cut in the centre. White can assure the central connection only by spending both actions in the centre, giving Black a free placement. However, White can refute all these threats. For example, if Black plays **f6-e5/a4** then **g3-f4/b5**, **d2-e3/e4**, **e1-d2/b2+**. Similarly, **f6-e3/a4**, **g3-f4/e5**, **b6-a5/a6**, **c8-b7/b6**, **b8-a7/a8**, **d8-c9/a9+**.

   In the initial position, White's **b4-c5/h5** does *not* work. Now Black can gain a tempo with **f4-e3/b7**. For example, **g3-f4/e4**, **a3-b4/b5+** and **c5-b4/a4 d6-e5/e4+**

Other comments

- Perhaps end with a list of beautiful final positions?
- Mention LittleGolem (and also abstractplay)?
- BGG thread about lack of clarity in Slither
- A strategic evaluation: dead stones on either side. (Same is other connection games but with the difference that stones in Slither are never entirely dead.)

- By Corey Clark (BGG message 4.5.2020): My only editorial issue is that the threads of strategic and tactical axioms you outline don't seem to come together at the end to form a comprehensive cloth. This is really not very important but maybe just a quick summary of how the various elements can form an overarching strategy would be more satisfying, just from the standpoint of the reader.
  I understand that a game this old with this many players cannot be fundamentally changed for all intents and purposes but from my end such a change was necessary, I made it, I'm glad I did and as such I even wish I had never gone public with the original Slither. It has serious issues regarding turn order advantage, the ineffectiveness of its pie rule and trivially repeated opening templates (a subject broched in the guide but oddly enough not meditated upon). As I recall I hoped to resolve at least the first two issues with the addition of a new rule: A stone cannot move unless it or its group touches an enemy stone at the outset of the turn. Obviously, the effect is that a stone placed in the corner to avoid the invocation of pie, cannot simply extricate itself from that position in a few moves. I am quite satisfied with the results ON play of playing with this modification (however drastically the character of the game and its superficial appeal is changed) and as such I personally withdrew my support for the original. I would recommend you try this updated version of Slither yourself, as it only adds to the existing tactics and strategy. On the other hand I don't much care for the kind of game Slither has become, no offense intended personally.
- Interesting games and/or potential problems:
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2473155
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2479026&nmove=29
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2086206&nmove=29
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2117738&nmove=54
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2493205&nmove=26
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2493250&move=cedddj
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2489914&move=gdhchh
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2498138&nmove=27
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2493256&nmove=45 and also move 52 later on: this only works because the white broadside on the fourth line has length 4
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2508570
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2505754&nmove=33
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2508570&move=fghhd
  - https://www.littlegolem.net/jsp/game/game.jsp?gid=2510318&nmove=41