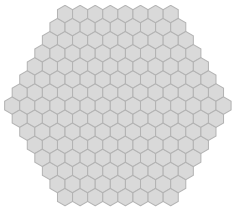


HAVANNAH

Christian Freeling (1976)

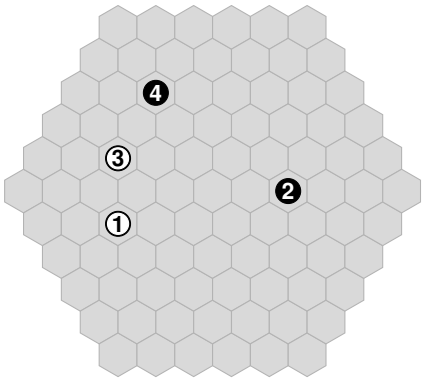
The game is played on an initially empty six-sided hexagonal board of any size.
The first player places a white stone on any hexagon, and the second player chooses a colour.

Players then take turns placing a stone of their colour on an empty cell. A player wins by establishing one of the following structures with stones of that player's colour:

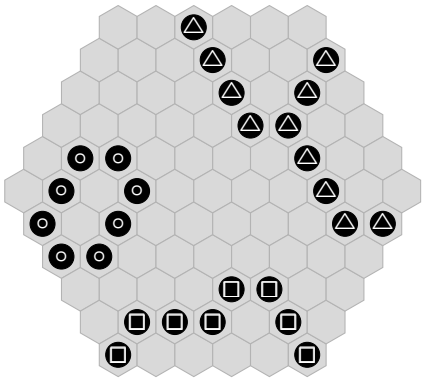
- a *ring*, a closed chain containing at least one cell, or
- a *bridge*, a chain linking two corner cells, or
- a *fork*, a chain linking three sides.

Corners do not belong to sides. The hexagons enclosed by a ring can be empty or occupied.

Diagrams explaining the rules



Players place stone on empty cells.
The swap rule is used.



Either of these structures is a win:
ring ⊙ — bridge ▣ — fork △

History

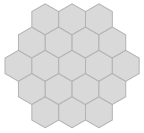
HAVANNAH was published by Ravensburger Spiele in 1981. It was recommended as 'Spiel des Jahres' in 1981 and 1982.

Board size

The game is highly scalable and for the first few games, I recommend sizes 4 or 5. Experienced players will want to go up to sizes 8 or 10, which allow for a rich strategic experience. In order to get a feeling for the game, as usual you are encouraged to look at the other extreme:

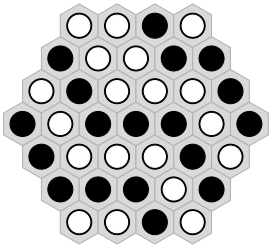
Problem 1. *Solve* HAVANNAH *on the board of size 3.*

First, find a winning strategy for the starting player, White, without the swap rule. Then find the best strategy for the second moving player with the swap rule: when to swap, when not to swap, and how to play?



While HAVANNAH can be enjoyed on boards of sizes ranging from 4 to 10, there is a noticeable change in the importance of the three winning structures. On the very small boards, forks and bridges are important whereas rings are rare, even as threats.
By contrast, on the large boards, bridges seldom occur. This is reasonable: there are only six bridge endpoints and an opponent can prevent a winning bridge by taking one of them. But supporting a bridge by early corner placements is just too slow. Instead of bridges, rings become a lot more relevant. Generally speaking, rings and bridges are mostly used as threats towards fork structures.

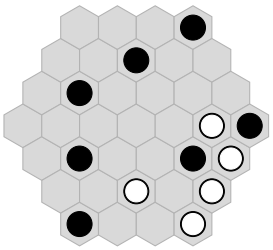
Draws. It is possible to fill the board without a ring, fork or bridge. One such position is shown here and similar patterns exist on boards of all sizes. Hence draws are possible in HANNAVAH. However, among tens of thousands of games on LittleGolem, there has been a single draw between human players, on the board of size 8. Thus HAVANNAH has a non-zero but very slim draw margin. To me, that is a very desirable state! The almost-drawlessness of HAVANNAH is not just a nice feature, it will be relevant later on for the spider strategy.



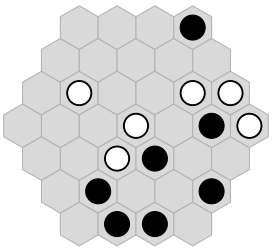
A drawn game.

Forced wins.

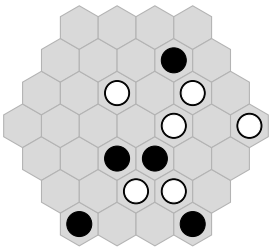
To get a feeling for HAVANNAH's win conditions, here are three straightforward problems.



Problem 2. White to play



Problem 3. White to play



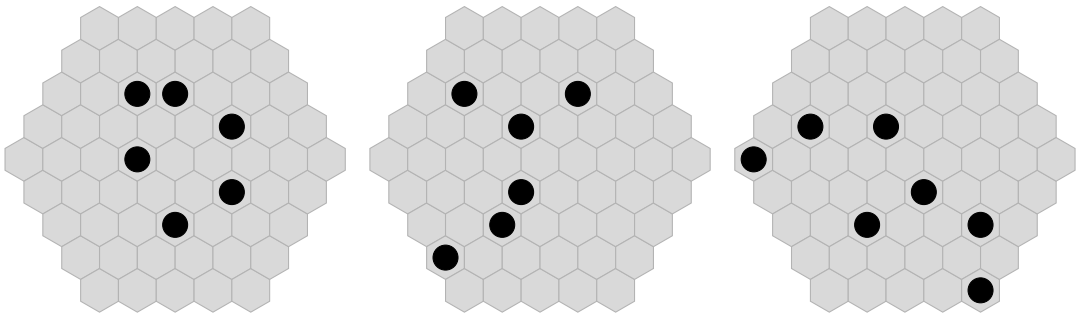
Problem 4. Black to play

Basic strategy

HAVANNAH is a particularly strategic game, and this guide discusses strategic concepts before tactics. The three win conditions immediately translate into frames which are crucial for all that follows. Life and death of groups in HAVANNAH is similar to that in HEX. After that, three basic strategic approaches are explained. There isn't much theory developed yet but it would certainly be worth the while.

Frames

A *frame* is a set stones that can be completed to a winning structure regardless of whether and how the opponent interferes. Accordingly, there are ring frames, fork frames and bridge frames; note that a bridge frame generally presumes the occupation of the two corners. Here are schematic examples for each:



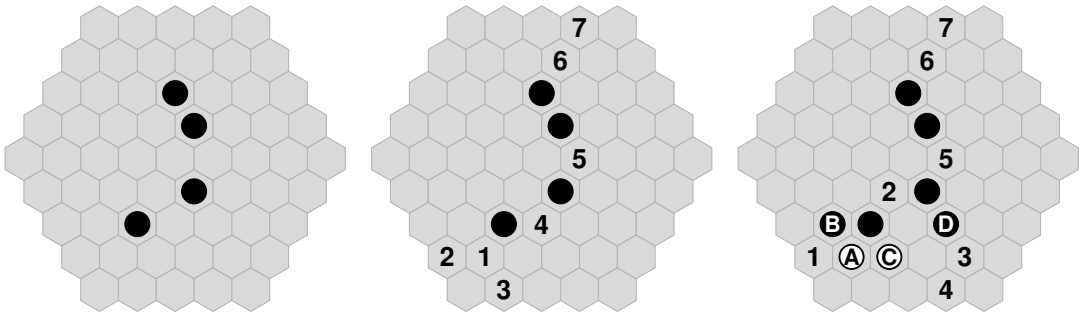
ring frame fork frame bridge frame

There are two important questions about potential and actual frames arising in most games:

1. How many turns is a structure away from being a frame?
2. How many turns does a frame need to be completed?

For either of these questions, relevant is the number of unanswered moves by the side building the structure. Many HAVANNAH games turn into races once both players have built frames. Then it becomes a matter of which frame is finished first. For that, clever use of forcing moves — gaining tempo — is crucial. Before the final racing-frame stage of an encounter, gameplay is about threatening several frames and, ideally at the same times, threatening to stymie frame potential of the opponent.

An important observation is that frames cannot be delayed unless there are nearby stones enabling other threats, such as rings. In particular, counting the turns to finish a fork is easy:



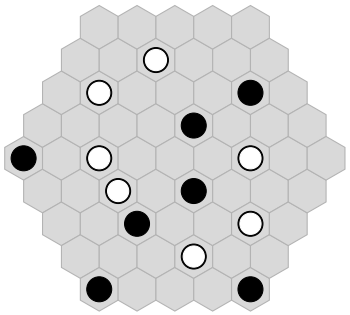
Fork frame: 7 turns One possible finish. A white play does not delay!

In the right-hand diagram, White has forced two exchanges, Ⓐ Ⓑ and Ⓒ Ⓓ, without reducing the number of moves required to complete the black fork. Clearly, the presence of other white stones nearby could make such delays possible — this is always a possibility when placements have multiple meanings.

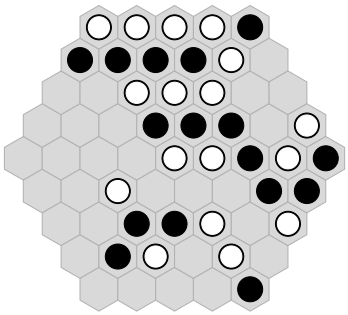
The concepts of frames and the counting just mentioned are two properties which make HAVANNAH so strategic; position evaluation is more clear than in other games. The third ingredient is the large number of winning structures, allowing strategic flexibility. For example, there are twenty selections of three boundaries to form a fork.

Completing frames.

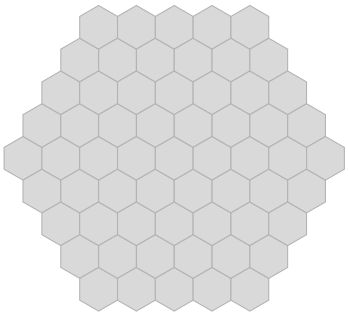
In each problem, count frame tempos and decide whether to advance one's own frame or to build against the opponent's frame.



Problem 5. White to play



Problem 6. Black to play



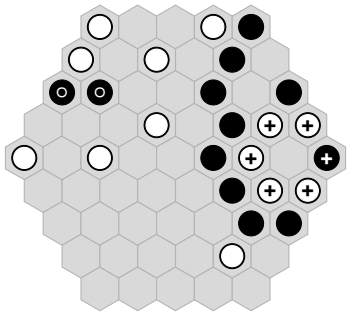
Problem 7. Black to play

Life and death

Stones of one colour are *dead* if they cannot form a frame, assuming the opponent answers each threat. During a typical HAVANNAH match, each side will have several alive groups alongside abandoned, dead groups. Life and death is like in HEX but more prominent.[7]

Dead groups can sometimes still be useful. For example, often they allow forcing moves from the outside. And occasionally a move threatens to resurrect two dead groups simultaneously and the opponent can prevent only one connection.

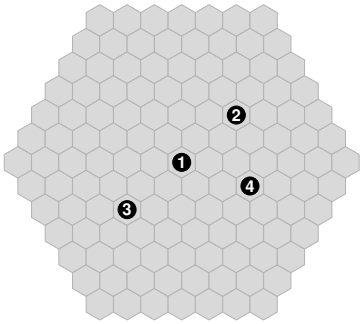
As usual, stones are often not yet dead and can be reactivated or left to rot, depending on circumstances. But the concept of life is important, as are threats to kill or reanimate stones.



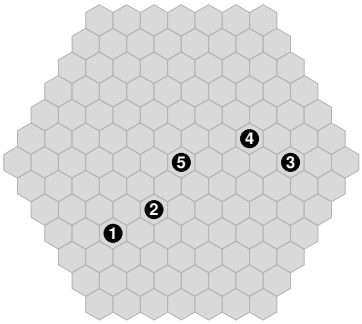
All the stones ⊕ and ● are dead.
The ◉ stones aren't fully dead yet.

Three fork strategies: spider, monkey, snake

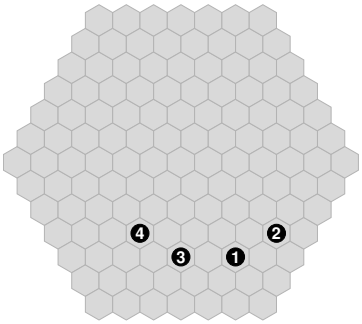
The basic win condition in HAVANNAH is the fork. Rings and bridges are more important as tactical threats. There are three general approaches for how to build a fork:



Spider strategy



Monkey strategy

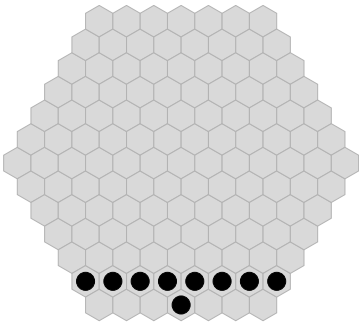


Snake strategy

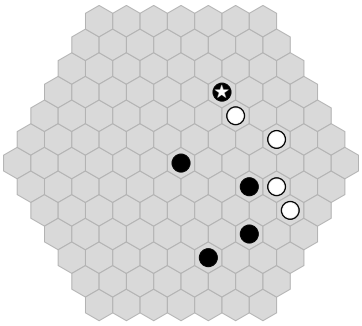
The *spider* weaves a central web, aiming to defend against quick forks. The spider's working assumption is that draws are unlikely, hence preventing the opponent from a winning connection should ultimately yield one for oneself. This principle already occurred for HEX: defence is offence. However, an interesting difference to HEX emerges nonetheless: because the rules of HAVANNAH do not prescribe which boundaries are to be linked by each side, a flexible strategy of central dominance can pay off in more ways.

The *monkey* starts low and climbs towards the centre. This is reverse to the spider: first staking out low positions, i.e. near the edges, and then aiming to connect in the centre. I think it is the most common approach. Neither spider nor monkey go for a quick win.

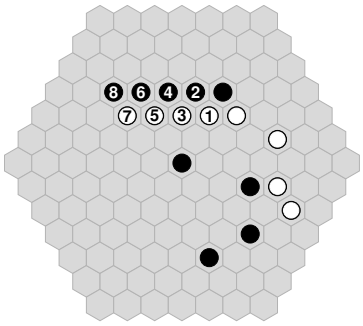
The *snake* starts low, like the monkey, and crawls along edges, going for a quick fork. By contrast to the other two approaches, the snake strategy does not really work from scratch: attempts to start at a corner and then fork out can easily be blocked by an opponent. However, the snake is very important at a later stage: blocking the opponent, even with a single stone, can become the start of a snake. In order to appreciate the advantages and drawbacks of the snake, look at the next three diagrams:



The shortest fork: an ideal but rather unrealistic snake.



A game position: Black blocks with ✪.

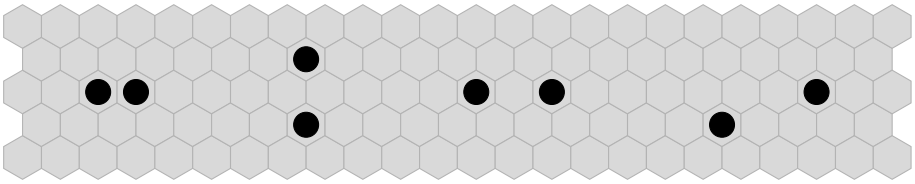


Continuation: Black's snake at the top is faster than White's frame.

[8]

Patterns

The following two-stone shapes occur frequently, and they are sorted by stability:

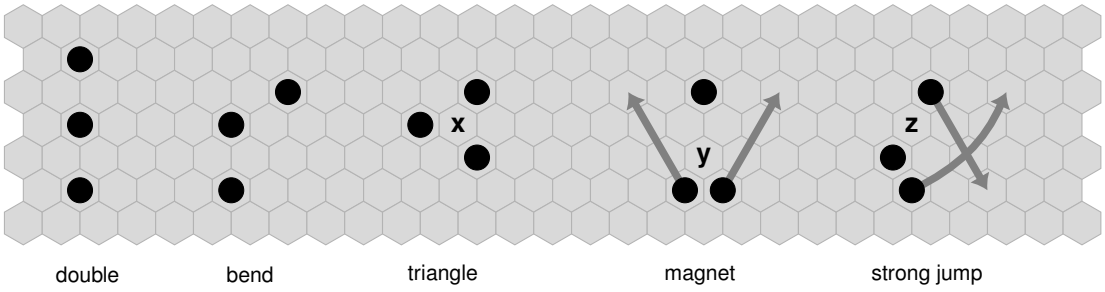


The *crawl* is the slowest possible extension but obviously unbreakable.

The *step* is the most important extension; the same as the HEX bridge (terminology which obviously won't work here). The step is normally safe but, unlike in HEX does have a weakness,

[8] The continuation diagram could use more text: if White extends to the left, Black blocks on the right and has a 7 turn fork frame. If White blocks on the right, then Black can run along to the NE corner after which White has to occupy the NW corner (otherwise Black gets a bridge), and then Black can turn on the left side, reaching the SW border). Perhaps I should turn this into a problem.

as will be explained below. Another name for the step, translated from Dutch 'vlieger' is *kite* which makes particular geometric sense if HAVANNAH is played on a triangular grid. In this exposition, I am using locomotion metaphors, however.
The (one-point) *jump* invites a *wedge* into its centre point and calculation is needed to predict which side would benefit from that. Even more loose is the *knight's move* which is usually played as part of a double threat.
Note that step and jump are the two extensions of distance 1, i.e. connection is possible by one additional placement. Due to the pecularities of the hexagonal tiling, the step cannot be broken without additional supporting stones but the jump can. There are two extensions of distance 2, of which the knight's move is depicted; the other is a straight line.[9]
Also of importance are shapes consisting of three stones:



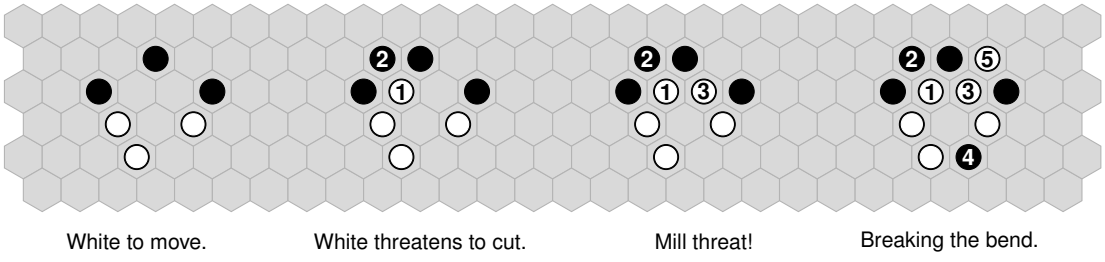
Both *double (step)* and *bend* are two steps in succession but in different directions. Bends are usually safe but not fast: there are still two more moves needed to link the two outer stones.
The *triangle* is a regular shape. White x does not cut.
The *magnet* is not a safe connection as it can be cut by a white placement on y. However, doing so is often detrimental because Black gets forcing moves by pushing up. Therefore, the magnet exudes influence along the marked directions.
The final pattern is a strengthened jump. It still has the wedge z as its weak spot but by cutting there, White invites a black wall along either of the indicated directions.

Tactics

Mill

The *mill* is the name for the smallest ring of six stones. It rarely ends high-level HAVANNAH matches but it occurs as a threat all the time. Unlike forks and bridges, it is a local winning pattern. In particular, sufficiently many stones near an opponent's seemingly safe link can sometimes break by a mill threat. The next sequence shows one such scenario:


The mill.

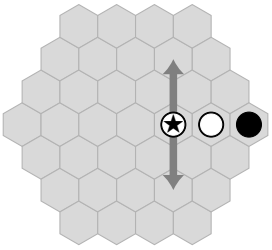


[9] All of this also holds for HEX and should probably go there because HAVANNAH comes later in the book.

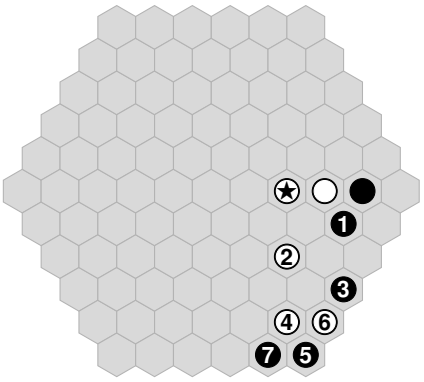
Observe the crucial difference to HEX: due to the presence of a local win condition, the ring, there are many more forcing moves in HAVANNAH.

Anchor

An *anchor* is a placement next to a friendly stone, played with the aim of exuding influence in the perpendicular direction of the pair. One use is to put pressure on an opposing stone or group without choosing a direction yet, thus maintaining flexibility.
On every board size there's a maximum height at which the anchor kills the group under it. Depending on whether the board is odd or even sized, corner play will differ around the critical height.
In the following two diagrams, ⍟ is an anchor. In the right-hand diagram, Black tries to escape with ❶ and so on, but only manages to get an unfavourable running battle with ❺ and ❼.



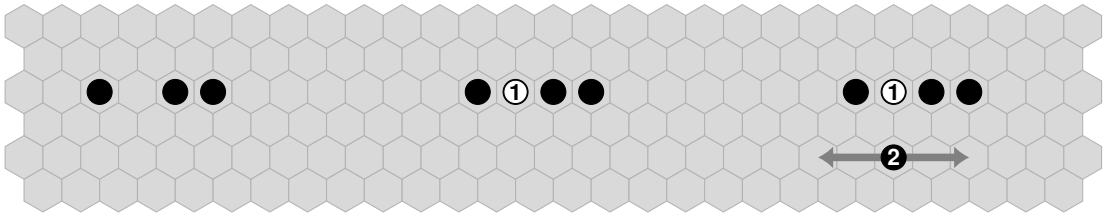
The anchor ⍟ and its direction of influence.



The anchor ⍟ kills ●.

Cup

In the following situation, White attacks at the weak spot of the black line of stones.



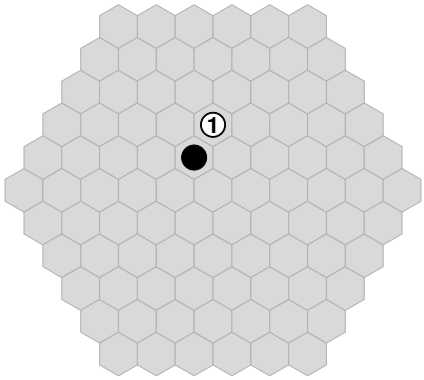
White to move. White wedges. Black plays a cup.

Black reacts to ① with a placement one line away. This *cup* is not connected to the other black stones right away. However, if White extends from the wedge to maintain separation, then Black builds along the indicated arrows. In particular, if ❷ is lower than ①, i.e. closer to the boundary then these new stones threaten a shorter connection than the original line.

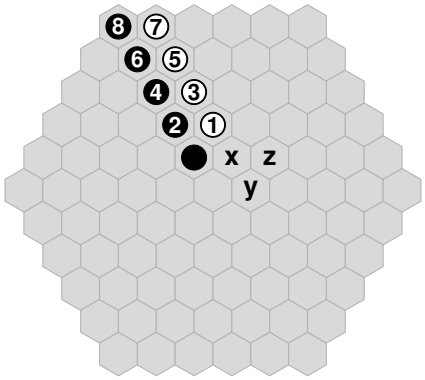
Block

In the left-hand position, White can prevent Black from reaching the top-left border. Because the white block in turn threatens to link to that border, the running sequence in the right-hand

position is to be expected.



① blocks ●

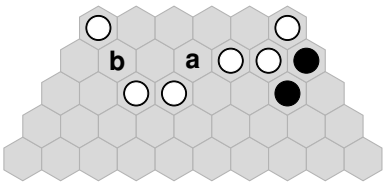


The natural development.

If Black follows up by playing x or y, this threatens to kill the White chain. Thus, White might want to play at y or z.
Assuming this sequence and an otherwise empty board, White now has an advantage towards a fork frame. On the other hand, Black has the move and can employ ❽ as a bridge threat.

Split

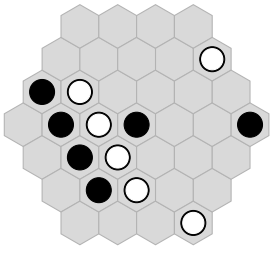
The *split* is an attack at two cooperating cutting points. Here is an example of a split as an anti-bridge device. The example diagram shows an almost finished white bridge. However, Black can play at the two weak points a and b, disabling the bridge.



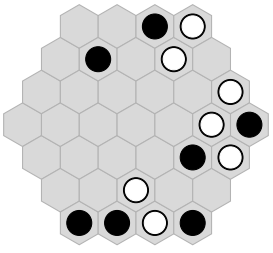
Tactical threats

Forcing moves are a crucial part of HAVANNAH. Threats to finish a winning structure are absolute and must be answered. Care has to be taken that a forcing move does not help the opponent. The following problems study forcing moves in a very tactical setting.

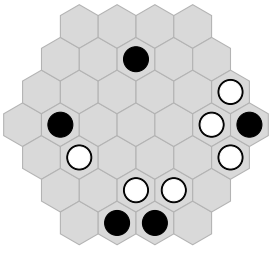
More forced wins.



Problem 8. White to play



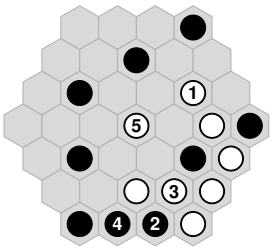
Problem 9. White to play



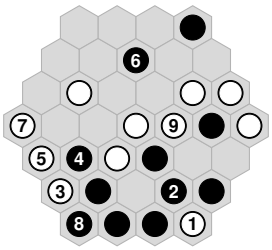
Problem 10. Black to play

Solutions to the problems

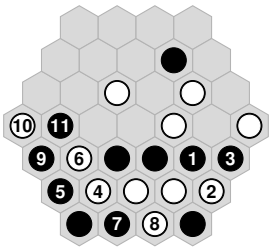
Solution to Problem 1. Without the swap rule, White wins by playing on any corner cell. No matter where Black replies, White can play next on an adjacent corner and force a bridge-avoiding reply. Doing this again, White can extend from the middle corner and get a bridge.
With swap: if the first stone is on a corner, the second player has to swap and follow the above procedure. Else taking an appropriate corner cell wins for the second player.



Solution to Problem 2.



Solution to Problem 3.

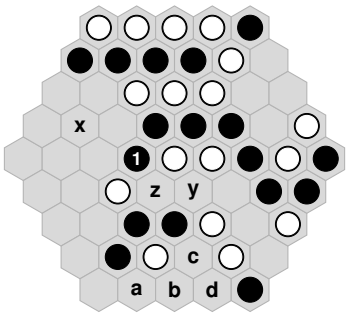


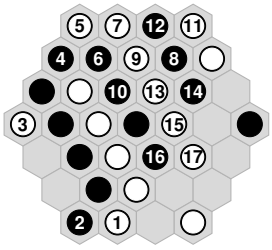
Solution to Problem 4.

Problem 3: If Black uses the ring threat (❹ at ❾) then White wins even quicker with a fork.

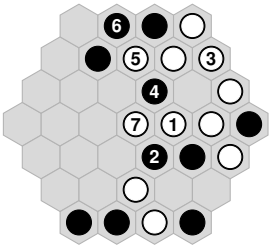
Solution to Problem 5. Black is about to threaten a bridge frame. While White can wedge into the black jump at the bottom left, Black can connect to a corner using a double threat. Therefore, Black can establish a bridge fork in the next turn by playing on the top right corner. That frame then needs five more turns to completion. On the other hand, the white structure on the left already is a fork frame which can be finished in six turns. Therefore, White should play any move advancing this fork. Convince yourself that a white play a the top right corner, denying Black's bridge, will lose to a black fork utilising a ring threat. Similarly, a White wedge at the bottom left can be refuted by careful Black play.

Solution to Problem 6. The topmost white chain is linked to the north and northeast borders, and a single step will connect it to the northwest border, yielding a win in four moves. Black ❶ sets up a double threat between x and y.
If White defends around x, then Black plays at y, establishing a connection to the three stones at the bottom. This threatens a two-move bridge. If White prevents that by occupying the lower left corner, then a is another double threat: either of a two-move fork or building a bridge with ❷ (ring threat) ⓒ ❹.
If White plays z to prevent this continuation, then Black x kills the top white chain and achieves a bridge or fork two turns faster than the White bottom five-move fork frame.
I think that any other black move but ❶ loses.

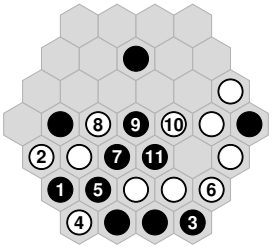




Problem 8.



Problem 9.



Problem 10.

Literature

[A] Timo Ewalds: *Playing and solving Havannah*, Ph.D. thesis, Edmonton, Alberta, http://webdocs.cs.ualberta.ca/~hayward/theses/ewalds.pdf (2012), 115 pages.
[B] Christian Freeling: *Havannah (designer's website)*, http://mindsports.nl/index.php/arena/havannah/ ().
[C] Christian Freeling: *Introducing Havannah*, Abstract Games Magazine 14–16 (2003), 1+2+3 pages.

[10] Problem 2 can be made sharper, so that is the only move.