

3-plays-ko-rules

by Robert Jasiek, 2006-09-27

Preface

Analysis is done for game end and scoring rules as in the Unified Area Rules and the following ko rules:

If a play creates a cycle, then the game ends prematurely. The result is then exceptional, and depends on the number of plays during the cycle:

- *Short cycle: If it is 2 or 3, then the player making the last play loses.*
- *Long cycle: If it is 4 or greater, then the result is a tie.*

Note: "plays" means "board-plays". Alternatively, the short-cycle-rule might be modified to prohibit the last play instead of letting the player lose. The long-cycle-rule might be modified in tournament rules to have a replay.

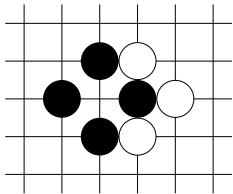
Compared to the Long-cycle-ko-rules, strategic consequences of the 3-plays-ko-rules differ only in the sending-3-returning-1 shape, which is rare.

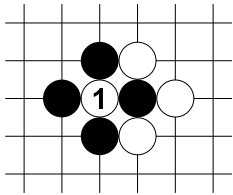
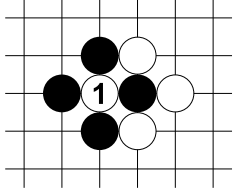
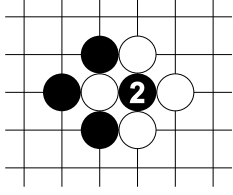
Colours have the following meanings:

- **Blue:** Necessarily perfect play leads to a cycle.
- **Red:** A cycle occurs only after a strategic mistake.
- **Lilac:** A cycle is possible but not forced.

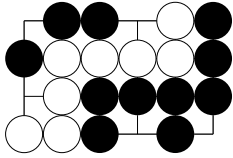
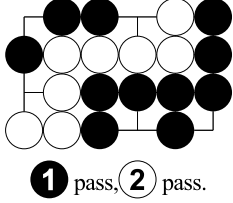
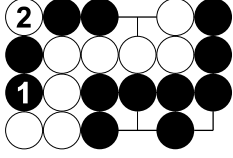
Short Cycles (2 or 3 Plays)

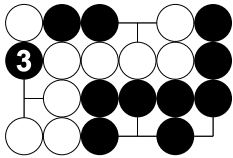
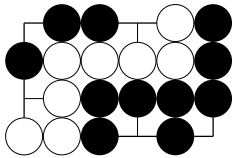
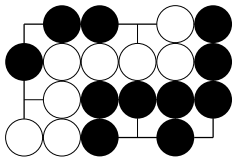
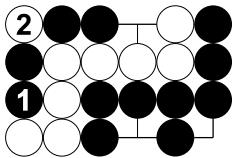
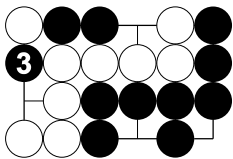
Basic-ko

	Position 0054 , White to move. A cycle does not occur in perfect play.
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	<p><u>Variation 1:</u> This is a possible perfect play.</p>
	<p><u>Variation 2:</u> Move 2 is a strategic mistake.</p>
	<p>Play 2 creates a short cycle. Black loses.</p>

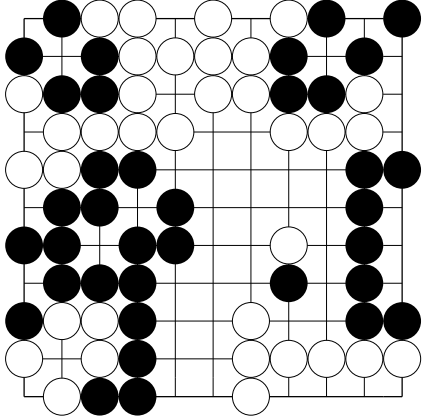
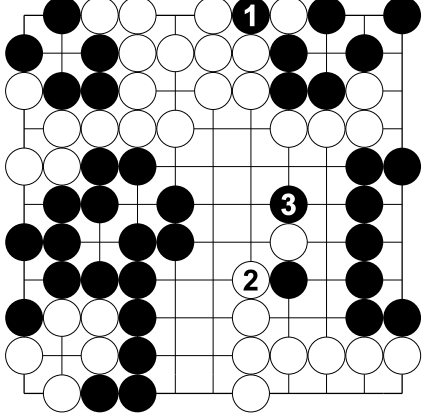
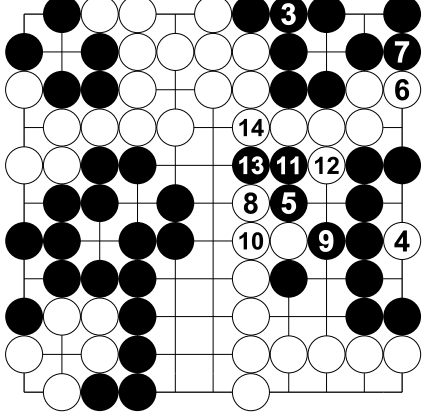
Sending-2-returning-1

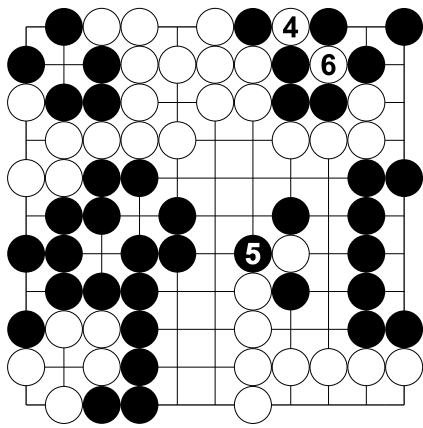
	<p>Position 0134, Black to move, komi = 0. A cycle does not occur in perfect play.</p>
	<p><u>Variation 1:</u> This is a possible perfect play. Score = 6. Result = Black win.</p>
	<p><u>Variation 2:</u> Move 1 is a strategic mistake.</p>

	<p>Play 3 creates a short cycle. Black loses.</p>
	<p>Position 0134, Black to move, komi = 7.5. Black can choose how to lose the game: with or without using a cycle.</p>
 <p>1 pass, 2 pass.</p>	<p><u>Variation 1:</u> This is a possible perfect play. Score = -1.5. Result = White win.</p>
	<p><u>Variation 2:</u> This is a possible perfect play.</p>
	<p>Play 3 creates a short cycle. Black loses.</p>

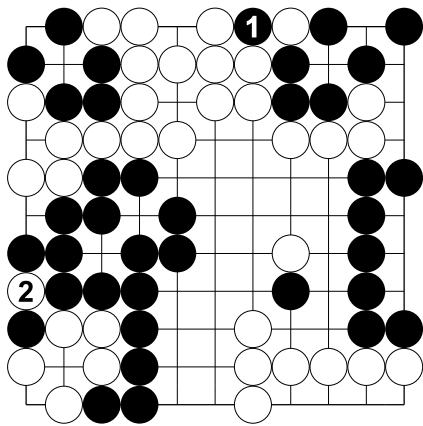
Long Cycles (at least 4 Plays)

Basic-kos during the Middle Game

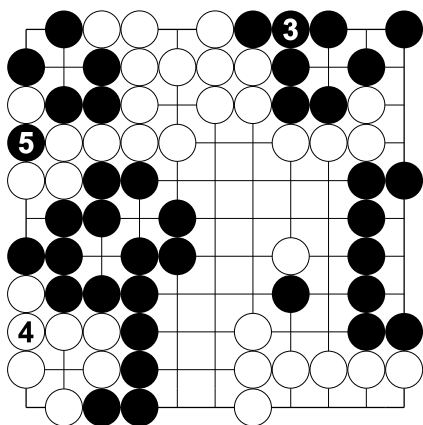
	<p>Position 0090, Black to move. A cycle does not occur in perfect play. Note: In most middle game positions with several basic-kos, one of them is the biggest and the others are left until later. In this idealized position, the two basic-kos on the left are equal options.</p>
	<p><u>Variation 1:</u> Should the players fight the biggest basic-ko?</p>
	<p><u>Variation 1a:</u> This might happen if Black 3 tries to ignore the ko threat 2.</p>



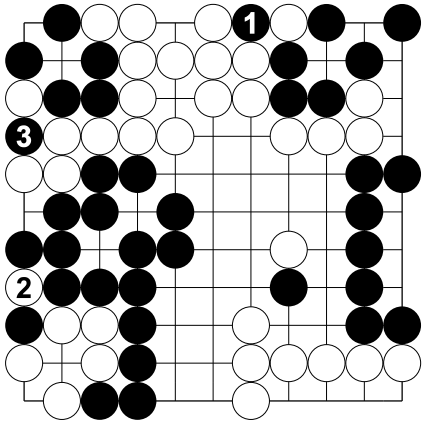
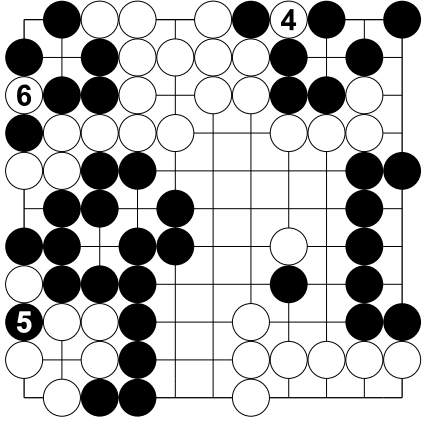
Variation 1b: Continuing variation 1, White wins the upper right basic-ko while Black gets only small endgame. White is going to win the game.



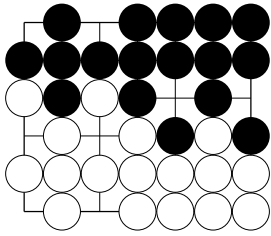
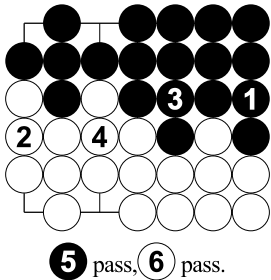
Variation 2: Move 2 is a strategic mistake.

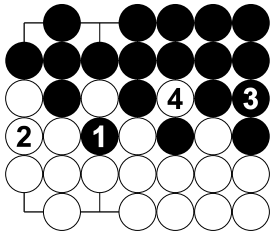
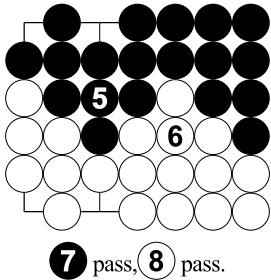
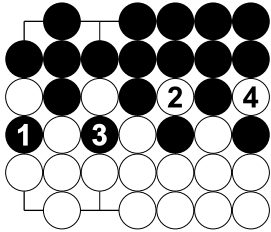
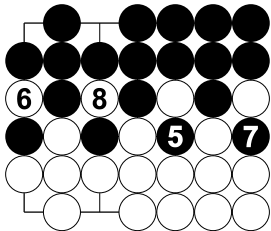
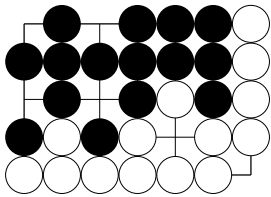


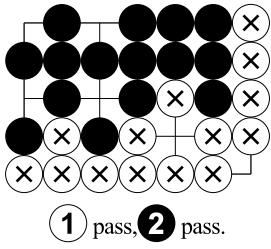
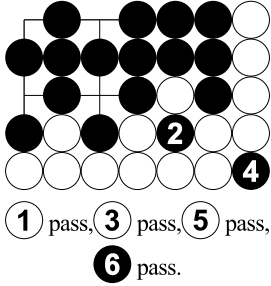
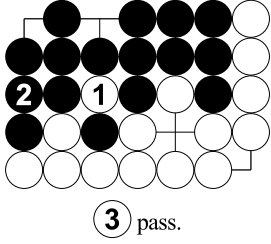
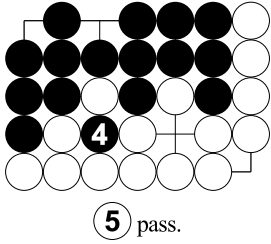
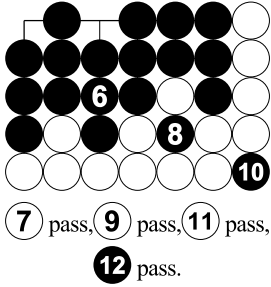
White might have won the biggest basic-ko. Now he has to win one of the smaller basic-kos. I.e. White has already suffered from a loss. This would have been similar if White 2 had connected the upper left basic-ko.

	<p><i>Variation 3:</i> Plays 2, 3, and 6 are strategic mistakes. Both players might create a cycle. Thereby White throws away his game win. Black's cooperation is trick play.</p>
	<p>Play 6 creates a long cycle. Result = tie.</p>

Basic-kos during the Endgame

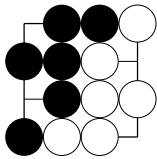
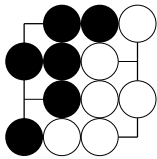
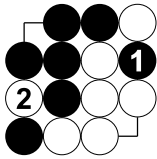
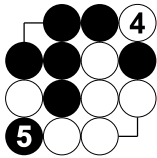
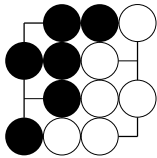
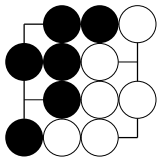
	<p>Position 0081, Black to move, komi = 0.5. A cycle does not occur in perfect play.</p>
 <p>5 pass, 6 pass.</p>	<p><i>Variation 1:</i> This is a possible perfect play. Score = -0.5. Result = White win. Notes: There are many variations that are perfect play. To be sure that all are perfect play, one has to either read ahead many variations or refer to a mathematical proposition that proves correct strategy and score. Such advanced strategic theory, however, is beyond the scope of this document.</p>

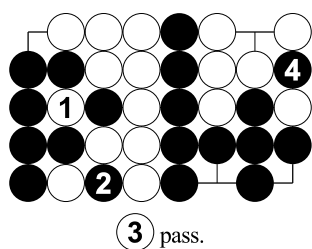
	<p><u>Variation 2:</u> This is a possible perfect play.</p>
 <p>7 pass, 8 pass.</p>	<p>Score = -0.5. Result = White win.</p>
	<p><u>Variation 3:</u> Play 8 is a strategic mistake.</p>
	<p>Play 8 creates a long cycle. Result = tie.</p>
	<p>Position 0033, White to move, komi = 0. A cycle does not occur in perfect play.</p>

 <p>① pass, ② pass.</p>	<p><u>Variation 1:</u> This is a possible perfect play. During the Agreement Phase after move 2, the players agree to remove the marked stones. Score = 35. Result = Black win.</p>
 <p>① pass, ③ pass, ⑤ pass, ⑥ pass.</p>	<p><u>Variation 2:</u> This is a possible perfect play. Score = 35. Result = Black win.</p>
 <p>③ pass.</p>	<p><u>Variation 3:</u> This is a possible perfect play.</p>
 <p>⑤ pass.</p>	
 <p>⑦ pass, ⑨ pass, ⑪ pass, ⑫ pass.</p>	<p>Score = 35. Result = Black win.</p>

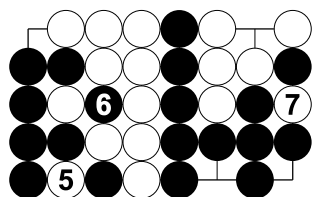
<p>4 pass, 6 pass, 7 pass.</p>	<p>Score = -11. Result = White win.</p>
	<p><u>Variation 3:</u> Ending the game by passing is not enough for removing a dead-ko. White makes a strategic mistake.</p>
<p>5 pass, 6 pass.</p>	<p>If the players end the game like this, then we have: Score = 3. Result = Black win.</p>
<p>6 pass, 8 pass, 10 pass, 11 pass.</p>	<p><u>Variation 3a:</u> This is a possible perfect play. Filling territory serves as a ko threat. Score = -11. Result = White win. Notes: On the 19x19 board, it is inconceivable that such a ko threat would not be available in practice. Only in theory, a dead-ko might survive at the game end. During the entire Go history, only one such 9x9 game has been reported.</p>
	<p><u>Variation 4:</u> Play 5 is a strategic mistake.</p>
	<p>Play 6 creates a long cycle. Result = tie.</p>

Double-ko-seki

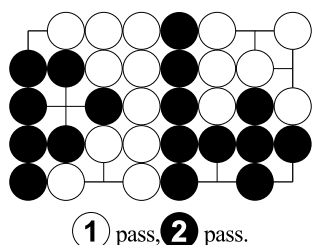
	<p>Position 0055, Black to move, komi = 0. A cycle occurs only if the players cooperate.</p>
 <p>① pass, ② pass.</p>	<p><u>Variation 1:</u> This is a possible perfect play. Score = 0. Result = tie.</p>
 <p>③ pass.</p>	<p><u>Variation 2:</u> This is a possible perfect play. Both players cooperate to create a long-cycle-tie.</p>
	<p>Play 5 creates a long cycle. Result = tie.</p>
	<p>Position 0055, Black to move, komi = -0.5. A cycle does not occur in perfect play.</p>
 <p>① pass, ② pass.</p>	<p><u>Variation 1:</u> This is a possible perfect play. Score = 0.5. Result = Black win.</p>



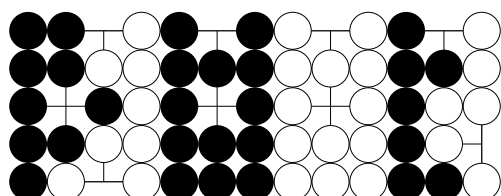
Variation 2: This is a possible perfect play.



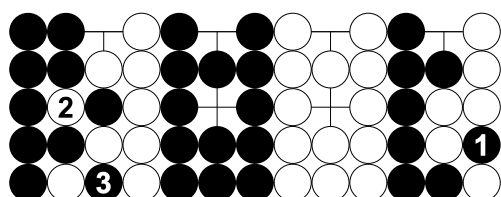
Play 7 creates a long cycle. Result = tie.



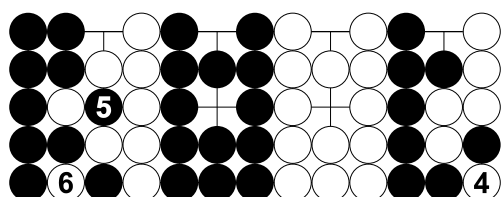
Variation 3: Move 2 is a strategic mistake.
Score = -6.5. Result = White win.



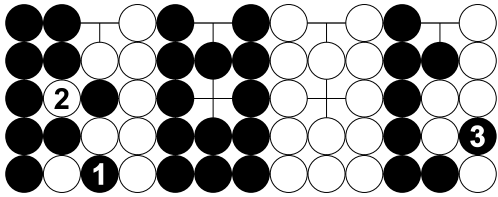
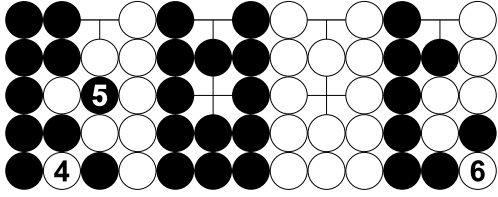
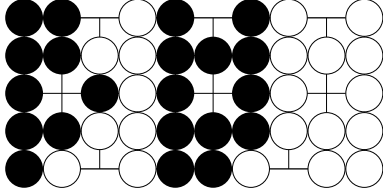
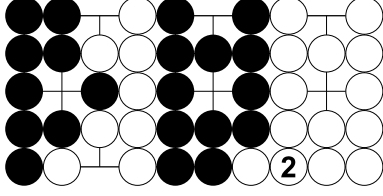
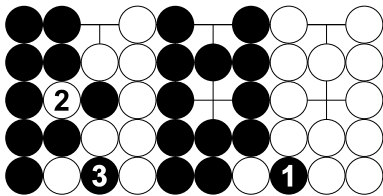
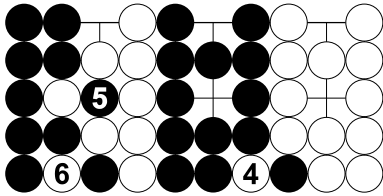
Position 0091, Black to move, komi = 0. A cycle occurs in perfect play.

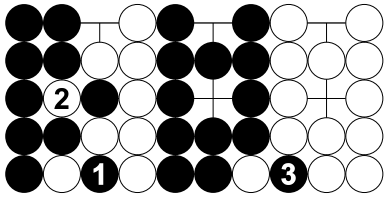
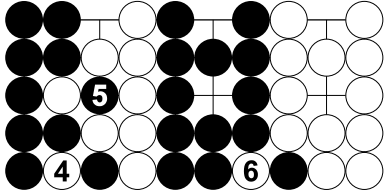


Variation 1: This is a possible perfect play.

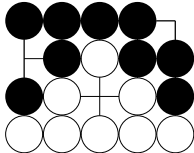
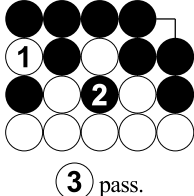
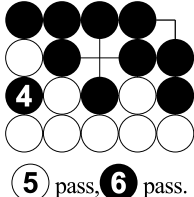
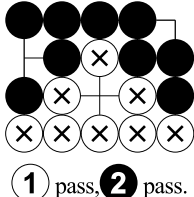


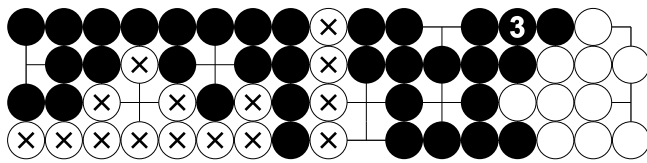
Play 6 creates a long cycle. Result = tie.

	<p><u>Variation 2:</u> This is a possible perfect play.</p>
	<p>Play 6 creates a long cycle. Result = tie.</p>
	<p>Position 0159, Black to move, komi = 0. A cycle occurs in perfect play.</p>
	<p><u>Variation 1:</u> Move 1 is a strategic mistake. Score = -1. Result = White win.</p>
	<p><u>Variation 2:</u> This is a possible perfect play.</p>
	<p>Play 6 creates a long cycle. Result = tie.</p>

	<p><u>Variation 3:</u> This is a possible perfect play.</p>
	<p>Play 6 creates a long cycle. Result = tie.</p>

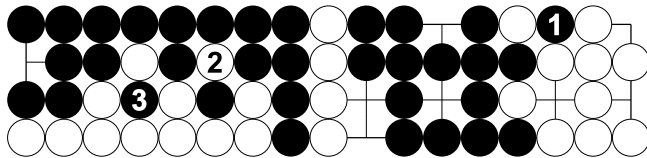
Double-ko-death

	<p>Position 0056, White to move. A cycle does not occur in perfect play.</p>
	<p><u>Variation 1:</u> This is a possible perfect play. White's attack is futile.</p>
	<p>Score = 20. Result = Black win.</p>
	<p><u>Variation 2:</u> This is a possible perfect play. During the Agreement Phase after move 2, the players agree to remove the marked stones. Score = 20. Result = Black win.</p>

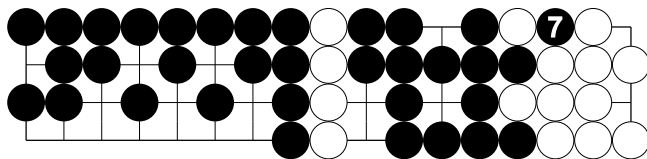
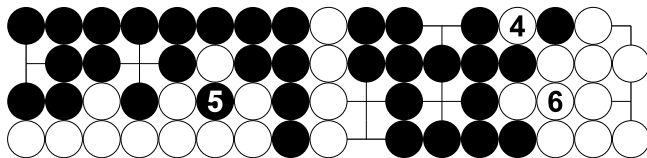


④ pass, ⑤ pass.

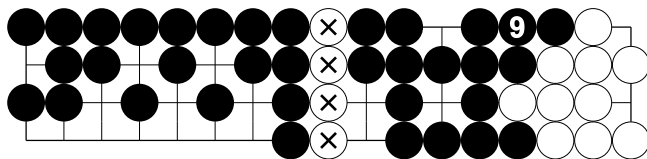
During an Agreement Phase after move 5, the players agree to remove the marked stones. Score = 3.5. Result = Black win.



Variation 2: This is a possible perfect play. Despite the double-ko-death White cannot win both endgame kos.

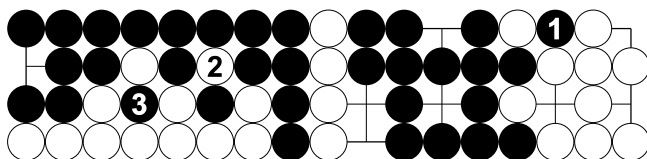


⑧ pass.



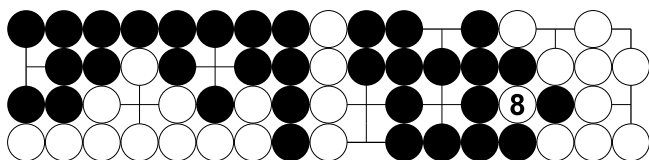
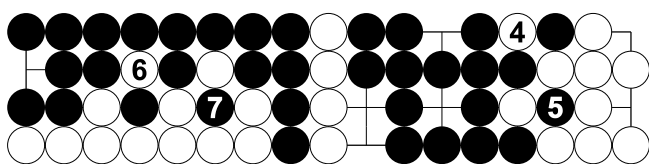
⑩ pass, ⑪ pass.

During an Agreement Phase after move 11, the players agree to remove the marked stones. Score = 3.5. Result = Black win.



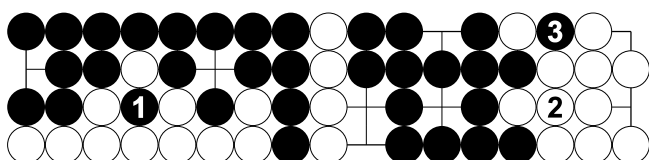
mistake.

Variation 3: Move 5 is strategic



tie.

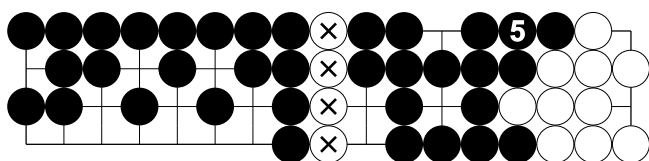
Play 8 creates a long cycle. Result =



4 pass.

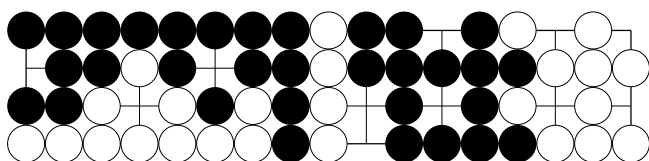
perfect play.

Variation 4: This is a possible



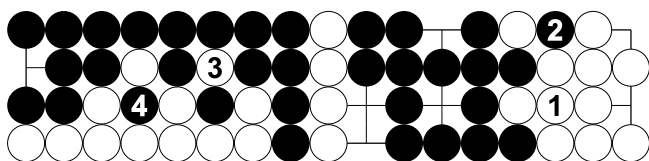
6 pass, 7 pass.

During an Agreement Phase after move 7, the players agree to remove the marked stones. Score = 3.5. Result = Black win.

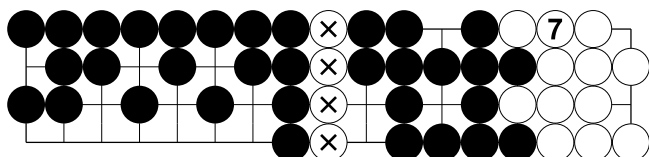
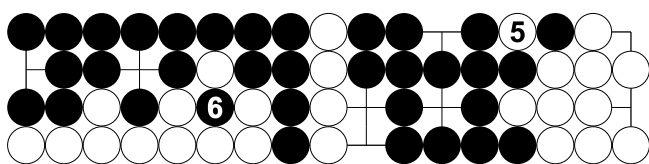


komi = 40.5. A cycle does not occur in perfect play.

Position 0082, White to move,

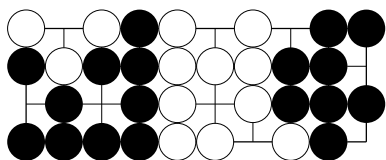


Variation 1: This is a possible perfect play. White is said to have an arbitrary number of ko threats in the double-ko-death.

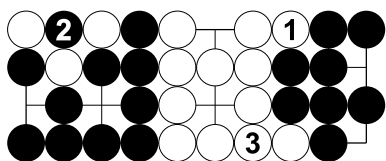


8 pass, 9 pass.

During an Agreement Phase after move 9, the players agree to remove the marked stones. Score = -0.5. Result = White win.

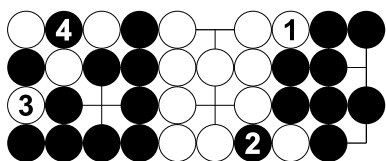


Position 0095, White to move, komi = 12.5.
A cycle does not occur in perfect play.

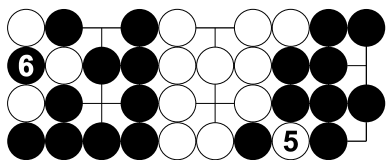


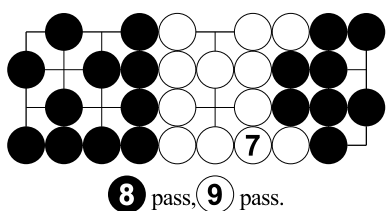
4 pass, 5 pass.

Variation 1: This is a possible perfect play.
Score = -0.5. Result = White win.

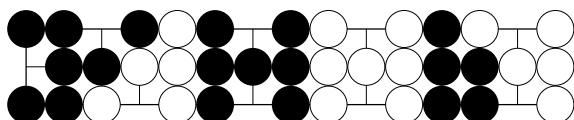


Variation 2: This is a possible perfect play.

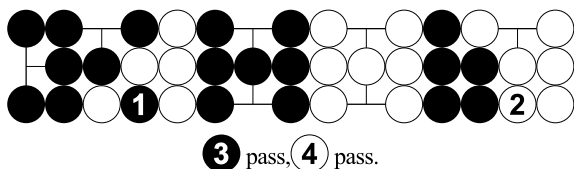




Score = -0.5. Result = White win.

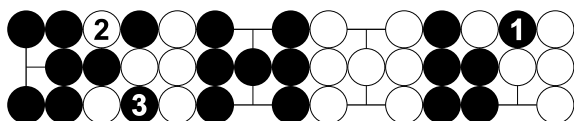


Position 0096, Black to move. A cycle does not occur in perfect play.



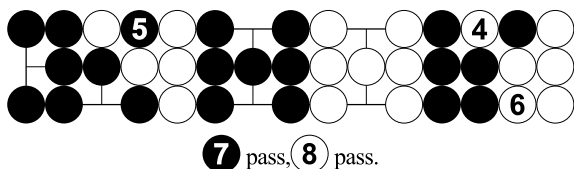
play. Score = 3. Result = Black win.

Variation 1: This is a possible perfect

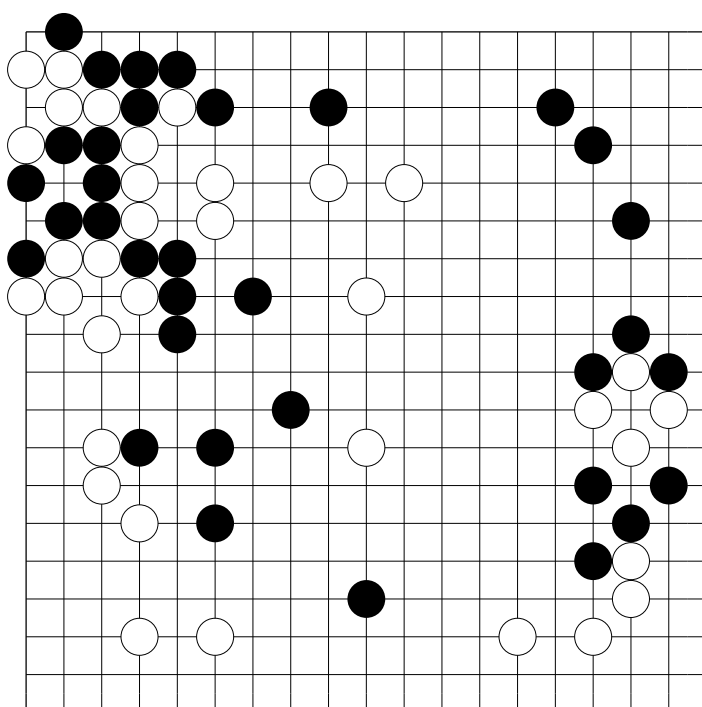


play.

Variation 2: This is a possible perfect

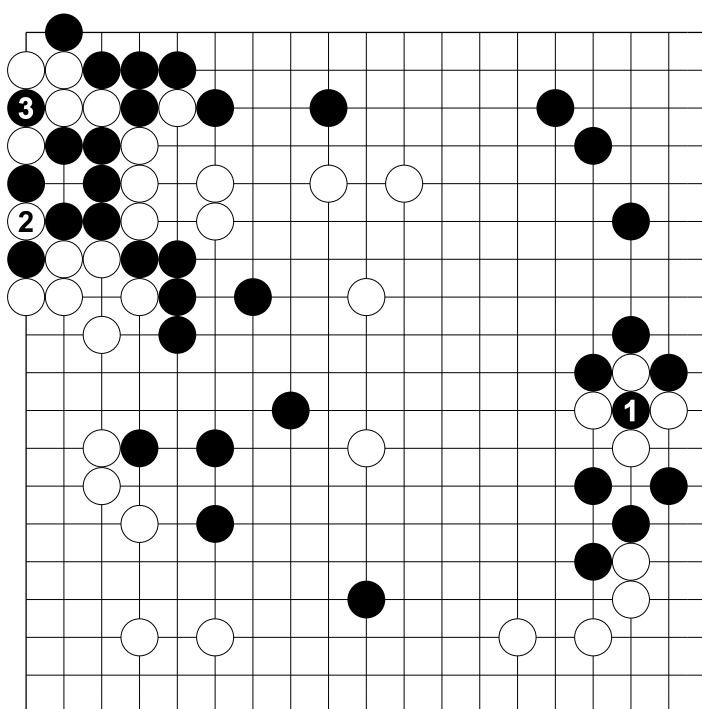


Score = 3. Result = Black win.



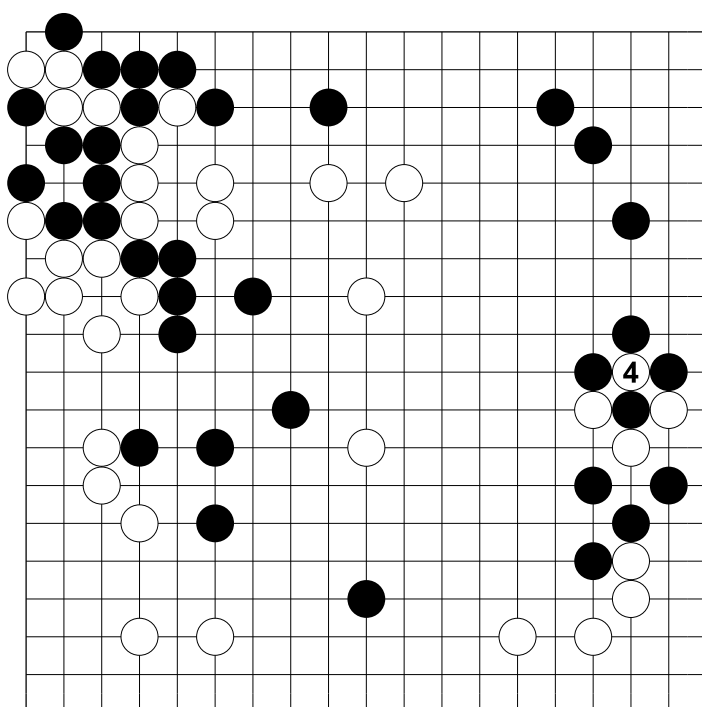
Position 0097, Black to

move. **A cycle does not occur.**



Variation 1: White uses his so

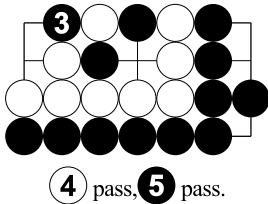
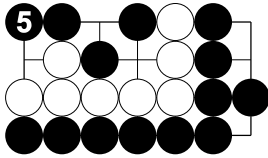
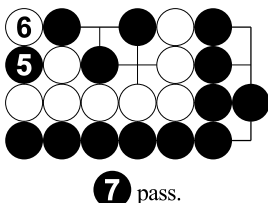
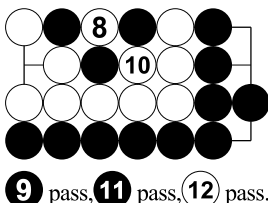
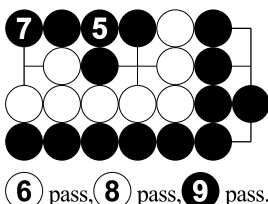
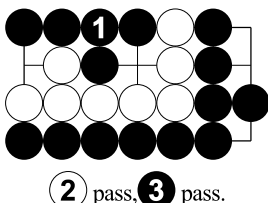
called supply of arbitrarily many ko threats in the double-ko-death.

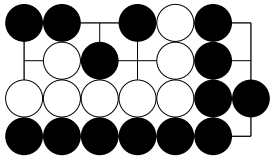
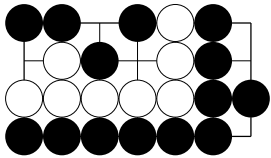
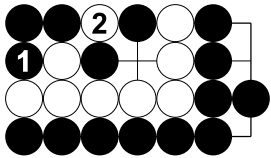
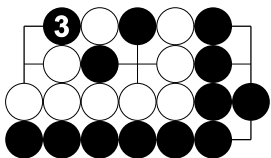
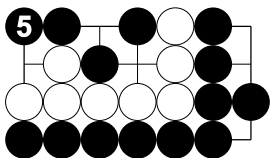
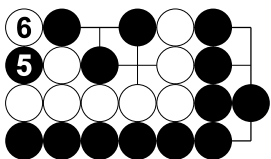


If Black tries to fight the basic-ko on the right side, he does not have ko threats in the double-ko-death. Therefore a cycle will not be created in typical strong play.

Sending-3-returning-1

	<p>Position 0160, Black to move, komi = 9.5. <i>A cycle does not occur in perfect play.</i></p>
<p>① pass, ② pass.</p>	<p><u>Variation 1</u>: This is a possible perfect play. Score = 0.5. Result = Black win.</p>
<p>① ②</p>	<p><u>Variation 2</u>: Move 5 is a strategic mistake.</p>

 <p>4 pass, 5 pass.</p>	<p>Score = -0.5. Result = White win.</p>
 <p>5 pass, 6 pass.</p>	<p><u>Variation 2a:</u> Move 5 is a strategic mistake. Play 5 creates a long cycle. Result = tie.</p>
 <p>6 pass, 7 pass.</p>	<p><u>Variation 2b:</u> Move 5 is a strategic mistake.</p>
 <p>8 pass, 9 pass, 10 pass.</p>	<p>Score = -11.5. Result = White win.</p>
 <p>7 pass, 8 pass, 9 pass.</p>	<p><u>Variation 2c:</u> This is a possible perfect play. Score = 0.5. Result = Black win.</p>
 <p>1 pass, 2 pass.</p>	<p><u>Variation 3:</u> This is a possible perfect play. Score = 0.5. Result = Black win.</p>

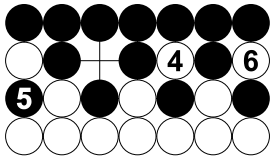
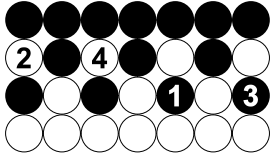
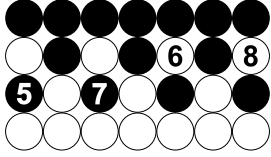
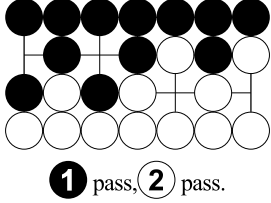
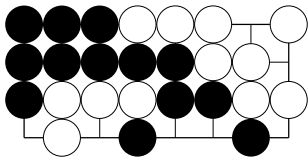
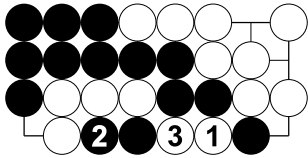
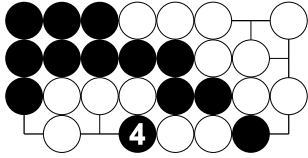
	<p>Position 0160, Black to move, komi = 10.5. A cycle occurs in perfect play. Notes: Here the 3-plays-ko-rules differ from the Long-cycle-ko-rules. This is the only known shape where their strategic consequences can differ.</p>
 <p>① pass, ② pass.</p>	<p><u>Variation 1:</u> Move 1 is a strategic mistake. Score = -0.5. Result = White win.</p>
 <p>① pass, ② pass.</p>	<p><u>Variation 2:</u> Move 5 is a strategic mistake.</p>
 <p>③ pass, ④ pass.</p>	<p>Score = -1.5. Result = White win.</p>
	<p><u>Variation 2a:</u> This is a possible perfect play. Play 5 creates a long cycle. Result = tie.</p>
 <p>⑤ pass, ⑥ pass.</p>	<p><u>Variation 2b:</u> Move 5 is a strategic mistake.</p>

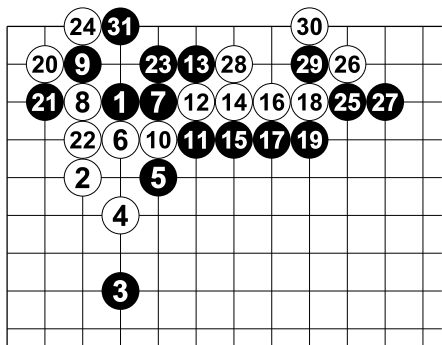
<p>9 pass, 11 pass, 12 pass.</p>	<p>Score = -12.5. Result = White win.</p>
<p>6 pass, 8 pass, 9 pass.</p>	<p><u>Variation 2c:</u> Move 5 is a strategic mistake. Score = -0.5. Result = White win.</p>
<p>2 pass, 3 pass.</p>	<p><u>Variation 3:</u> Move 1 is a strategic mistake. Score = -0.5. Result = White win.</p>

Frequently Studied Other Traditional Rare Shapes

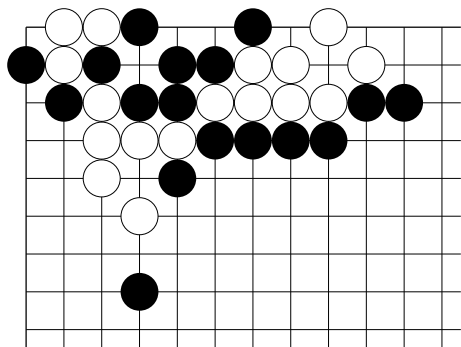
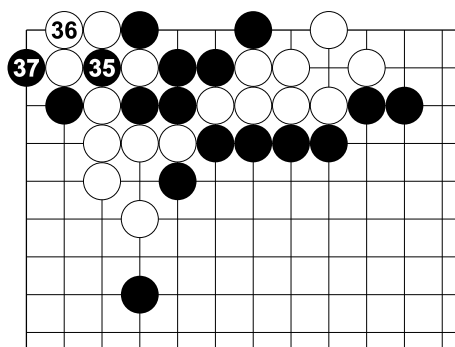
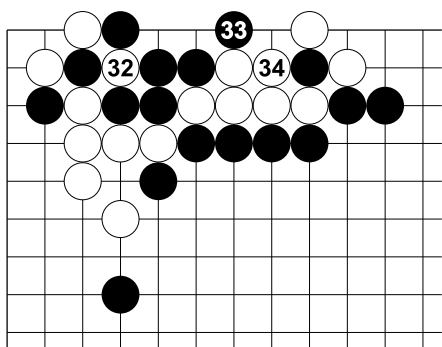
	<p>Position 0049, White to move, komi = 0. A cycle occurs in perfect play.</p>
	<p><u>Variation 1:</u> This is a possible perfect play.</p>
	<p>Play 6 creates a long cycle. Result = tie.</p>

	<p>Position 0049, White to move, komi = -20.5. A cycle does not occur in perfect play. Notes: Also in other long cycle shapes, a player might consider winning the game by sacrificing the local shape. It is not a local shape alone that causes a cycle. In particular, the global position and the komi have to be considered for correct strategy, too.</p>
	<p><u>Variation 1:</u> Move 6 is a strategic mistake.</p>
	<p>Play 6 creates a long cycle. Result = tie.</p>
	<p><u>Variation 2:</u> This is a possible perfect play. Score = 0.5. Result = Black win.</p>
	<p>Position 0109, Black to move, komi = 0. A cycle can occur in perfect play when either player forces his opponent to create a cycle.</p>
	<p><u>Variation 1:</u> This is a possible perfect play.</p>

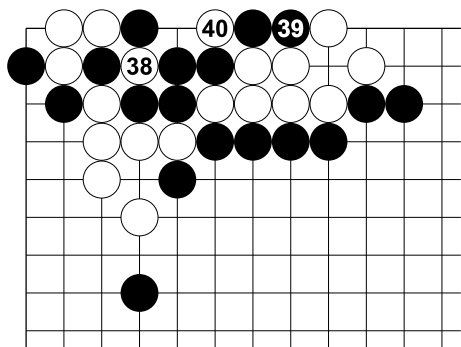
	Play 6 creates a long cycle. Result = tie.
	<u>Variation 2:</u> This is a possible perfect play.
	Play 8 creates a long cycle. Result = tie.
	<u>Variation 3:</u> This is a possible perfect play. Score = 0. Result = tie.
	Position 0070 , White to move, komi = 0. A cycle occurs in perfect play.
	<u>Variation 1:</u> This is a possible perfect play.
	Play 4 creates a long cycle. Result = tie.



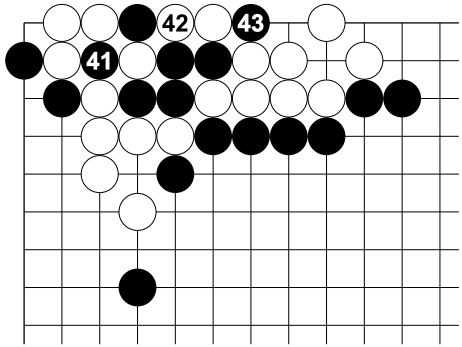
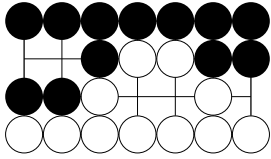
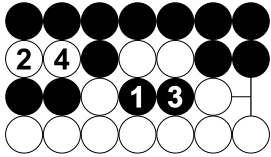
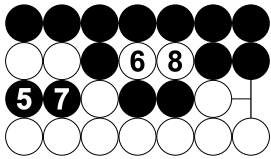
Position 0158, move-sequence in the joseki dictionaries. **Players can cooperate to play this long-cycle-tie "joseki"**. Notes: It is both players' right to play like this. If in a tournament a long-cycle-tie was announced to lead to a replayed game, if the players continue to create long-cycle-ties, but if it is necessary to proceed with the tournament, then eventually the tournament director has these choices: a) keep the tournament rules and declare several winners or b) break the tournament rules and draw lots. Good tournament rules set the choice in advance.



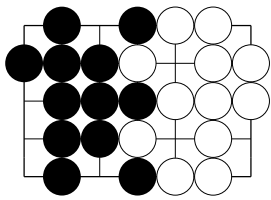
White to move, komi = 7.5.

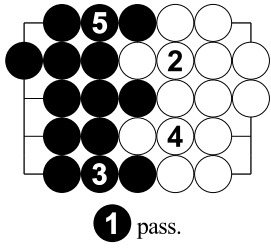
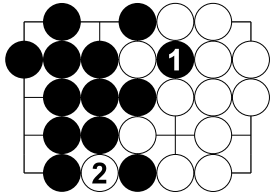
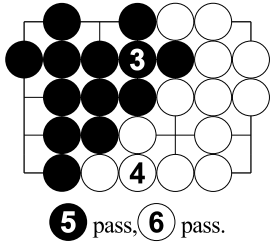


Cycle part 1.

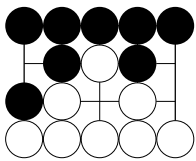
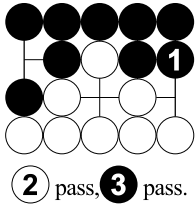
	<p>Cycle part 2. Play 43 creates a long cycle. Result = tie.</p>
	<p>Position 0050, Black to move, komi = 0.5. A cycle occurs in perfect play.</p>
	<p><u>Variation 1</u>: This is a possible perfect play.</p>
	<p>Play 8 creates a long cycle. Result = tie.</p>

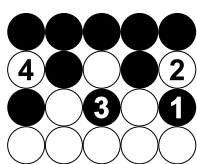
Hell-kos

	<p>Position 0151, Black to move, komi = 0.5. A cycle does not occur in perfect play.</p>
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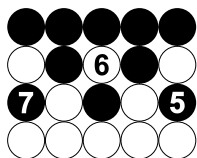
	<p><u>Variation 3:</u> This is a possible perfect play. Score = 0.5. Result = Black win.</p>
	<p><u>Variation 4:</u> This is a possible perfect play. Note: Many other perfect play variations are also possible. This is typical for symmetrical positions.</p>
	<p>Score = 0.5. Result = Black win.</p>

Preliminary Shapes

	<p>Position 0052, Black to move, komi = 0. Creating a triple-ko would be a strategic mistake.</p>
	<p><u>Variation 1:</u> This is a possible perfect play. Score = 1. Result = Black win.</p>



Variation 2: Move 1 is a strategic mistake.



Play 7 creates a long cycle. Result = tie.