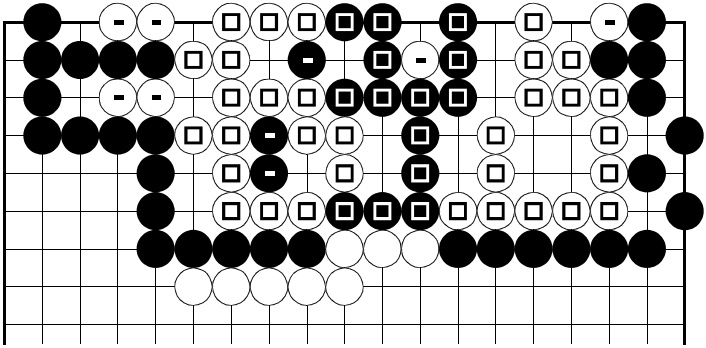


Essential (squares) and nonessential (minuses) strings

2.3 Liberties

2.3.1 Physical, Approach and Fighting Liberties

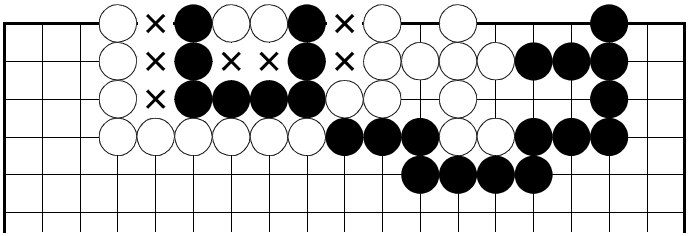
The following kinds say how liberties are counted.

A string's **physical liberty** is an adjacent empty intersection.

A group's **number of approach liberties** is the minimal number of the attacker's excess plays necessary for removal.

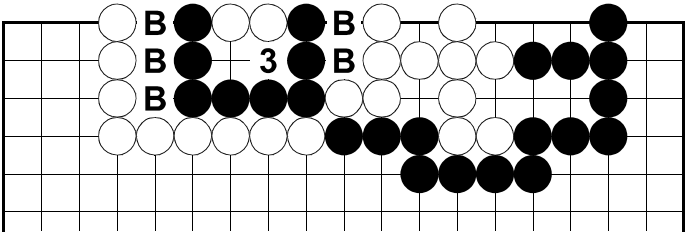
In a semeai, Black's or White's **number of fighting liberties** are specifically defined numbers of relevant approach liberties so that they are equal in the unsettled, non-trivial cases of a semeai class and type.

Fighting liberties can be equal also in seki cases. When the kinds of liberties are identical, then sometimes only the shorthand 'liberty' is used.



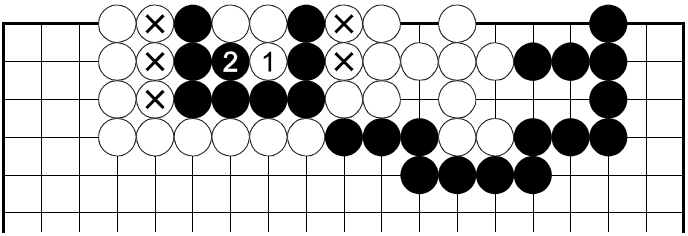
Example 1: Black's physical liberties

Example 1: The 7 marked intersections are the physical liberties of Black's essential semeai string. In semeais, knowing their numbers is insufficient though.

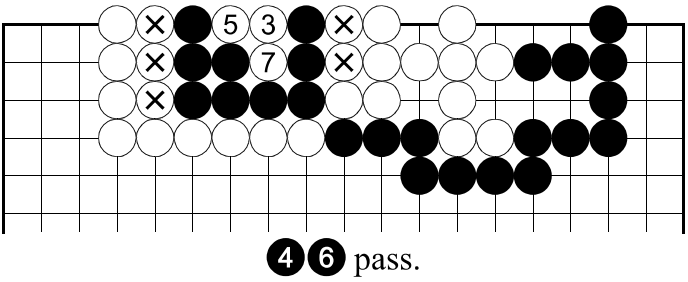


Dia. 1.1: Black's approach liberties

Dia. 1.1: If removal of the black string is the only objective, then White needs 8 plays more than Black to remove the black semeai string. Besides having to fill the five liberties on the outside and inside, White has to make three more plays than Black in the black eye. 8 is called the black semeai string's number of approach liberties.



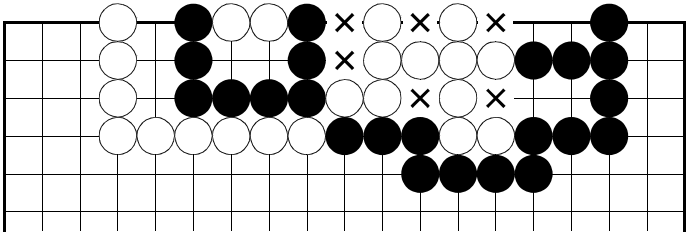
Dia. 1.2: White approaches Black's eye



Dia. 1.3: continuation

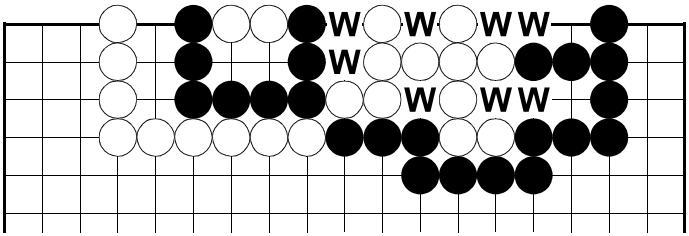
Dia. 1.2+1.3: Black 2 resists and prevents that White can remove the black string by making only two plays. Afterwards White needs the three plays White 3, 5 and 7 to fill Black's eye. Altogether White has made the four plays White 1,

3, 5 and 7 while Black has made the one play Black 2 in that eye. The difference of white and black plays in the eye is four minus one; the excess is three. This is the number of approach liberties of Black's eye in *Dia. 1.1.*



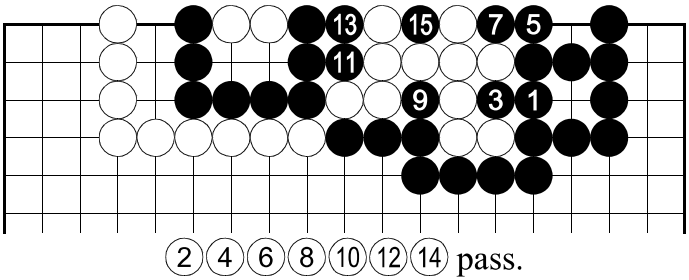
Dia. 1.4: White's physical liberties

Dia. 1.4: The 6 marked intersections are the physical liberties of White's essential semeai string.



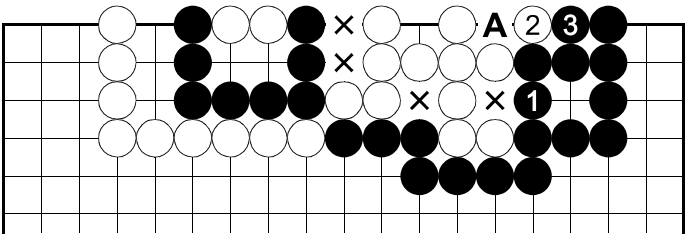
Dia. 1.5: White's approach liberties

Dia. 1.5: Supposing removal of the essential white string is the only objective, Black, the attacker needs to make 8 more plays than White to remove that string. This is White's number of approach liberties. On the outside, Black has to make two extra approach plays to approach White's outside physical liberties.



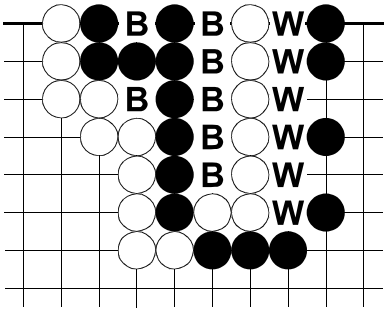
Dia. 1.6: Black approaches

Dia. 1.6: This example sequence shows that Black needs to make 8 plays until he removes the essential white string.

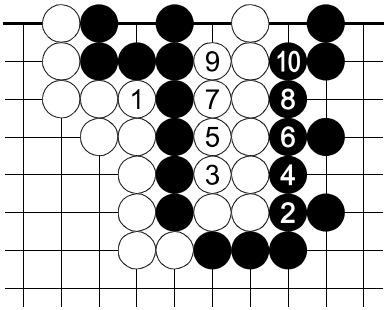


Dia. 1.7: White resists

Dia. 1.7: White 2 tries to resist. When the intersections marked with crosses will have been filled, then Black A threatens removal by filling the eye liberty. Unless White has a good excess of ko threats, his resistance is bad though because he reduces his number of approach liberties. Instead of having to play on the intersections 2 and A, Black will only have to play on the one intersection A. Altogether, on the intersections A, 2 and 3, Black will have made two plays while White will have made one play; the difference of plays there is two minus one, that is one. This is a worse, smaller number for White on these intersections than letting Black make two excess plays on the intersections 2 and A. Hence, unless White can fight the ko, White does not resist but lets Black play like in *Dia. 1.6* so that his minimal number of necessary approach plays is 8.



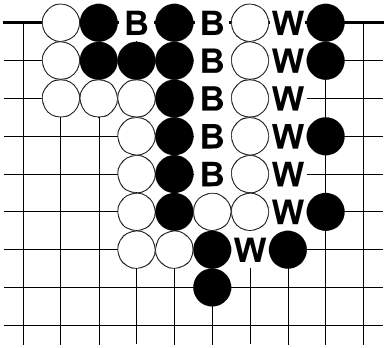
Example 2: fighting liberties



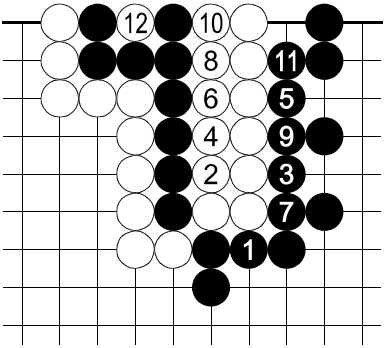
Dia. 2.1: futile defense

Example 2: When in a semeai one side has an eye and the other side has none, then the fighting liberties include the inside liberties only for the side with the eye. Here this is Black. A simple count of the fighting liberties shows who wins the semeai: Black's 7 fighting liberties beat White's 6.

Dia. 2.1: Reading confirms that the white semeai string is dead. Even starting does not help White.



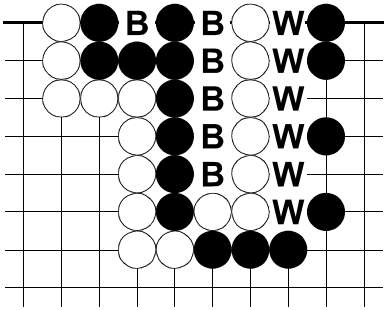
Example 3: fighting liberties



Dia. 3.1: futile defense

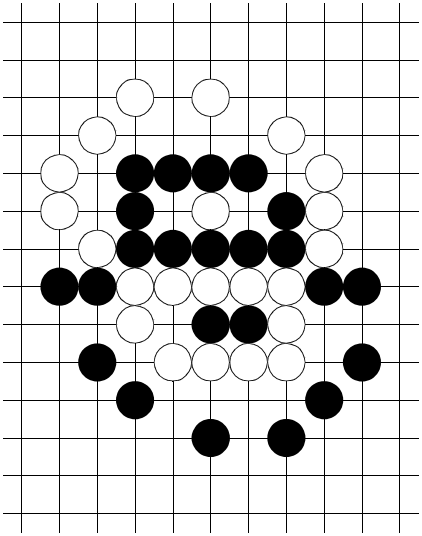
Example 3: Like *Example 2*, Black has an eye while White has none. The inside liberties count only towards Black's fighting liberties. For such a semeai type, they are defined like that. White's greater number of 7 fighting liberties beats Black's smaller number 6. This tells us that White has won the semeai and its black string is dead.

Dia. 3.1: Such a sequence shows the same: White can remove the black semeai string.

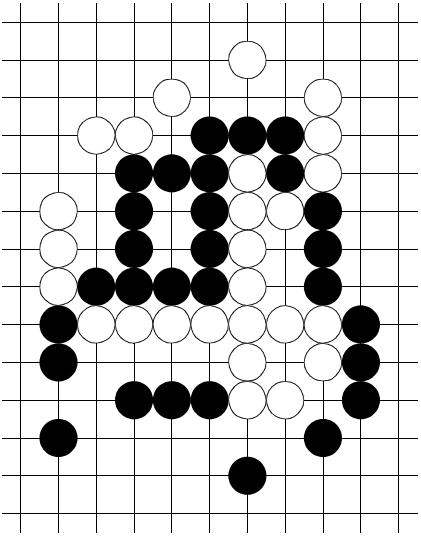


Example 4: fighting liberties

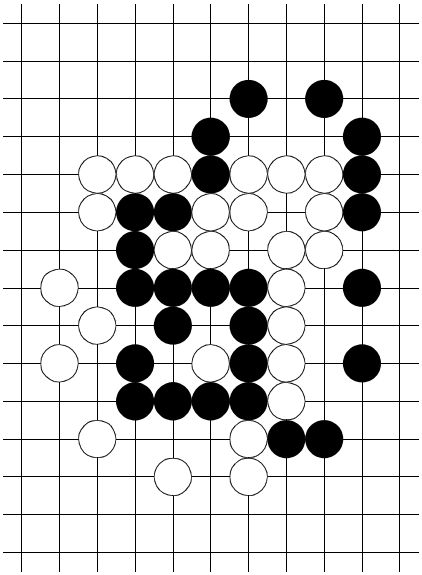
Example 4: This is another example of the eye versus no eye semeai type. Again the inside liberties are part of only Black's fighting liberties. Each player has the same number of 6 fighting liberties. This equality indicates the unsettled semeai status. The starting player wins the semeai.



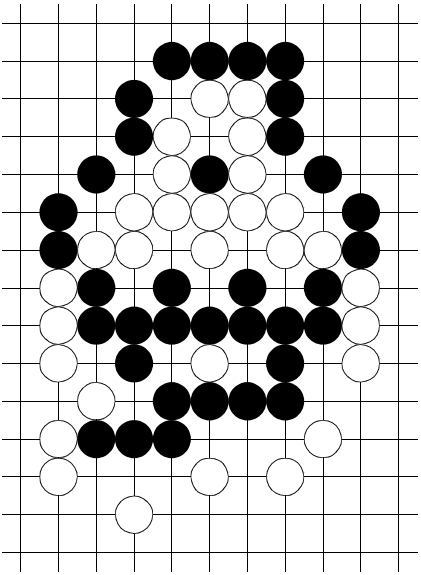
Problem 3



Problem 4



Problem 5



Problem 6

3.10.4 Case 3: With Inside Liberties, Equal Numbers of Exclusive Approach Liberties

A type 2 case 3 semeai is a seki. This is possible because there is at least one inside liberty and the numbers of exclusive approach liberties are equal.

Additional properties:

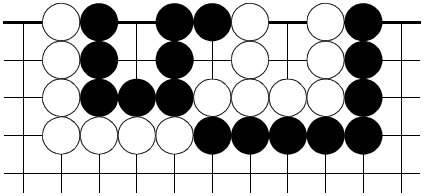
- Each side has a small eye.
- There are inside liberties.
- The numbers of exclusive approach liberties are equal.

Principle:

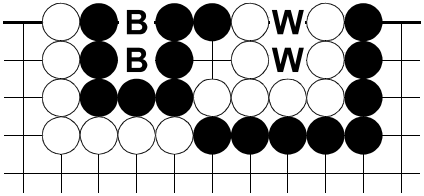
- **The semeai is settled as a seki.**

Remarks:

The fighting liberties are defined to include the exclusive approach liberties while the inside liberties are disregarded. If also they were included, they would have to be included for both players. When forming both players' difference of fighting liberties, the inside liberties would cancel out each other. Therefore not including them is simpler. The inside liberties protect the defender though because the starting attacker would need to fill them, too. Doing so takes away these liberties also from the attacker because the inside liberties are liberties for both players' essential semeai strings. For a removal, the last inside liberty would have to be filled before the last opposing eye liberty. Therefore, at the moment when the attacker fills the last inside liberty, the defender still has some eye liberty. Due to the initially equal number of exclusive approach liberties and the defender's next turn, he could remove the attacker's essential string before losing his own. Hence the attacker cannot succeed. Whenever the case 3 properties are given, the current local status is seki.

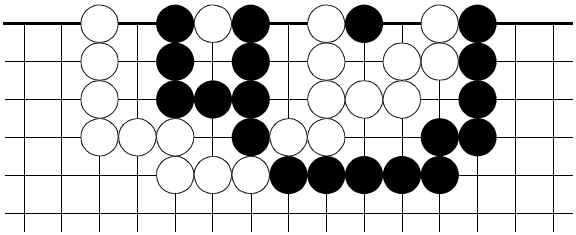


Example 1: seki

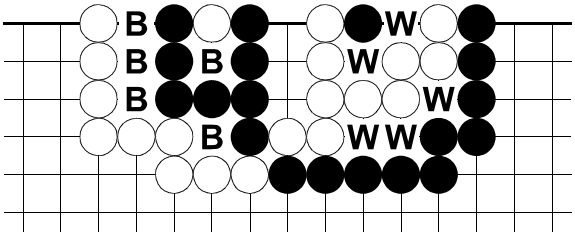


Dia. 1.1: fighting liberties

Example 1 + Dia. 1.1: Each player has 2 fighting liberties in his eye. Therefore the one inside liberty suffices to let the semeai be a seki.



Example 2: seki



Dia. 2.1: fighting liberties

Example 2 + Dia. 2.1: Black has 5 fighting liberties (four on the outside and one in his eye) and White has the same number of fighting liberties (three on the outside and two in his eye). Due to the equal number of fighting liberties, the semeai is a seki.

3.10.5 Common Features of Cases 4 to 6

Principles:

- **The favourite is the side with the greater number of exclusive approach liberties.**

- **The favourite is alive.**
- **The favourite's number of fighting liberties is the number of his exclusive approach liberties.**
- **The underdog's number of fighting liberties is the number of his exclusive approach liberties plus the number of inside approach liberties.**

3.10.6 Case 4: With Inside Liberties, Unequal Numbers of Exclusive Approach Liberties, Equal Number of Fighting Liberties

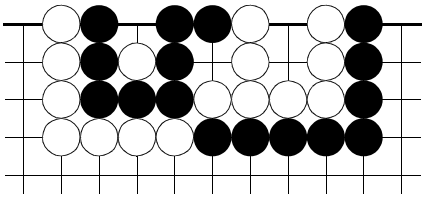
In an unsettled type 2 case 4 semeai, the underdog's essential semeai string either survives in seki or is killed.

Additional properties:

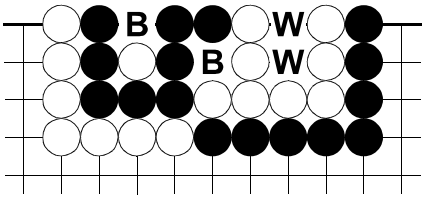
- Each side has a small eye.
- There are inside liberties.
- The numbers of exclusive approach liberties are unequal.
- The numbers of fighting liberties are equal.

Principles:

- **The semeai is unsettled.**
- **If the favourite starts, the underdog's group is dead.**
- **If the underdog starts, the semeai is a seki.**

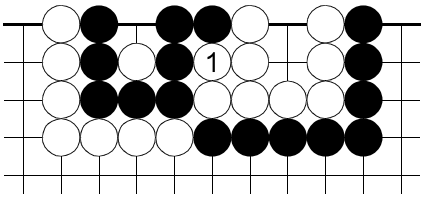


Example 1: unsettled

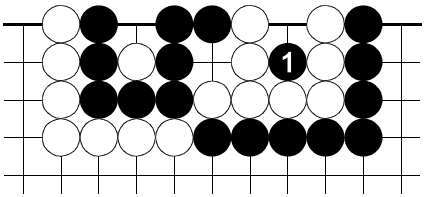


Dia. 1.1: fighting liberties

Example 1 + Dia. 1.1: Case 4 and the following cases with inside liberties and their unequal numbers of exclusive approach liberties have a favourite: the player having the greater number of exclusive approach liberties. In this example, it is White because he has two exclusive approach liberties (both in his eye) while Black has only one (in his eye). The underdog has a consolidating advantage though: the inside liberty counts towards only his fighting liberties. Each player has 2 fighting liberties: White has his two eye approach liberties while Black has one liberty each in his eye and on the inside. The combination of the inequality of numbers of exclusive approach liberties and equality of numbers of fighting liberties indicates the unsettled semeai status.



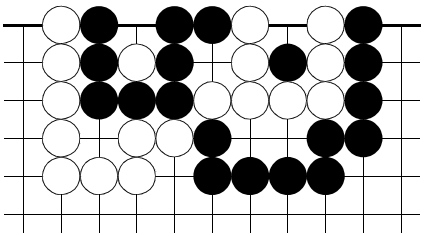
Dia. 1.2: favourite starts and kills



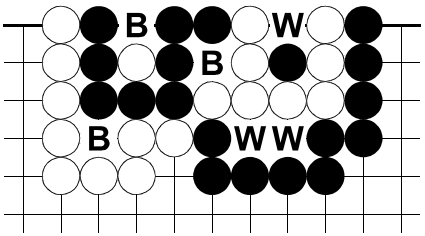
Dia. 1.3: underdog starts and creates seki

Dia. 1.2: If the favourite starts, then the underdog's semeai string is killed.

Dia. 1.3: If the underdog starts, then the semeai becomes a seki.

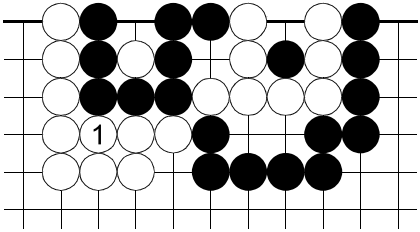


Example 2: unsettled

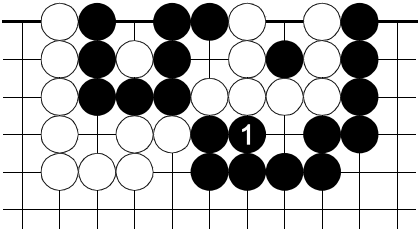


Dia. 2.1: fighting liberties

Example 2 + Dia. 2.1: Black has 2 exclusive approach liberties (one each on the outside and in his eye) while White has the greater number of 3 exclusive approach liberties (two on the outside and one in his eye) so that White is the favourite. Each player has 3 fighting liberties because Black may count also the inside liberty for that purpose. The semeai is unsettled.



Dia. 2.2: favourite starts and kills



Dia. 2.3: underdog starts and creates seki

Dia. 2.2: White, the favourite starts and kills the underdog's semeai string.

Dia. 2.3: Black, the underdog starts and creates a seki.

3.10.7 Case 5: With Inside Liberties, Unequal Numbers of Exclusive Approach Liberties, the Favourite has More Fighting Liberties

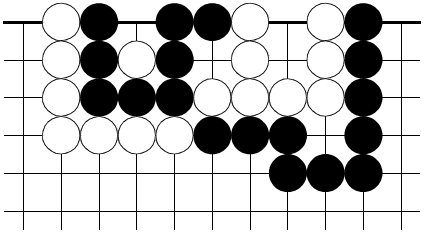
A type 2 case 5 semeai has already been won by the favourite.

Additional properties:

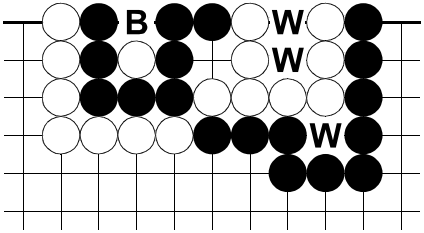
- Each side has a small eye.
- There are inside liberties.
- The numbers of exclusive approach liberties are unequal.
- The favourite has more fighting liberties.

Principles:

- **The semeai is settled.**
- **The underdog's group is dead.**

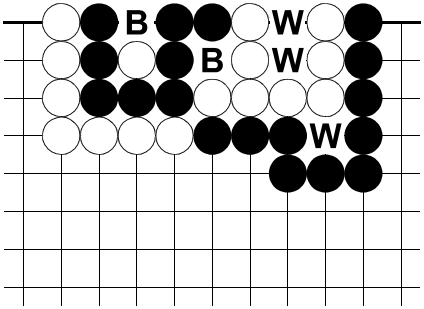


Example 1: dead underdog

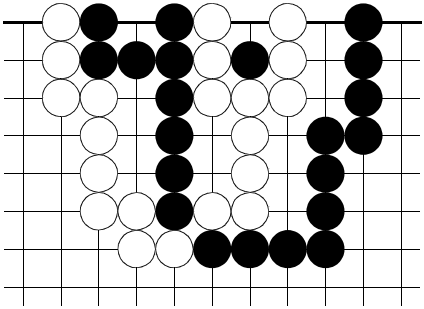


Dia. 1.1: exclusive approach liberties

Dia. 1.1: White is the favourite because he has 3 exclusive approach liberties (one on the outside and two in his eye) while Black has only 1 exclusive approach liberty in his eye.

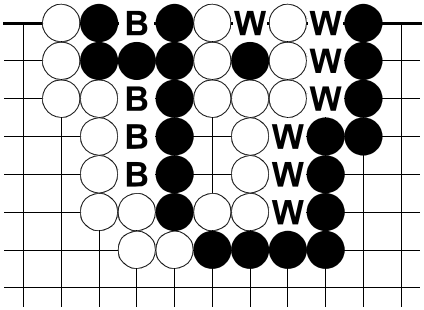


Dia. 1.2: fighting liberties

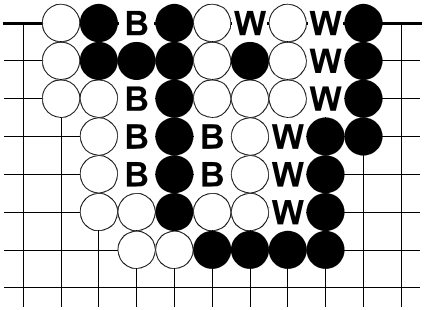


Example 2: dead underdog

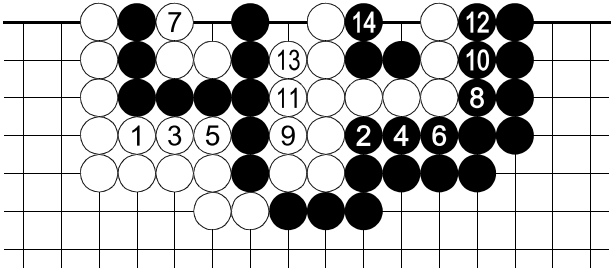
Dia. 1.2: The inside liberty counts for Black, the underdog's 2 fighting liberties. White has 3 fighting liberties. Due to his greater number, White wins the semeai and the underdog's semeai string is dead.



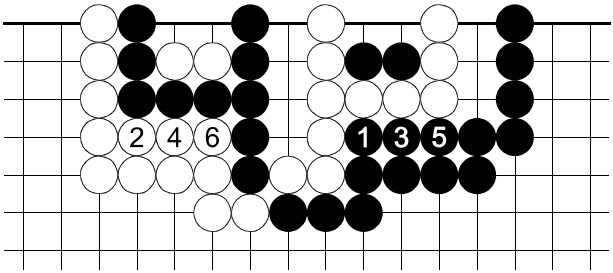
Dia. 2.1: exclusive approach liberties



Dia. 2.2: fighting liberties



Dia. 2.3: futile attack by the favourite



Dia. 2.4 futile attack by the underdog

Dia. 2.3+2.4: Either player's attack does not succeed. While the favourite fails just barely, the underdog cannot even dream of killing the opponent. Usually neither sequence is played during the middle game.

3.15 Types 2 and 3 Summary

In a type 2 semeai, each side has a small eye.

In a type 3 semeai, each side has a big eye of the same size.

The following summary applies equally to types 2 and 3:

General principles:

- **At least one inside liberty makes sekis possible.**
- **If there is a favourite, then he has the greater number of exclusive approach liberties.**

6 Class 3: Like Class 1, Essential String with a Big Eye in Atari

Definition:

A **class 3** semeai is like a class 1 semeai except for this condition:

- At least one essential string with a big eye is in atari.

Remarks:

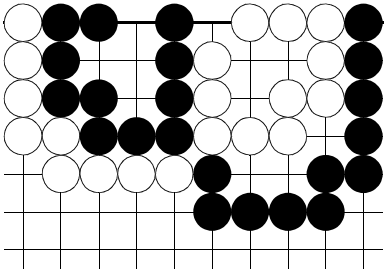
Also see *3.2 Class 1 Definition (p. 62).* In this and the following chapters, the types use the class 1 type numbers. Of course, only those types with some big eyes at all can belong to class 3. Therefore class 3 types 1 or 2 do not exist. The seemingly not included cases simply do not exist. Another semeai class constructed from combining the conditions of classes 2 and 3 would have types 3 and 5 but not type 4 because a string with neither eye, inside liberties nor outside liberties cannot exist.

Principles:

- **A big eye of a side with an essential string in atari is almost-filled.**
- **A side with a big eye and an essential string in atari does not have any outside liberty.**
- **There is no inside liberty.**
- **A player's exclusive approach liberties are considered unless the semeai is won immediately by removing an essential string with a big eye initially in atari.**
- **The opponent of a player with a big eye in atari can win and dissolve the semeai immediately by removing the player's essential string.**
- **If the only player having a big eye in atari plays first, then the semeai can revert to class 1, unless the opponent's essential string in a type 4 semeai has been in atari, too, and can be removed immediately.**

8.3 Type 5: One Side has a Big Eye, the Other Side has a Smaller Eye

The favourite controls the inside liberties.



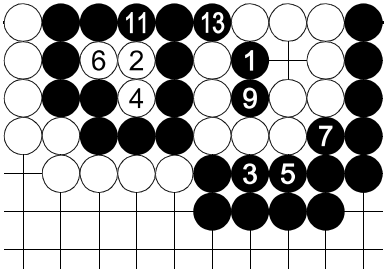
Case 1 example 1

Case 1:

The numbers of fighting liberties are equal.

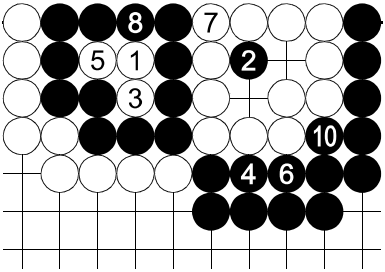
The starting player wins.

In Dia. 1.1, 1.2 and 2.1, usually only move 1 is played during the middle game.



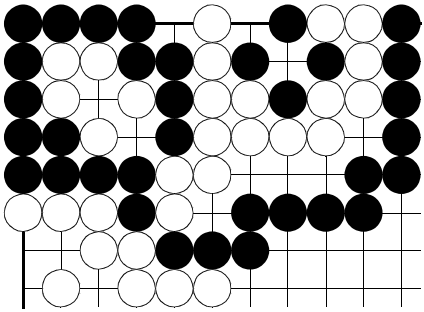
(8) (10) pass, (12) at (2).

Dia. 1.1: The starting favourite kills the underdog. White 8 at 13 does not help, either.

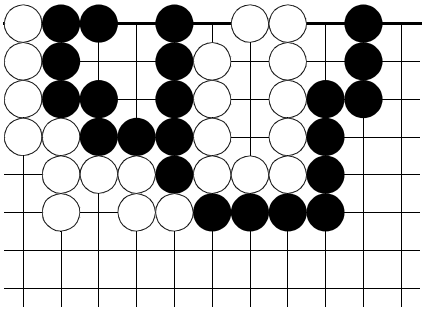


(9) at (1), (11) at (3).

Dia. 1.2: The starting underdog kills the favourite.



Case 1 example 2



Case 2