Chapter 6　Perpetual Patterns　（Ko）

5000　Ko, the Basic Pattern from which a perpetual phase occurs

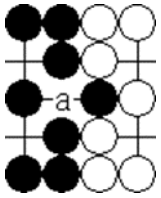


Fig.1

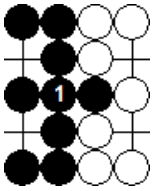


Fig. 2

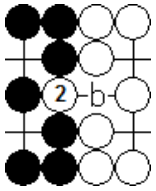


Fig.3 after black's pass

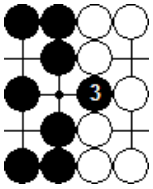


Fig. 4 if (3) is permitted

For a basic understanding of perpetual patterns, please look at the Fig.1 above.
If it is the black's turn to play and it is wise for the black to make a move at "a" than to pass, the result will be as shown in Fig.2.　However, if the black chooses to pass, the white will be happy to make a move at "a" in Fig. 1 to capture one black stone and the result would be as shown in Fig. 3.　You will recognize that, at Fig. 3, the situation is just the reverse of the pattern of Fig.1 and that the white enjoyed additional 1 point.
Now it is the black's turn.　If black should be permitted to play at b in Fig. 3, he would be wise to make a move at "b" to capture one white stone than to pass.　However, if that move at "b" is permitted, the result after the move would be as shown in Fig. 4.　If the move (3) were permitted and the black actually chose to make that move as in Fig. 4, you will notice that the board pattern is exactly the same as Fig. 1.　From Fig.1 to Fig. 4, white captured one stone and black captured one stone also.　This means the board pattern was returned to Fig.1 after two moves of players, (2) and (3).　If such moves should be permitted and the both players choose to make a move there, these patterns will go on repeatedly and there will be no end to it as indicated in Fig. 5, Fig. 6 and so on.

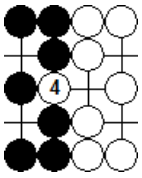


Fig. 5

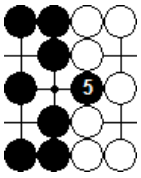


Fig. 6

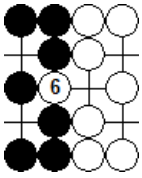


Fig. 7

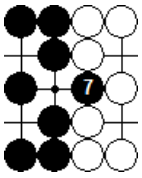


Fig. 8 ……

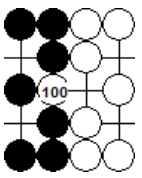


Fig. 101

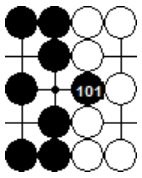
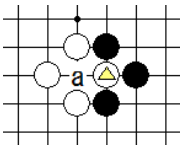


Fig. 102……

Note that each move of the black and white above is gaining 1 point for a move.　If there is no other place to play as a valuable move, each player will want to continue these moves.　Then there will be no way to finish these perpetual moves.
Realizing this fact, the rule decided that such a move as (3) above recapturing a stone just played should not be permitted.　This pattern is the simplest pattern where a perpetual phase is occurring and this pattern is named "Ko" in its Japanese technical term.

5010 Basic Ko Rule



Presently, the most common basic Ko Rule states that a player is not allowed to recapture a stone just played on the board so that the complete board pattern will come back to the pattern experienced one move ago.

With the pattern shown in this chart, if the white made a move at △ and captured a black stone at "a, the black is not permitted to make the next move at "a" to recapture a white stone at at △, because the complete board pattern if the black should play at "a" is exactly the same as the board pattern at the timing just before the white has played at △, that was a move ago.

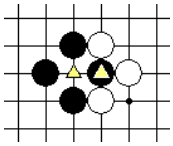
However, the black is allowed to play at "a" if not just after the white's △, since the board pattern of the entire board will be changed when one or more moves are made somewhere.

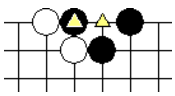
At this point, we wish to clarify that there can be a generalized perpetual move prohibition rule which states that a player is not permitted to make a move which brings about a complete entire board pattern which was once experienced during the game. This general rule will be clear and objective but it is argued that this rule may not be practicable. In common Ko patterns, the same pattern comes back after two moves. However, there can be other more complicated patterns with which two players find it necessary to repeat the same moves after four moves, six moves, eight moves, etc. In theory, it is, in one sense, convenient to apply the general perpetual move prohibition rule, but in practice, most of the Go rules today actually decides that the game will be judged to be a "draw" if such a long perpetual pattern occurs and two players cannot escape from it.

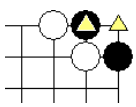
Such long perpetual patterns will be shown later.

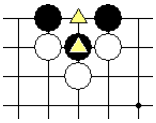
5020 Basic Patterns of Ko

This perpetual Ko pattern may form a technically complicated fight on the board but there are only three basic patterns of Ko as shown below.


near the center


at an edge


at a corner


This is a variation of the center

5030 More Important Ko fights

As you saw in the preceding two sections, Ko is simple in its shape, but the fight related

to such a Ko pattern may get pretty complicated depending on the situation of the set of stones related to the Ko. In the pattern we saw in section 5000, the value of the Ko may be as small valued as 1 point only, but the value of Ko fight may be much larger. We will see why. First let us examine the situation of the following chart Fig. 1, as white has played move (1).

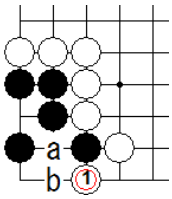


Fig. 1

By the white's move at (1), one black stone is in the risk of capture now. It is possible to avoid that capture if the black makes the next move at "a". However, that move is not the best move here locally. The black had better, instead of avoiding capture, to make a move at "b" to make a Ko shape at this point. Why?

If the black plays at "a", the white will play at "b" to prevent the second black eye to be formed at the corner. The result shown below in Fig. 2 is a pattern of the black's death with one eye only.

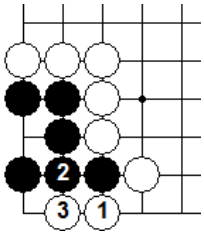


Fig. 2

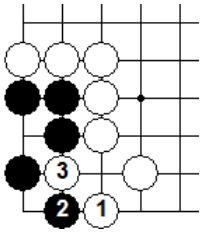


Fig. 3

Then, if the black plays at "b" in Fig. 1, to make the Ko form, what will happen? As shown in Fig. 3, white can capture one stone by move (3) and if white can make another additional move, the white can kill this whole group of black stones, yes.

Well now, let us ask ourselves if the black can capture the white stone at (3). The answer is "No, they can't." because of the rule which does not permit the recapture of the Ko stone. Well, then, is black dead? The answer is "No, not yet!" Why?

For the purpose of explanation, let us assume that there was a pattern of stones indicated in Fig. 4 on the same board.

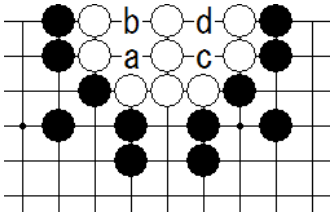
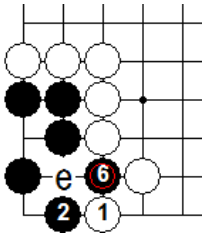


Fig. 4



black's (4) at "a" and white's (5) at "b"

Fig. 5

In this pattern the white group is living with two separate eyes. However if the black can make two moves consecutively, the black can kill the white group. For example, if

the black plays at “a” and then at “b”, the black will capture two stones and the white will lose one eye. Similarly, if the black can play at “c” and “d”, the black also capture two stones there and white will be left with one eye only. In normal situations, the black will not be able to make two consecutive moves, since moves must be made alternately and if the black makes a move at “a”, white can respond at “b” to avoid the death of the group. However, when a Ko fight starts, the story is different.

Let us assume that the game went on to reach the white’s (3) in Fig. 3. It is wise for the black to play at “a” in Fig. 4. What will happen then?

If the white chooses to make another move at Fig. 3 to kill the whole black stones there, he can do so but the black will be happy to play at “b” in Fig. 4 to kill the whole white group there. For this reason, the black’s move at “a” is called “Ko-Threat”.

If the white does not like that result, he will have to make a response at “b” to avoid white’s death in Fig. 4. Then the black is able to make a move at (6) to recapture a white stone as shown in Fig. 5. Now, by the rule, the white at (7) is not allowed to make a move at “e” to recapture a stone and he must make a move somewhere else. White will try to find his own Ko-Threat on the board. He may or may not find a suitable Ko-Threat. It depends of the situation of the board. If he finds a good Ko-Threat, the black may have to respond to it but he will have another Ko-Threat at “c”. If the black is able to get the chance to play at “e”, you will see that the black gets the survival pattern with two separate eyes.

If you carefully compare the result of the black’s move of “a” or “b” at Fig. 1, you will recognize that the result of Ko is better than the result of a straight death!

5040 A Typical Sequence of Moves at Ko

Here we will demonstrate a typical sequence of moves at Ko starting from the chart Fig. 1 below.

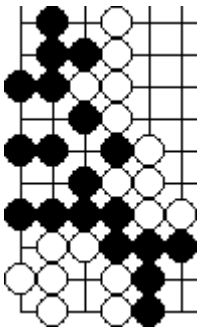


Fig. 1

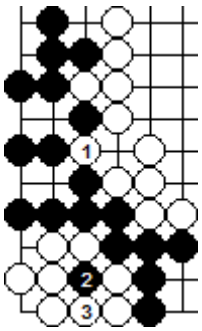


Fig. 2

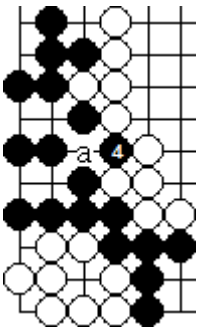


Fig. 3

White’s (1) is a Ko fight. Black’s (2) is Ko-Threat saying that he will play at (3) to kill the white’s group at the left lower corner, if white should choose to resolve the Ko fight. White’s (3) is a response to the Ko-Threat refusing the black to kill the white’s group at the left lower corner. Then the black is permitted to play at (4) in Fig. 3. Then for the white he must find his Ko-Threat on the board for (5). If this Ko-Threat is important, the black will respond to it for (6) there locally, and white can play (7) to recapture one

stone at the Ko to continue the fight, but if the black judges that he does not want to continue the Ko fight, he can choose to play at "a" in Fig. 3 for (6) to resolve or finish this Ko fight. These are the typical sequence of moves when a Ko fight starts. Please refer to the following chart.

Chart 1

--Response to the Threat---Return to Ko--→(Ko continues)

Ko starts---Ko Threat--<

--Resolve Ko----Second Move of the Theat→(Ko ends)

5050 The Number of Ko-Threats

When a Ko fight starts, it is important for both players to count the number of possible Ko-Threats. Sometimes, the number of Ko-Threats may have something to do with how it is used. Here you will see a typical pattern with which the number of Ko-Threats may vary depending on how you do with it.

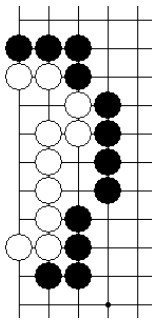


Fig. 1

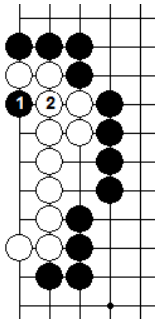


Fig. 2

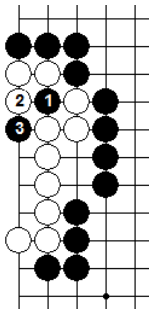


Fig. 3

Let us check the pattern shown in Fig. 1. You will see that there is a Ko-Threat for the black. However, if you play at (1) , it is used as a Ko-Threat once only. The white will respond at (2) and that is all. There will be no more Ko-Threat there. If you are more thoughtful and play at (1) as shown in Fig. 3, the white will respond at (2), but then there will be another Ko-Threat at (3) and the white will have to respond to it at (4). This means that there were two Ko-Threats locally and if you choose the move (1) at Fig. 2, you can only use it once.

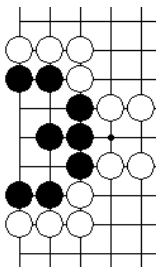


Fig. 4

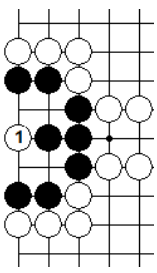


Fig. 5

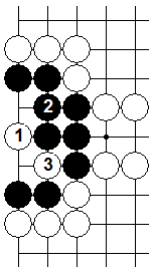


Fig. 6

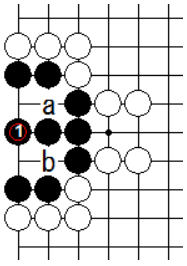


Fig. 7

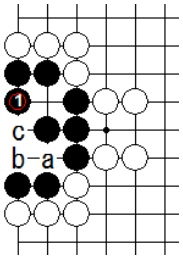


Fig. 8

Please check the Fig. 4. If you are careless, you may think this group of black stones is living with the territory with the size of 5 points. But if you are careful enough, you will find out that the white can kill the black group by the single move of (1) in Fig. 5. You will be able to confirm black's death in Fig. 6. Then you will want to add a move to

Fig. 1 to make the group of black stones completely living. The move (1) at Fig. 7 may be the move you may choose. However, the move (1) in Fig.7 is not the best move. You must be careful enough to add a stone at (1) in Fig. 8. The size of the territory for Fig. 7 and Fig. 8 is exactly the same, 4 points. But the number of Ko-Threats for the white that may become important is different. If (1) in Fig. 7 is the black's move, the white can enjoy two Ko-Threats at "a" and "b". However, if (1) in Fig. 8 is the black's move, the white has one Ko-Threat only at "a", "b" or "c".

5060 The size of Ko-Threats

The size of the Ko-Threats will be calculated by the number of points one will gain if two consecutive moves should be made.

Here we will show you some samples of Ko-Treats of various sizes.

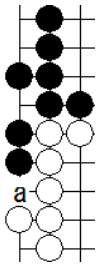


Fig. 1

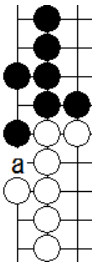


Fig. 2

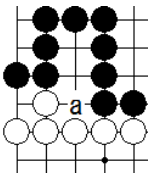


Fig. 3

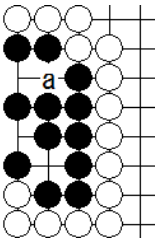


Fig. 4

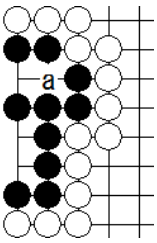


Fig. 5

The size of the white's Ko-Threat of "a" in Fig. 1 is very small. By two consecutive moves of the white, he can capture two black stones but the black can capture one stone back at once. The value the white will gain is only 1 point.

The Ko-Threat of "a" in Fig. 2 is even smaller. By two consecutive moves the white can capture one black stone but the result will be another small Ko. If white can win this Ko fight. his gain is 1 point, but if black wins this Ko fight, the white has no gain at all.

The Ko-Threat of "a" in Fig. 3 is slightly larger than that of Fig. 1. If this local pattern is to be resolved, black's territory will be 1 or 2 points depending on who plays there first. If the pattern is used as a Ko-Threat of "a" in Fig. 3, the result if the white can make two consecutive moves will be zero as the blacks territory.

The Ko-Threat of "a" of Fig. 4 is greater. By two consecutive moves the white will gain 4 points. The Ko-Threat of "a" of Fig. 5 may look like the same pattern as "a" in Fig. 4. But there is a vast difference between "a" in Fig. 4 and "a" in Fig. 5. In case of Fig. 5, by the white's two consecutive moves, the whole black group will be dead. Thus the gain is not 4 points but as big as 26 points!

As you have learned the importance of the size of Ko-Threats and the number of Ko-Threats, you will see that the possibility to win a Ko fight will be greater if you have more Ko-Threats which are large enough as threats. However, you must remember that a Ko fight is more complicated than that. Firstly the value of the Ko fight itself is important to consider. The value of the Ko fight is measured with the comparison of

the two patterns, one achieved when you win the Ko fight and the other which is reached when you give up the Ko fight. Secondly, if you have a number of Ko-Threats on the board, the question is whether you should use larger Ko-Threats before you use smaller Ko-Threats. This is a pretty delicate question since occasionally it is desirable to use smaller Ko-Threats first and leave larger Ko-Threats for a later use.

5070 A loss-taking Ko-Threat

In the last section, the size of a Ko-Threat was defined as the gain you would realize if you could make two consecutive moves. But there is another measurement of the size of a Ko-Threat, which is the loss you may suffer if the response was made against that Ko-Threat. This second meaning of the value of Ko-Threat is independent of the the value of it in its first meaning.

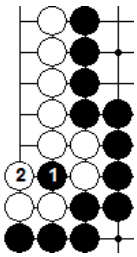


Fig. 1

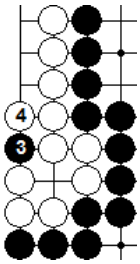


Fig. 2

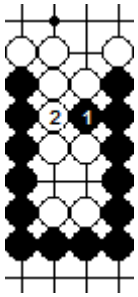


Fig. 3

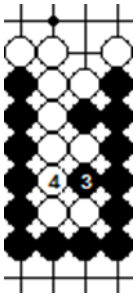


Fig. 4

Normally, a Ko-Threat and the following response to it will not make any difference of points. As you will see, the Ko-Threat (1) and its response (2) will not give no difference of points in Fig. 1. The same thing is true with the Ko-Threat (3) and its response (4) in Fig. 2. Similarly, the Ko-Threat (1) and its response (2) will give no difference of points in Fig. 3. The same thing is true with the Ko-Threat (3) and its response (4) in Fig. 4.

Now look at the chart Fig. 5. Will a move "a" a meaningful Ko-Threat for the black?

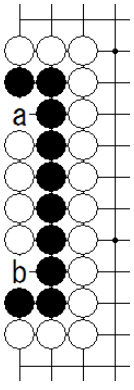


Fig. 5

As a matter of fact, this local pattern is a type of Moratorium discussed in 4030.

In normal games, neither black nor white will want to make a move at "a" or "b" because that is a bad move. This pattern recognized as moratorium means there is no terrory points for the black or for the white, in other words, zero verses zero.

In normal situations, black or white will not touch that local position because a move there will be loss-making. If black plays "a", white will be happy to play "b" and gain

22 points. If white plays “a”, then black will be happy to play “b” and gain 10 points.

But if you ask if this local pattern can provide a Ko-Threat, the answer is tehnically “yes”. For example, if you are fighting on a very large sized Ko somewhere on the board and the black wants an effective Ko-Threat, a move at “a” in Fig. 5 will provide one. If the black plays “a” and the white decides to resolve the Ko situation, the black will play “b” next. The black will lose the Ko but will gain 8 points there. It may be a good deal. The 8 points is the size of this Ko threat if the Ko is resolved at that point. However, in case the white chooses to respond to the Ko-Threat of black’s “a” with his move at “b”, the black’s loss is as big as 22 points.
If that loss is too big, the loss may get to be greater than the value of the Ko itself!
For this reason, a Ko threat like “a” in Fig. 5 will be good only in a very exceptional case. That exception is a situation in which the value of the Ko is realy very great and that is the only Ko-Threat available for the player on the board and there is no valid Ko-Threat left for either player.
The example of a Ko-Threat at “a” in Fig. 5 is an exteme case. In most cases, players will not want to use a Ko-Threat which is loss taking when responded duly.
However there are cases of a Ko-Threats with much smaller losses. One such a Ko-Threat may look small, but if you use many such small loss-taking Ko-Threats, the aggregate total of losses may get to be as large as the value of the Ko itself. Players must be careful in judging gains and losses.

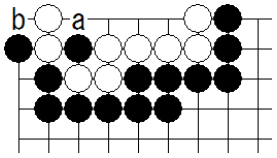


Fig. 6

If Fig. 6 is remaining on the board, will the black’s move “a” or “b” be a valid Ko-Threat? The answer is “yes” but a move “a” or “b” will produce a loss if responded there. In fact, the white’s move at “a” is necessary sometime before the end of the game.
If the black makes a move at “a”, the white will capture two black stones instantly. These two moves will offset losses of the black and white but, as the reslut, the white’s move at “a” becomes unnecessary. Thus the black’s Ko-Threat at “a” produces 1 point loss. If the Ko fighting is so small that it is only a matter of 1 point difference between the black and the white, the Ko-Threat move at “a” will result in giving 1 point free to your opponent. You will be able to confirm that the black’s Ko-Threat at “b” is possible but also loss making. In this case the loss is greater than 1 point.

5080 A Ko-Threat that should be Resolved before You Start a Ko Fight

As explained in 5050, the number of valid Ko-Threats is important. Generally speaking, a Ko-Threat should be kept unused until you start a Ko fight. However there is an exception you had better remember, that is the type of Ko-threats that must

be resolved before you start a Ko fight. Lee us look at the Fig. 7

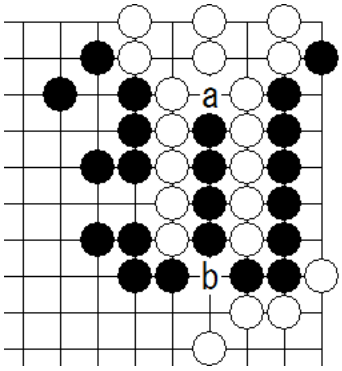


Fig. 7

In this pattern, black stones are all connected and there is no risk of capture. White group has two eyes and is living for sure. In normal situations, if the white play at "a", the black will connect at "b". Similarly, if the black plays at "b" first, white must play at "a" to maintain two eyes. However, when a Ko fight starts at some other location of the board, the pattern shown in Fig. 7 provides one valid Ko-Threat for either player who plays first. For example, if black plays at "b" as a Ko-Threat, white must respond at "a". but if white plays at "a" first, black must respond at "b". Thus the pattern of Fig. 1 is reognized as a Ko-Threat for either player who plays first. This means that at the time you start a Ko fight somewhere, this common Ko-Threat must be resolved beforehand.

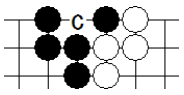


Fig. 8 White's move at "c" is a ko fight.

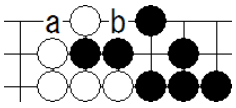


Fig. 9

Fig. 8 is an example of the smallest Ko often named "1/2 point Ko" since the white can gain only one point by capturing a black stone playing at "c" and then connect "c" to the stones on the right. For this small Ko fight, a Ko-Threat of one point difference is good enough. Fig. 9 shows a pattern which is valued one point difference if two moves can be made consecutively. Commonly, if white plays at "a", black will respond at "b" and if black plays at "b" first, white will respond at "a". The order of the moves have nothing to do with the points of either player. However, this pattern provides a mutual common Ko Threat of one point and for that reason, white, for example, must play at "a" and black will inevitably respond at "b", before the white starts the small ko fight at "c" in Fig. 8. Similarly, the black must play "b" to force white to respond at "a" before he starts a 1/2 point Ko.

5090 Double Ko

Between the black and white, two groups of stones may start fighting two Kos locally there. It is technically called "Double Ko". There can be a variety of double Kos, favorable to you, unfavorable to you or just in between. You will see the difference in the following charts.

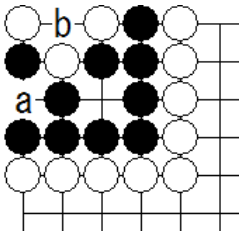


Fig. 1

Fig. 1 is a example of double Ko in which black is living and the white is dead. The black can capture three white stones playing at “b”, but that move is uncessasery. Black can pass and white is regarded dead. This will be confirmed by realizing that black can capture white any time but white cannot capture the black. However, before the end of the game, the white is free to play at “a”. To this move of the white, black cannot pass.

If he should pass, the white will be able to capture all black stones. Therefore, if white plays at “a” the black must respond at “b” and the situation resembles the starting point.

This means that Fig. 1 provides good Ko-Threat for the white. If another Ko flight starts somewhere else on the board, no matter how many Ko-Threats the black may have, white needs no other Ko-Threats than just this Double Ko situation.

Thus this local pattern is regarded white’s death but, if another Ko flight starts somewhere else, the white is able to use this pattern as a Ko-Threat for that Ko. In one sense white has endless Ko-Threats here and it will become the black’s headache.

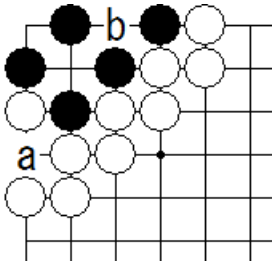


Fig. 2

Fig. 2 is an example of double Ko which is unfavorable to the black. The black at this corner is only able to survive if he can capture the white playing at “a” and connect it and then connect at “b”. But he needs three moves in a row which is practically impossible. You will see that black’s move at “a” is possible but the white can respond to it at “b”. The situation is unchanged. Since white is able to capture the black any time and the black has no means to survive, this pattern is recognized as black’s death.

However, if black has chance to use this pattern as a Ko-Threat, he will be able to play “a” and connection of “a” in two consecutive moves, and then, the “b” becomes a straight Ko fighting.

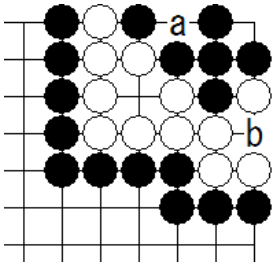


Fig. 3

Fig. 3 is an example of double Ko which is not favorable to you or your opponent.

In this pattern, “a” and “b” are the point where a player can capture one opponent’s stone.

When such a Ko capture move is made, the other player cannot pass. As you can see, if the black plays at “b”, white’s move at “a” is a must. If the white plays at “a”, black cannot pass and needs a response at “b”. But you will be able to confirm that neither black nor white can capture the opponents group. This means the situation is peaceful if the pattern remains as in Fig.3 and will be regarded as “moratorium”. This pattern of double Ko moratorium may be used as a Ko-Thread if another Ko fight starts somewhere on the board.

All double Kos are pretty complicated but it will ultimately be solved at the end of the game.

In the later chapter, we will see patterns more complicated than the double Ko such as triple Ko, quadruple Ko, etc.

5100 Two Step Ko

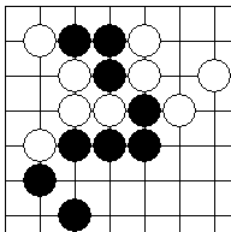


Fig. 1

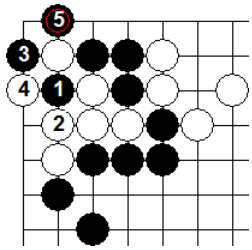


Fig. 2

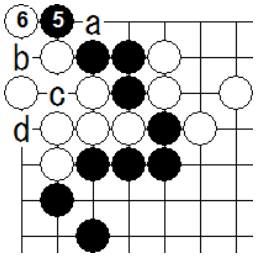


Fig. 3

If the pattern like the one shown in Fig. 1 appears on the board, you may consider that the black three stones at the upper edge have been captured. However, if you play from the black’s moves (1) to (5) of Fig. 2, the white will play (6) and the result will be the pattern shown in Fig. 3. This is called the pattern known as “Two Step Ko” (distinct from “Double Ko”).

If the white has chance to play “a”, the white wins this Two Step Ko. But if the black has a good Ko-Threat, he will utilize it and play “b” to capture the white stone at (6) . However, the black cannot finish this Ko fight with a single move from there. At best, the black must win the first Ko and then enable him to play “c” to capture another white stone. That is the start of the second step of the Ko. For the black to win the Ko fight, he must find another good Ko-Threat to enable him to play “d” to win the Two

Step Ko.
This is a typical fight of the Two Step Ko".

5110 Delayed Ko

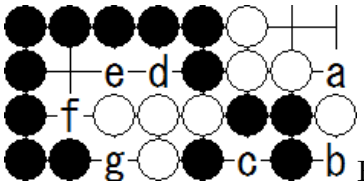


Fig. 4 Delayed Ko

Delayed Ko is another pattern different from a Two Step Ko or a Double Ko.
Look at Fig. 4. In this pattern the white is able to play "a" and then "b" for the last move of capture at "c". In this case he needs three moves to capture black stones. Or else, the white can play "c" to start the Ko fight at "c" and try to win the Ko by the move at "b". In this case, he needs only two moves to capture black stones but the starting point is a Ko. In this pattern, however, the white does not need to play such moves at once. If the black has chance to play at "d" what will happen? If black "d" is played, white can choose to win the capturing race by "a" or choose to start the Ko at "c". However, if black plays "d" and then "e", the story gets different. After the black's "d" and "e", white's move at "a" is too late since the black's next move at "f" is ready to start the Ko fight. The white cannot escape from this Ko fight. Which means it is now a straight Ko fight. In this pattern, the black required two moves "d" and "e" to start the Ko. After the black's move at "d", there is only one move "e" needed to start the Ko. This is pretty delicate. There can be a pattern where more than three moves are needed to start the Ko. The less moves needed, the more urgent for the white to consider when to start such a delayed Ko fight. If only one move is needed to force the Ko flight to start, it becomes rather urgent.

5120 Thousand Years Ko

There are many variations of Kos, but the pattern shown in Chart 3 occasionally occurs and is very unique. It is named "thousand years Ko".

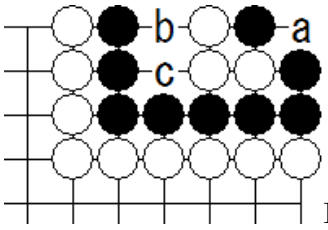


Fig. 5 Thousand Years Ko

If this position is made, white has an option to make a move at "a" to capture one black stone. And if he has chance to place another stone where a black stone was sitting, the five white stones get to be impossible for the black to capture. When such white's two moves are made, the pattern ends up as a moratorium with two vacant spots "b" and "c" left open. In fact, this is the best result for the white. Then, what will happen if black

plays from Fig. 5? Black's move at "a" will be a suicidal move"! If that is played, the black cannot play "b" or "c". But the white can make a move at "c". If the black kills four white stones, the white can kill the whole black stones by a move in the center of four vacant spots. However, the black has an option to play at "b" for example. White must respond at "a ", and this becomes a common straight Ko fight. The black has another option, that is, to leave this pattern untouched. White's option is to play at "a" anyway. And if the black is happy with the moratorium pattern, he can choose it, but if the Black prefers a straight Ko fight, he can choose to play at "b" to start the Ko.

5130 Eternal Life

From this section, we will discuss further complicated perpetual patterns which the same board pattern inevetably comes back again after four or more moves.

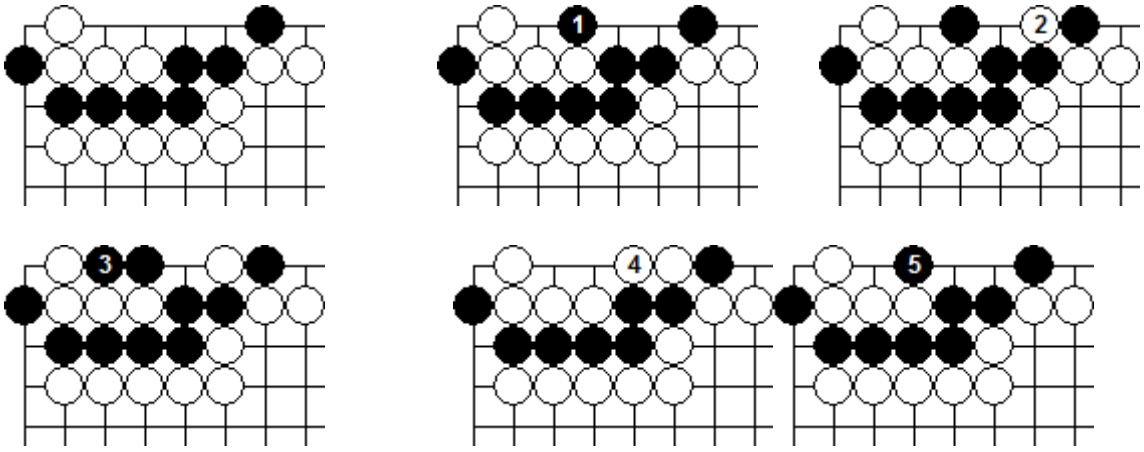


Fig. 1

Let us examine the moves from (1) to (5) in the Fig.1. It is complicated but from the black's (1) to (5) each move of the black and white is a must if either player does not want to give up this local fight. The sequence is inevitable. At first sight, you may think there may be other moves to consider, but actually, if one player misses following the above mentioned sequence, he will lose the fight and get a damage there. Thus, if rule allows it, each player would want to follow this sequence of (1) to (5). As you can see, the board pattern at the timing (5) is played is exactly the same as the board pattern at the timing (1) is played. This means that the same board pattern is repeated at every fourth move if the rule allows such moves.

For an ideal rule, how should this situation be solved? One rational solution is to prohibit the move which makes the board pattern reappear. In the above example, moves (1) to (4) are OK but move (5) is not allowed as the pattern at (5) is exactly the same as the pattern at (1). This rule is fine in theory but as a practical matter, it is pretty confusing for the players. Two players may start to argue where the same board pattern started to reappear. Well it should be possible to determine which is correct if an argument starts. The record of the game is objective and one will be able to

determine who made the violation of the rule, if the rule is made that way. However, considering the complicated situation, the current rules decided that the game shall be suspended as a drawn game, if the same board pattern is repeated. Under this draw rule, the game shall be suspended when the move (5) is made.
This pattern is named “eternal life” pattern.

5140 Triple Ko

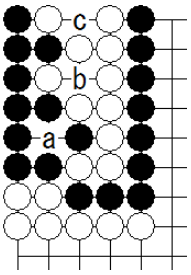


Fig. 1

Fig. 1 is an example of so-called “triple Ko” pattern. When this pattern occurs, the sequence of six moves becomes unavoidable. As you can see, if it is the white's turn to make a move, he can capture 10 black stones by the move at “a”. However, if it is the black’s turn he can capture one stone either at “b” or “c”.

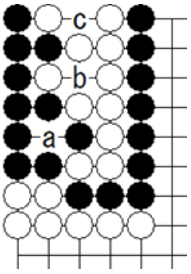


Fig. 2

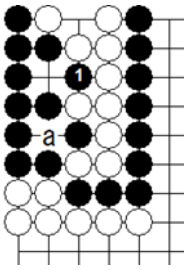


Fig. 3

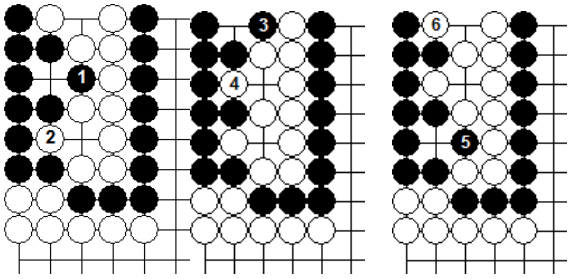


Fig. 4

Suppose the black plays at “b” in Fig. 2, the result will be Fig.3 and now the white is at a risk. The white’s only move is at “a”. In this manner, either player cannot play elsewhere and the moves will go like (1) to (2), (3) to (4) and then (5)to (6) as shown in Fig. 4. Each of such moves is unavoidable and now you will see that the board pattern at (6) is exactly the same as Fig. 2
The rule handles this triple Ko pattern exactly in the same way as eternal life pattern deciding that the game is a draw if the same pattern repeats. In theory a quarduple Ko may occur although it is even rarer than a triple Ko which is rare itself.

5150 Circular Ko

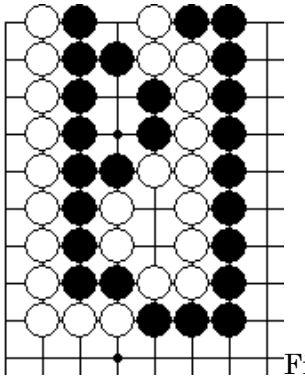


Fig. 5

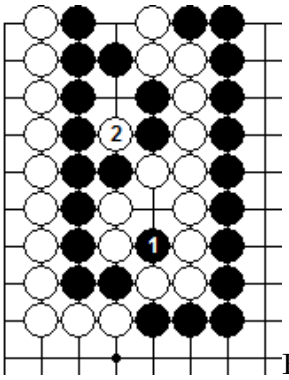


Fig. 6

Fig. 5 is another complicated pattern and is named “Circuler Ko”.

Either player may pass but if one player tries to capture the opponent’s stones, his only valid move will be to place a stone in the opponent’s eye with two vacant points space as a move (1) of Fig. 6 . To this move, the White cannot capture this stone. If he does, the black can play at the only vacant point at the upper end and now the whole group of the white stones are killed. Thus the only valid response of the White will be (2) in Fig. 6.

At this point, if a player capture one stone, the opponent will do the same and the result will become a moratorium patttern. But, each player has a choice to capture two stones.

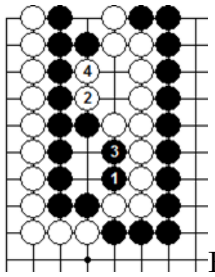


Fig. 7

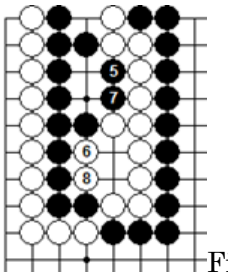


Fig. 8

Then the move will be made up to (4) shown in Fig. 7. From here, if both players contiue similar moves, the Fig. 8 will be the pattern reached. As you can see, the pattern reached at (8) in Fig. 8 is the same pattern as Fig. 5. In this case the same board pattern reappears after eight moves. The rule decides to handle this case as draw as well.

Concerning this pattern of a circular Ko, there can be a variation of moves depending on the order of moves. But, after eight moves, the same board pattern comes back. Thus, the current rule over this pattern is a draw after the eight moves are played.

5160 Corner Bent Four Space

Ko brings about some interesting situations. Concerning a bent four space at the edge or at the center of the board, we have learned that it is a typical survival pattern at 3040 in Chapter Four where we discussed life and death. Fig. 1 is an example.

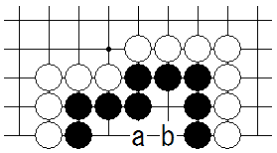


Fig. 1

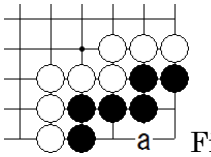


Fig. 2

In Fig. 1, black's survival is assured as white tries to attack this black group by "a", the black can respond at "b" to bring it to a complete survival pattern. If the white's move is "b", the black can respond at "a" to survive.

However, at corners, a similar bent four space will become a delicate situation. Fig. 2 is a basic corner bent four space. In this case, the black needs another stone to be placed at "a" to bring the group into a complete survival pattern. Then the black can secure 3 points territory and survive completely. However, if white plays "a" first, the black find it difficult to cope with it so easily.

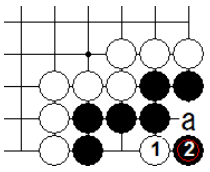


Fig. 3

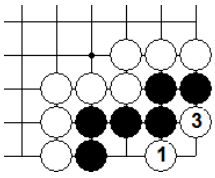


Fig. 4

Black's best move after white's (1) will be (2) in Fig. 3, but at the corner, the white can play at "a" to capture that stone at the very corner! Fig. 4 shows you the pattern realized by (3). This result is a start of a typical Ko fight and it is quite serious. In case the black can capture (3) and (1) in a row, the black will survive with two eyes, but in case the white wins the Ko fight, the white will capture all black stones. In conclusion, the pattern shown in Fig. 2 where the black has a bent four space, the black can survive if he plays first but if the white plays first, the result will be a serious Ko fight. In actual games, either black or white will start these moves.

Now, please look at the patterns shown in Fig. 5a to c.

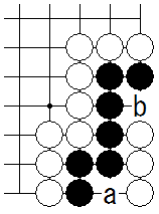


Fig. 5a

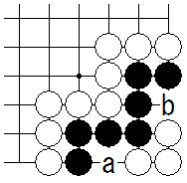


Fig. 5b

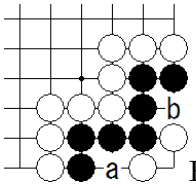


Fig.5c

These three patterns are more delicate. In these situations, the black cannot play "a" or "b" since such moves are suicidal. This means that the black can not do anything about it in these patterns. In Fig. 5c, the white can place a stone at the very corner to bring it into the pattern of Fig. 5b. Then the white is free to play "a" to start a fight. The black's only possible response would be at "b" to capture the four white stones including "a".

The result will be the pattern of the basic bent four space shown in Fig. 2. When that situation is reached, the white will start the Ko fight. The conclusion is a Ko fight.

In Japanse rules, the rule decided that the patterns Fig. 5a to 5c will be judged to be the black's death with the condition that the white stones outside that pattern is living for

sure. This rule is often referred to as “Corner Bent Four Rule”. Please note that the Japanese bent four space rule applies to patterns from Fig. 5a to Fig. 5c and the pattern of Fig. 2, more basic and purer bent four space, will not be treated dead under that Japanese rule.

The reasoning of this Japanese rule is that in the forms of Fig. 5a to 5c, the black cannot do anything about it until the end of the game. The white can start fighing anytime and the result would be a Ko fight. Since that situation is one-sided, they made it a rule to regard these patterns as black’s straight death without further argument.

In Chinese rules, there is no such “Corner Bent Four Rule” and such a situation is to be settled by actual moves of each player.

5170 A Group of Stones not Living but cannot be Captured

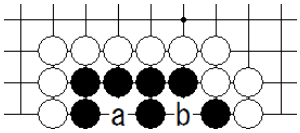


Fig. 1

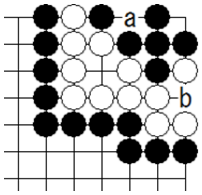


Fig.2

Please look at Fig. 1. In this pattern, the black group has one eye at “a” but “b” is a false eye and the black cannot form the second eye. We have learned that that is a typical death pattern. However if there somewhere on the board is a pattern of double Ko survival pattern, that is bringing a puzzling situation. Fig. 2 is a double Ko pattern. If a pattern of Fig. 1 and Fig. 2 appear on the board, you will find that the white cannot capture the black group of Fig. 1. Let us check that situation. The white will play “b” to capture the black in Fig. 1. The black can play “b” in Fig. 2. Now, the white may be able to kill all black stones by a move of “a” in Fig. 1, but if he does, the black can capture all white stones in Fig. 2. That is a terrible result for the white. Thus the white will not choose to play “a” in Fig. 1. He will have to respond to black’s “b” in Fig. 2 by a move of “a” to avoid capture. Then the black can capture back the white stone at “b” in Fig. 1.

Under this situation, the white can play anywhere else or use a Ko Thread somewhere on the board and then come back to play at “b” in Fig. 1 again. But the black can simply repeat a similar sequence of moves in Fig. 2 and recapture the white stone at “b” in Fig. 1. Note that even when white has many more Ko Threats than the black, the black’s Ko Thread in Fig. 2 is infinite or endless. Under this situation, even in Japanese rules or Chinese rules, it is impossible to capture the black stones in Fig. 1.

Normally, the interpretation is that a group of stones unable to capture is regarded a living group. What then is the black’ group of Fig. 1 if Fig. 2 exists on the same board? A very delicate question! This pattern resembles a triple Ko but the local pattern of

Fig. 1 and Fig. 2 are totally independent unlike a triple Ko. The current rule both Japanese and Chinese decided that the pattern of Fig. 1 is judged unconditionally dead. The author finds it difficult to say that it is a good rule.

Finally we will show you another pattern in Fig. 3

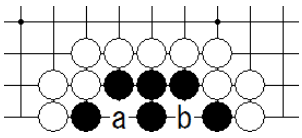


Fig. 3

Nobody will argue to the interpretation that this group of black stones with no eye is dead. But if there is a double Ko of Fig. 2 on the same board, you will find out that the white cannot capture these black stones if two players are making moves alternately.

5180 The Charm of Ko

I am afraid the explanation of perpetual patterns including Ko has been rather complicated and somwhat confusing for the readers. However, the Ko rule saying that immediate Ko recapturing is not allowed is very clever. This means that you can only recapture a stone at the Ko, after some additional moves at some other parts of the board is a wonderful solution of Ko rule problems to avoid repetition of the same total board pattern. This rule makes the game of Go very charming and fascinationg. I hope you will start enjoying Ko in actual games.

5190 Actual Importance of Ko

When a group of stones of one color is surrounded by the stones of the other color, it is very important for the stones to survive. Actually there are three patters as the result of the moves by each player.

(1) The group will reach a survival pattern

(2) The group will reach a status of Ko and the group will die if that player looses the Ko fight but will enjoy two consecutive moves somewhere on the board. The group will survive if that player succeeds in winning the Ko flight although the opponent will be allowed to make two consecutive moves somewhere on the board.

(3) The group will die eventually.

Naturally, the pattern (1) is most desirable for the player whose group of stones is surrouded by the stones of the other player. The worst result would be (3). The pattern reaching a Ko flight is just the bewteen these two cases.

Fig. 1 shows you a pattern which often ocurs in actual games when the black tries to invade to the lower left corner when two white stones have already been there as shown in the pattern.

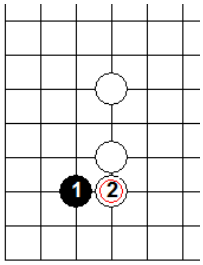


Fig. 1

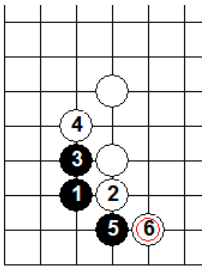


Fig. 2

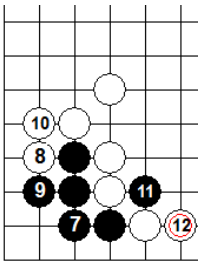


Fig. 3

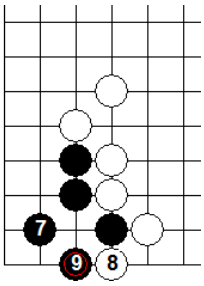


Fig. 4

The white will play (2) of Fig. 1 so that the black cannot flee towards the center of the board. The black will try to form a sizable territory at the corner by (3) and (5). The white will play (6) as shown in Fig. 2. If the black simply connects by the move of (7), the result after a few moves will be found the straight death of the black group as shown in Fig 3. The corner space of the black is too small.

The move (7) shown in Fig. 4 is the best move for the black at this point. When the white plays (8), the black will play (9) and the result is a start of a Ko fight. If the black wins the Ko fight, the result would be the black's survival. If he looses the Ko fight the result would be the black's death. This result to reach a Ko fight is naturally less favorable to the black than survival, but is more favorable than a mere death.