# Palago Rules

**Tiles:** Two players, White and Blue, share a common pool of 48 hexagonal arch tiles. Each tile contains a white arch and a blue arch, and may be oriented in three ways such that the corner colours are the same for each rotation. The small circular slices are called *tips*.


**Figure 1. Three rotations of an arch tile.**

**Start:** White places two adjacent tiles in the playing area, such that edge colours match.

**Play:** Players then take turns adding two adjacent tiles, such that at least one touches an existing tile and all edge colours match. Both tiles *must* be played unless the first tile wins the game.

Figure 2 shows a typical opening by White (left) and reply by Blue (right). This is probably the best opening pair for White, as discussed in the section on Opening Theory below.

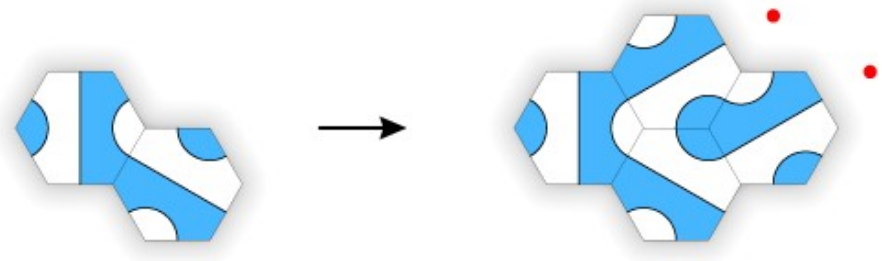

**Figure 2. A typical starting sequence.**

**Aim:** The game is won by the player who forms a closed group of their colour containing at least one arch (an *arch group*). Only one tile need be played if that tile wins the game for either player.

For example, Figure 3 shows a game won by Blue who has enclosed a blue arch group containing one arch. The closed white group contains no arches so doesn't count.

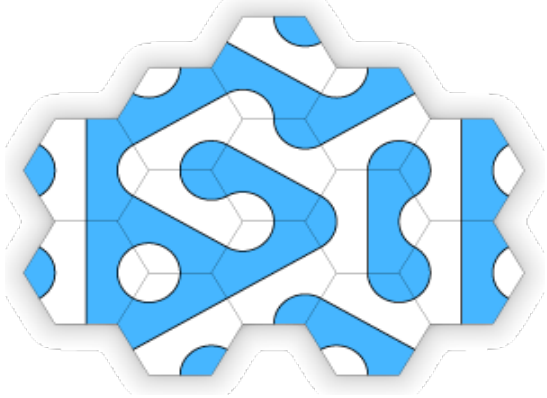

**Figure 3. A game won by Blue.**

**Tiebreaker:** If a move closes arch groups for both players then the mover loses. If the tiles run out before either player wins (rare) then the game is won by the player with the largest group (counting arches) otherwise the game is a draw (even rarer).

## Holes

Single holes enclosed on all six sides, as shown in Figure 4, represent a special case. A player cannot place the first tile of their move in such a hole (unless that tile immediately wins the game) as it would then be impossible to place the second tile of the move adjacent to it.

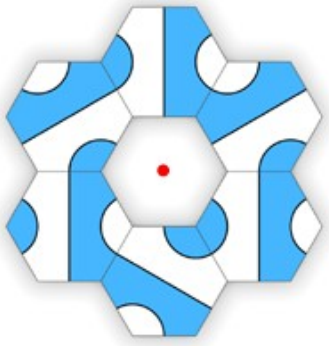

**Figure 4. A hole.**

Figure 5 (left) shows a situation in which either player may fill a hole by closing their group; however, they would lose by doing so as such a move would also close an opponent's group (right). Such unplayable positions of mutual disadvantage are called *seki* in Go.

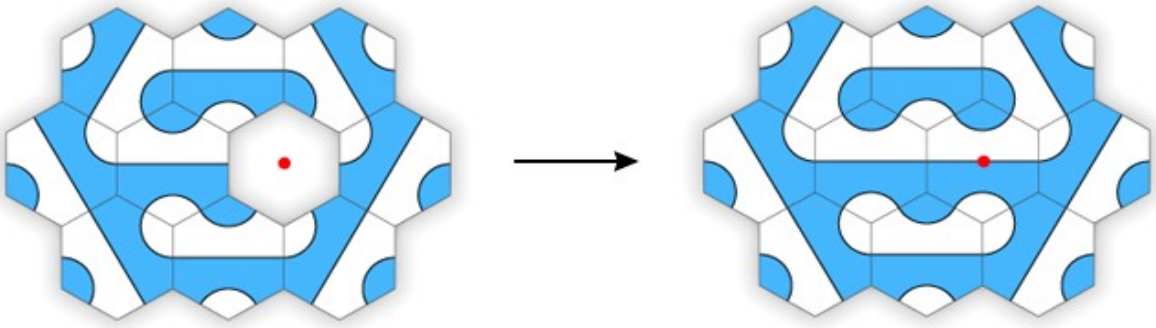

**Figure 5. A losing move for both players (seki).**

However, White can quickly turn the position to their advantage by playing the two tiles shown in Figure 6 (left). This move closes the group except for the freedoms within the hole, which White can close on their next move to win (right).

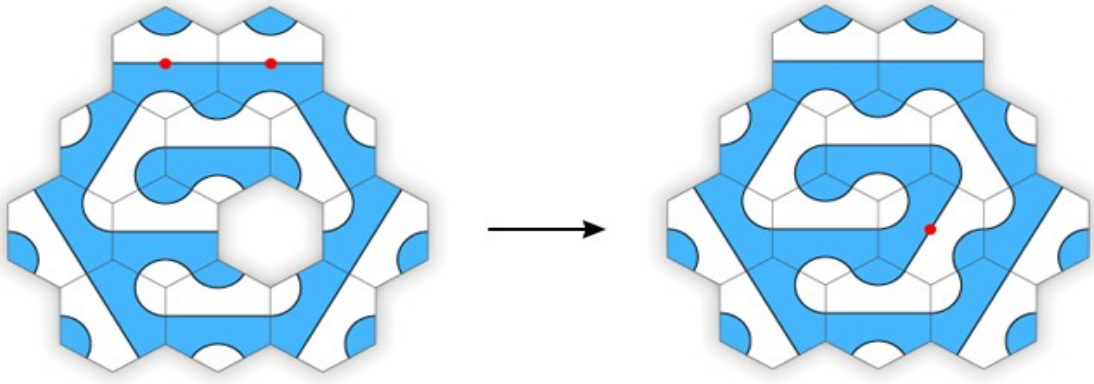

**Figure 6. White resolves the seki to win.**

It's theoretically possible for Blue to achieve a similar win from the position shown in Figure 5 (left). However, this is unlikely as it would require at least nine tiles to close the surrounding Blue group and White is only three tiles away from a win.

This example shows how a group adjoining a single hole may be closed if the rest of the group is closed first. However, any group adjoining two or more separate holes is safe from closure; holes may therefore be used strategically as attacking moves (one hole) or to ensure group safety (two holes).

## Strategy & Tactics

Players should look for moves that simultaneously achieve two disjoint threats, which constitutes a guaranteed win unless both threats can be nullifed by an adjacent tile pair.

Attacking players should be able to form an immediate threat almost every turn, which can be useful for limiting the opponent's replies. For example, Blue threatens to win from their very first move in Figure 2, forcing White to play at one or both of the red dots to stay alive. However, overly aggressive play can prove disastrous if the opponent's developing position is ignored; a much safer approach is: *connect the opponent's most dangerous threats each turn to nullify them*. This may give the opponent the largest group, but it's unlikely that the game will last long enough for that to matter.

The requirement that tile pairs be placed adjacent to each other makes it harder to spoil double threats set up by the opponent. This means that games are more likely to end in a kill rather than players being able to continually defend until the tiles run out.

**Tip Threats:** Figure 7 (left) shows that three tips in a row are a guaranteed win if left undefended, as their owner can form two disjoint threats next turn (right). This is true for both players in this example.

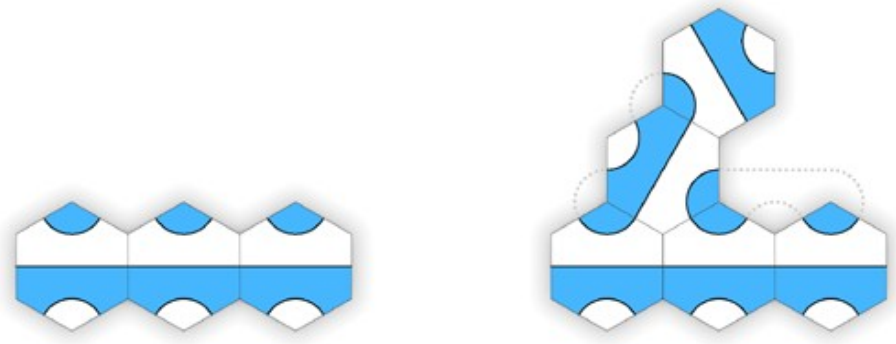

**Figure 7. Guaranteed win for the next player.**

In fact, even two tips in a row pose a similarly fatal if more subtle threat. Figure 8 shows how such a pair can be exploited by the next player to set up a win.

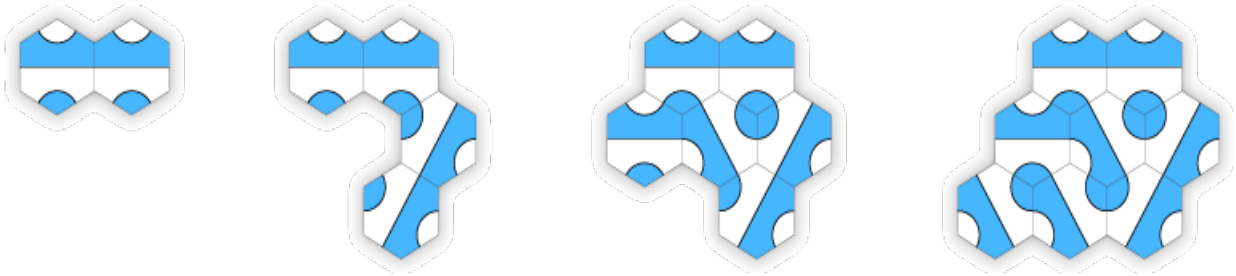

**Figure 8. Two tips in a row can set up a win.**

Note, however, that such positions should always be considered in the context of the surrounding pieces and never in isolation. For example, Figure 9 shows that Blue can end up fighting for their life if they blindly try the same trick in a slightly different situation!

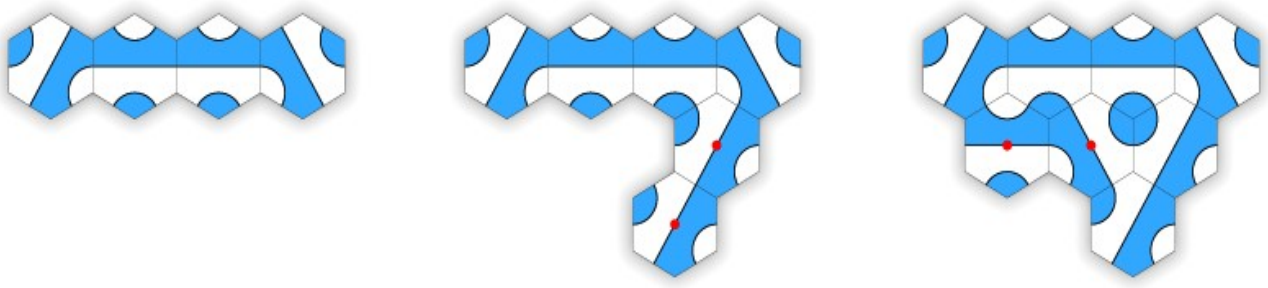

**Figure 9. The context can change the result.**

**Danger Patterns:** Figure 10 shows a danger pattern called the *triskelion*; White can force a win if it's their turn to play by creating two disjoint threats as shown. Although White will never be presented with this exact pattern – there will always be four tiles placed after the second move – the principle holds for a number of similar patterns: *look for disjoint groups, three or less moves from completion, that can both be reached with a single tile pair.*

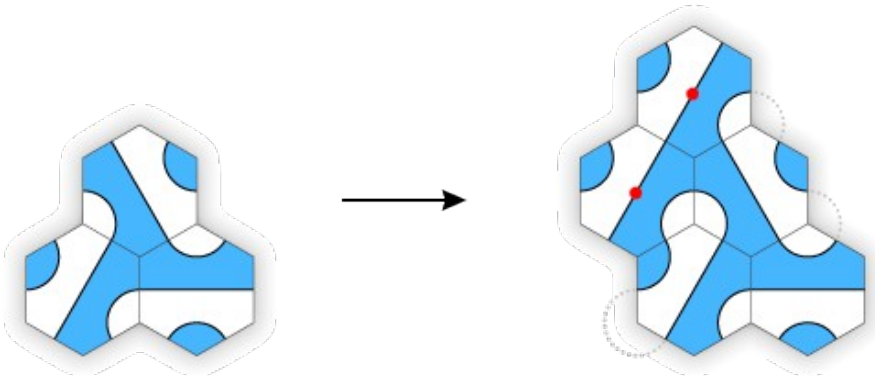

**Figure 10. White can win.**

Figure 11 shows a more subtle danger pattern; White has already lost this game even with next move. This can be proven using similar techniques to those used in the solution of Puzzle B below.

**Figure 11. White has already lost.**

Figure 12 shows two Blue tips joined to make a 2/3 circle or "open mouth" formation (left). It would be prudent of White to negate this formation by closing the circle as shown (middle), otherwise Blue may make an immediate threat next turn (right) or use it as a dead end into which a nearby group may be extended to close off two freedoms at once.

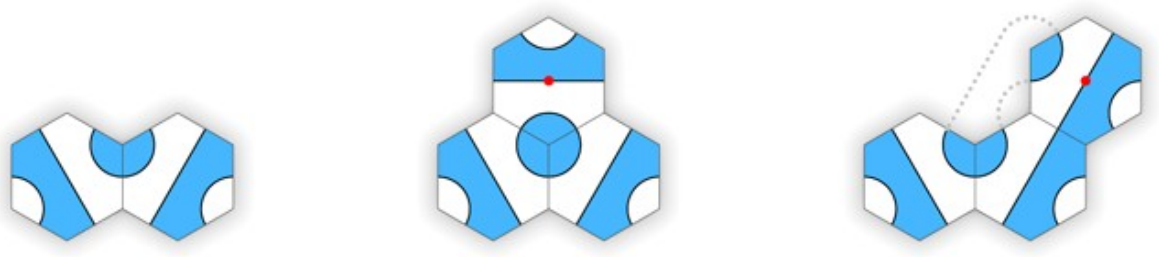

**Figure 12. Open mouths should be closed.**

**Immediate Threats:** Figure 13 shows two basic types of immediate threat that the opponent *must* answer next turn. These are called *one-freedom* and *two-freedom* threats based on the number of tips required to close the group.

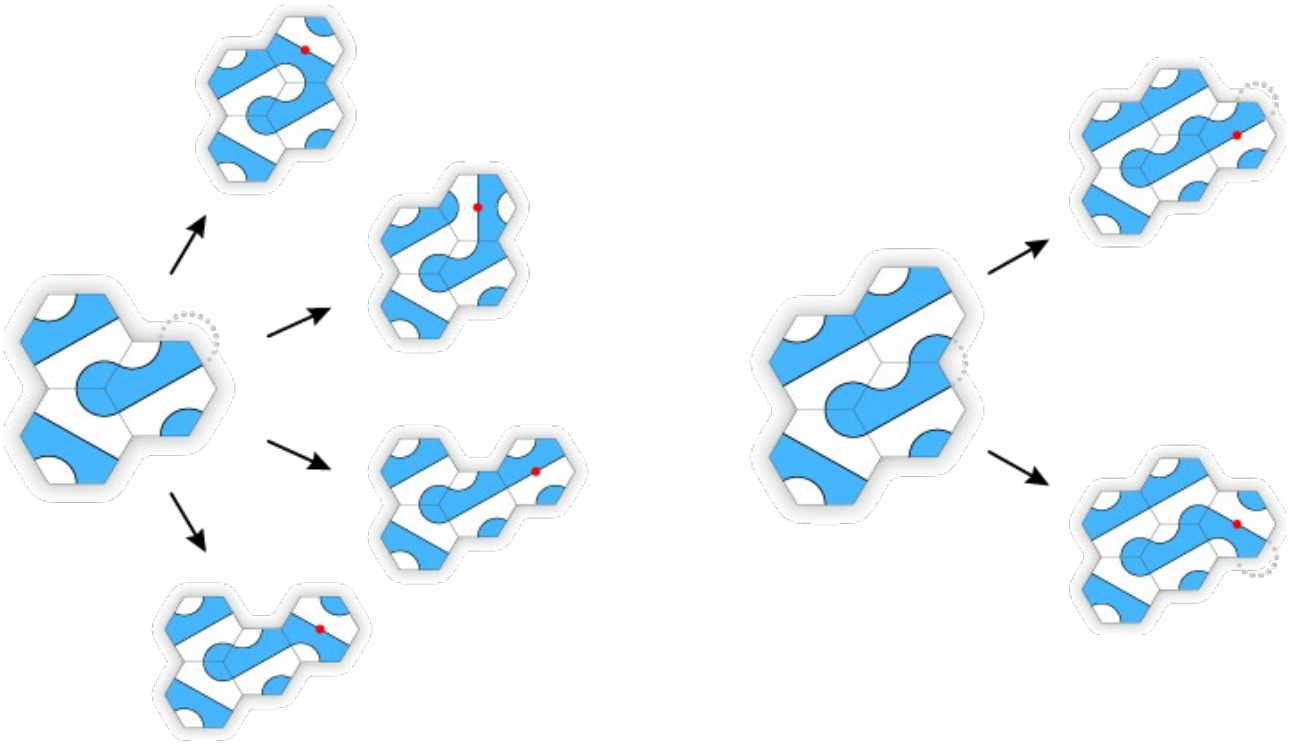

**Figure 13. A two-freedom threat and one-freedom threat.**

The two-freedom threat (left) is less dangerous as it has four safe extensions that counter it with a single tile. The one-freedom threat, on the other hand, is more dangerous as it has only two feasible extensions (right), neither of which counter the threat but simply reduce it to a two-freedom threat that requires a second adjacent tile to fully address.

## Opening Theory

Figure 14 shows the six unique opening pairs, not counting reflections and rotations.

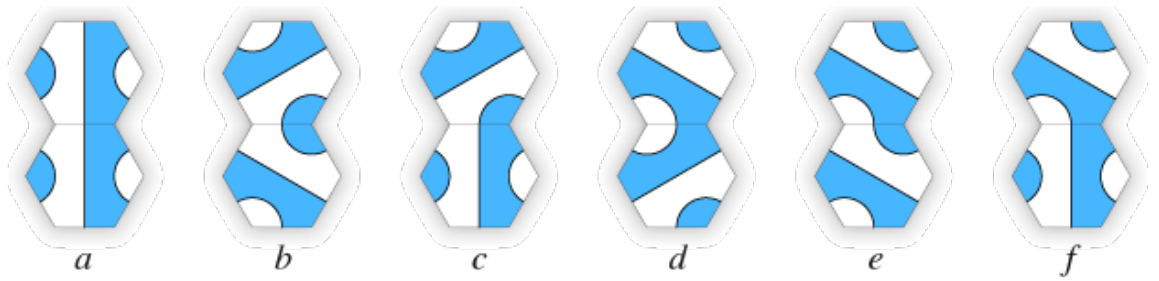


**Figure 14. The six unique opening pairs.**

White should only ever open with formation **f** for the reasons given below. Blue should only ever open with its inverse **c**.

White is assumed to start the game in the following examples, for consistency.

### Opening *a*

Opening **a** is a provable loss for White, as shown in Figure 15. If Blue replies with a rotation of **a** as shown then White is forced to close the open mouth, allowing Blue to set up a winning fork next turn (right).

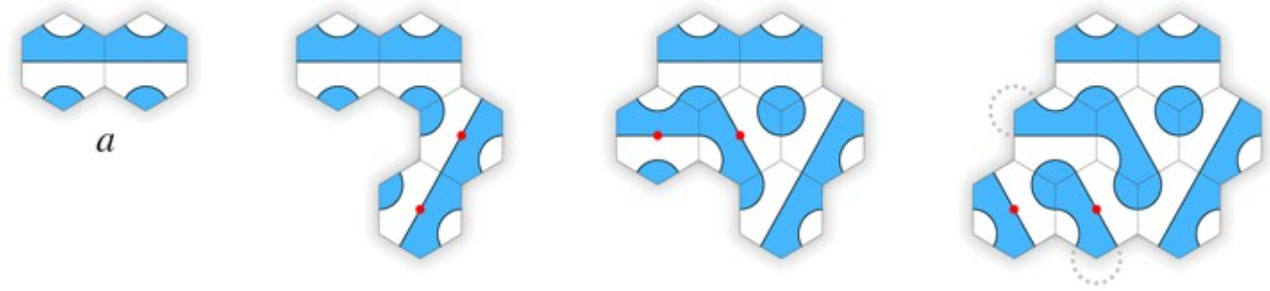


**Figure 15. Solution for opening a.**

### Opening *b*

Similarly, opening **b** is a provable loss for White if Blue replies with a rotation of **b** as shown in Figure 16. This creates an immediate threat which White must address by playing at points *p*, *q* or both (shown). Blue can then set up a winning fork next turn (right).

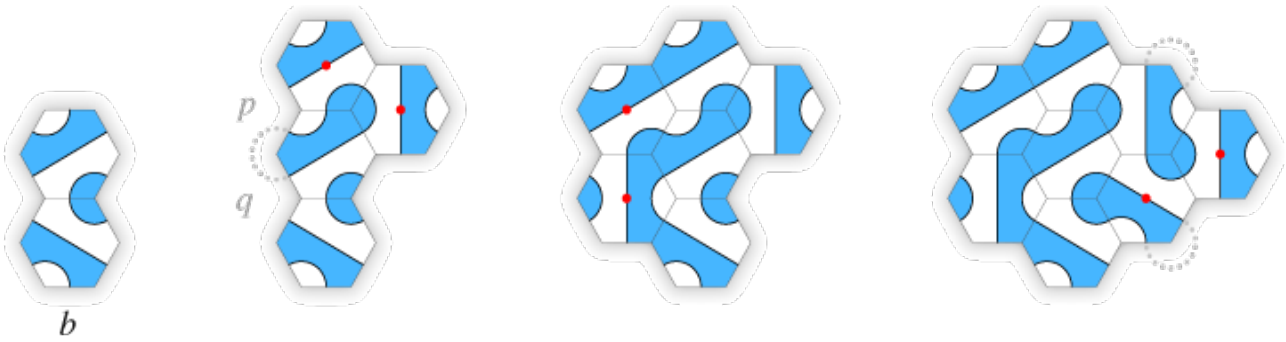


**Figure 16. Solution for opening b.**

### Openings *c* and *d*

Openings **c** and **d** combine to make a probable loss for White; if White starts with **c** then Blue can play **d** to set up a win, and vice versa (Figure 17). This start looks more promising for White as they are not immediately threatened and can in fact set up a two-freedom threat of their own, as shown. However, Blue has a killer reply that negates the danger and sets up an even stronger one-freedom threat (right). White cannot address this threat without leaving a double tip for Blue to set up a win.

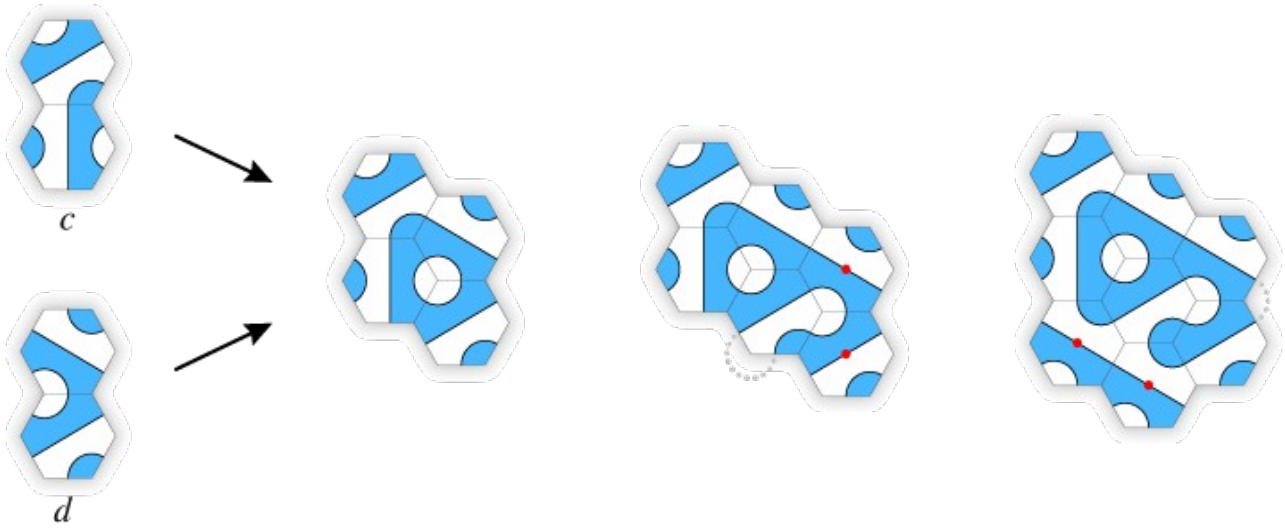


**Figure 17. Solution for openings c and d.**

If White makes their second move more defensive (Figure 18) then Blue may create two immediate threats as shown. White may address both of these next turn but cannot stop Blue from then setting up a winning fork (right).

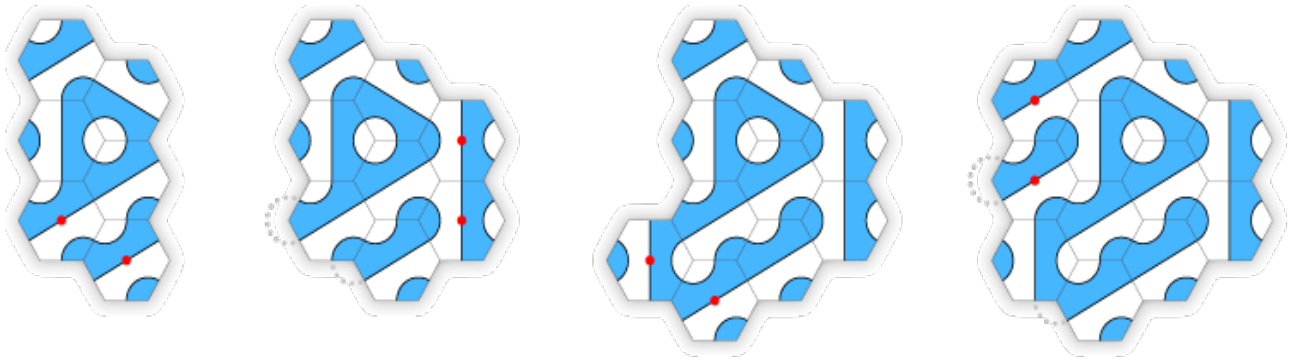

**Figure 18. Defensive play also leads to defeat.**

White may follow other lines of play on their second move, but none have yet been found that allow survival.

### Opening *e*

Opening **e**, shown in Figure 19, allows Blue to immediately create a strong single-freedom threat (middle) to which White has only one viable reply (right).

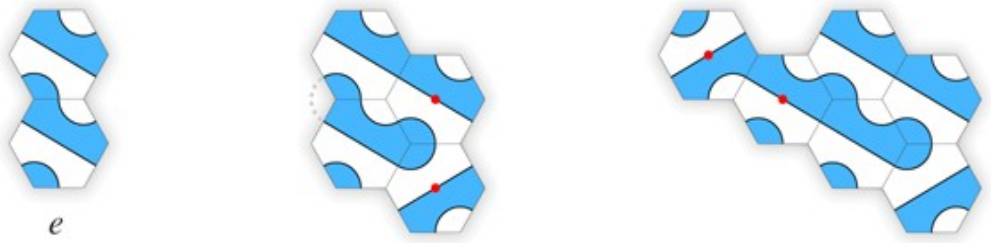


**Figure 19. Blue attacks to force the reply shown...**

This sets up an overwhelmingly strong position for Blue with numerous winning attacks, one of which is shown in Figure 20:

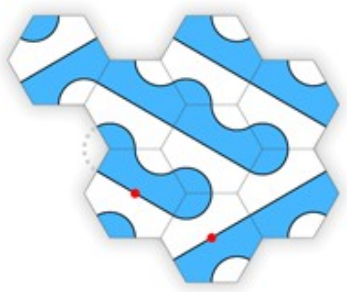

**Figure 20. ...which Blue can then exploit.**

Note that Blue's attack leaves double White tips in two places which is theoretically dangerous, however Blue can force a win from this position without losing the initiative. Thanks to Mike McManaway for emphasising the danger of this opening.

### Opening *f*

Formation **f** is therefore White's only viable opening pair. Figure 21 shows opening pair **f** and a sensible reply by Blue.

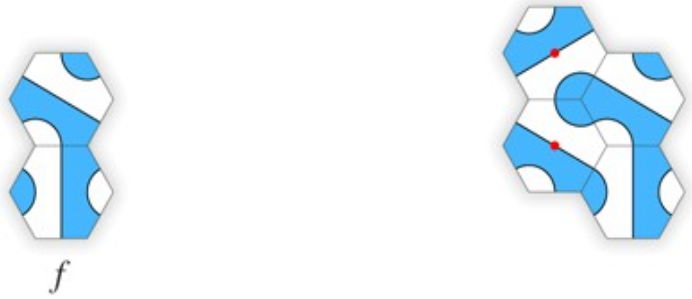


**Figure 21. Opening f and a sensible reply by Blue.**

Figure 22 shows what was initially thought to be a strong positional reply by Blue (middle) that doesn't create an immediate threat but achieves two important goals as it eliminates a White tip and sets up a double Blue tip. However, White has a strong third move (right) that puts Blue under serious pressure (thanks to Mike McManaway for pointing this out).

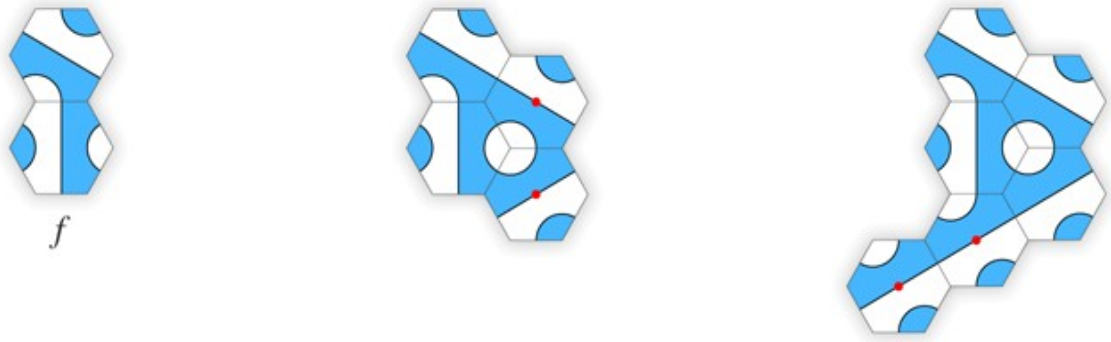


**Figure 22. A doubtful reply by Blue.**

Alternatively, Blue can make a more aggressive reply to opening pair **f** as shown in Figure 23 (middle) and make an immediate threat on their first move. However, White can easily refute this threat as shown to leave themselves in a superior position, so this is probably not a good play for Blue.

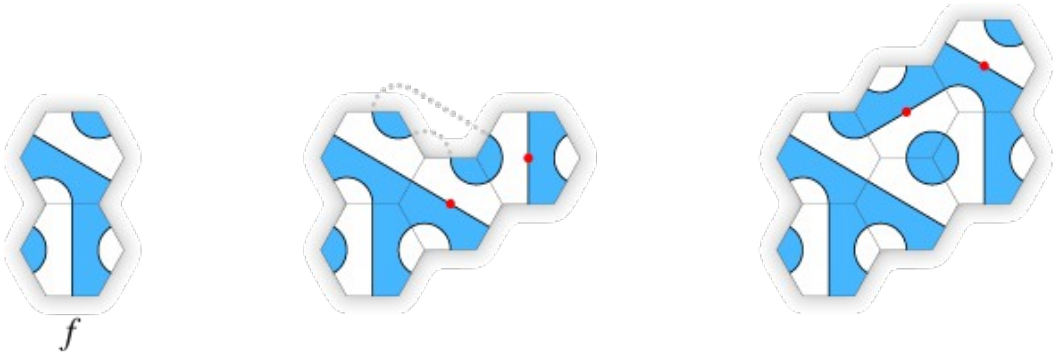


**Figure 23. A more aggressive play by Blue.**