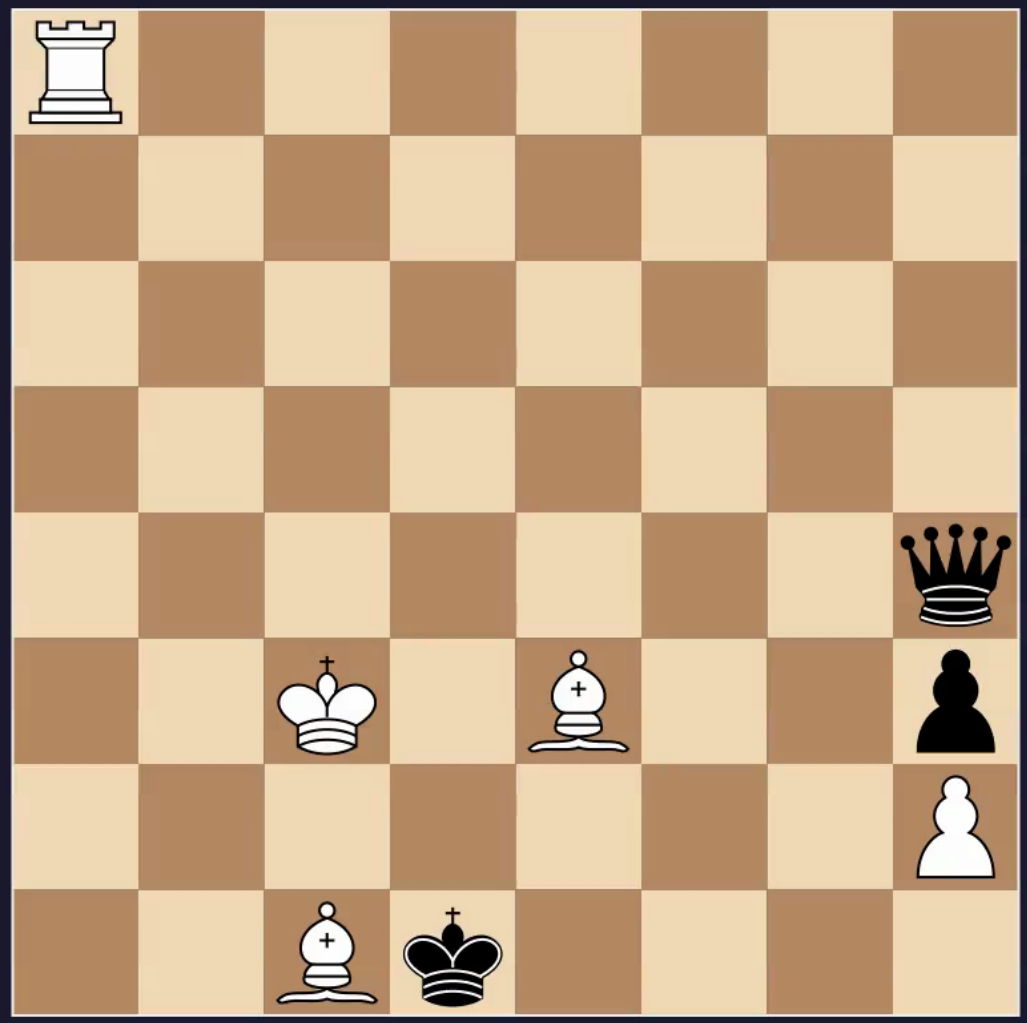
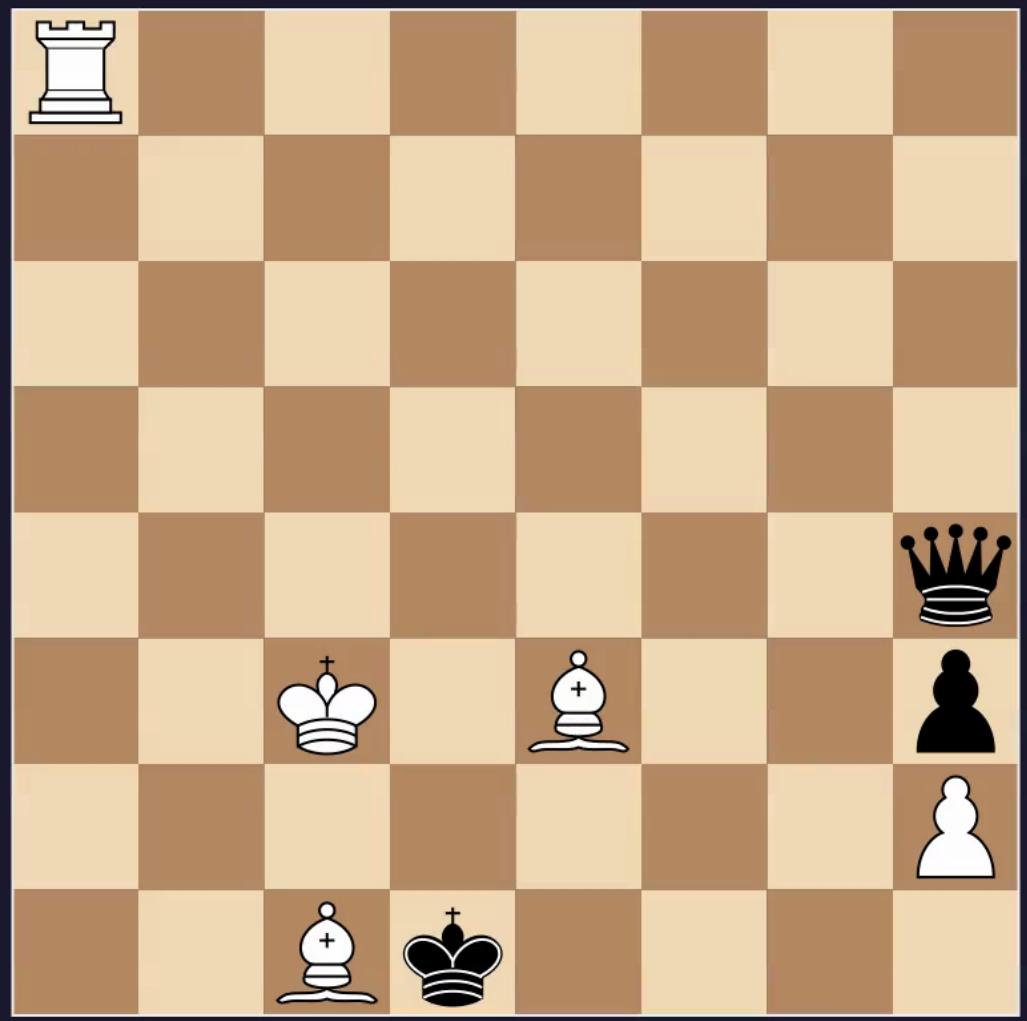
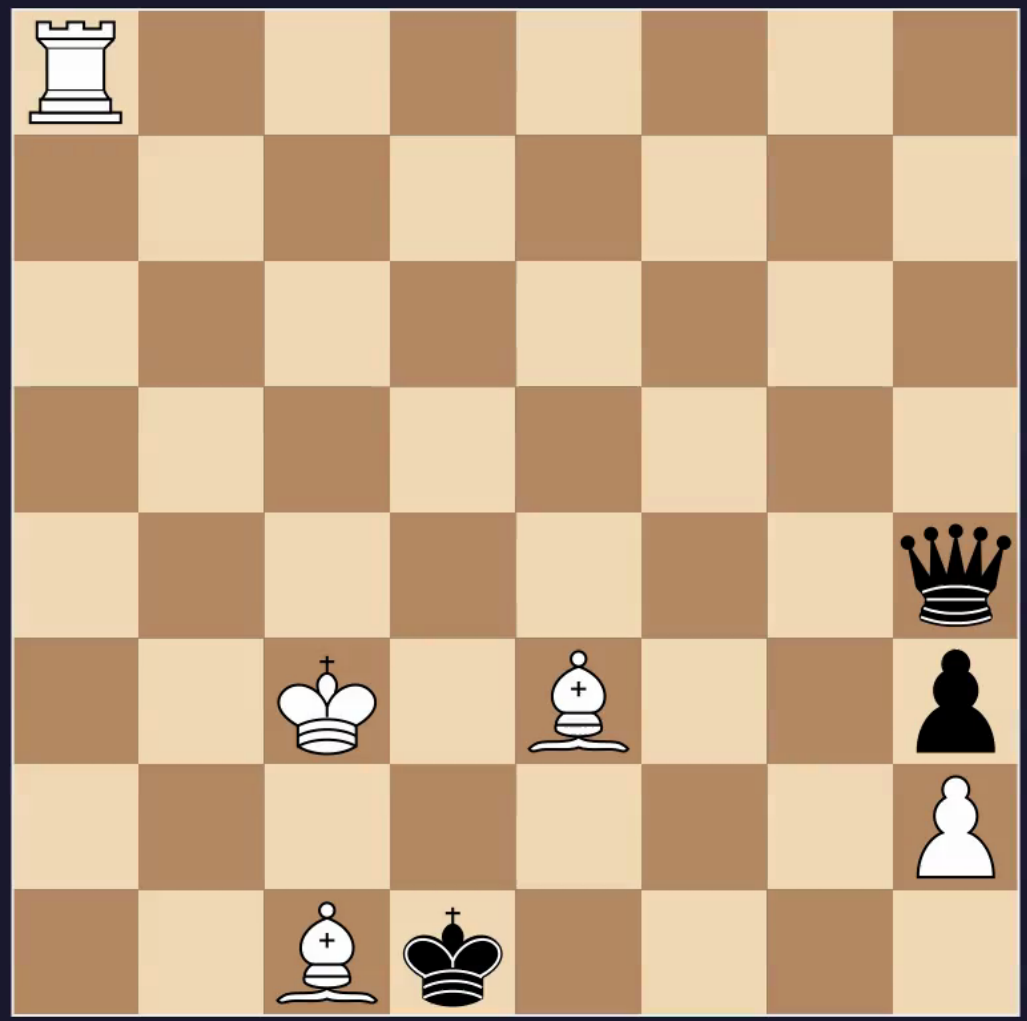
Is Kasparov Right about Solving Chess?

The 584-move argument, game trees,
and why there's hope to solve chess from move 1



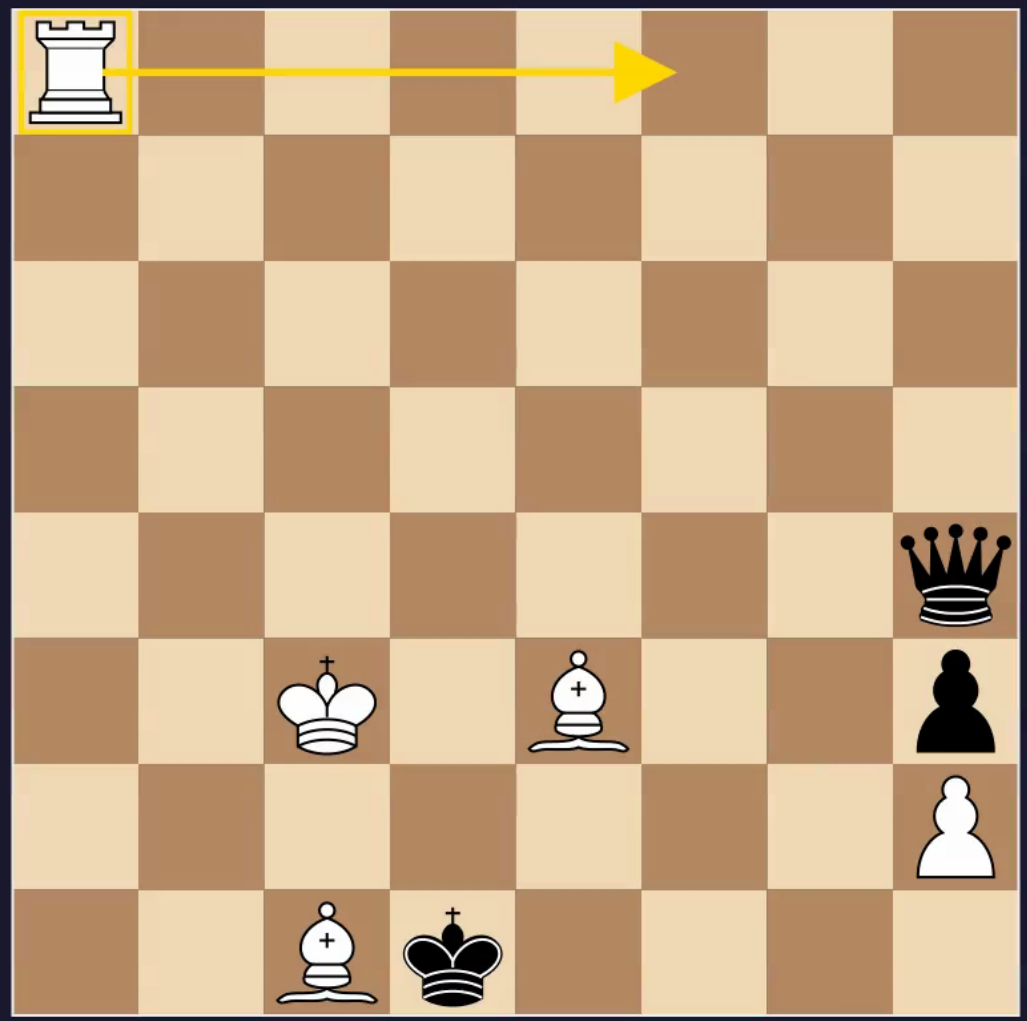


White to move.



584

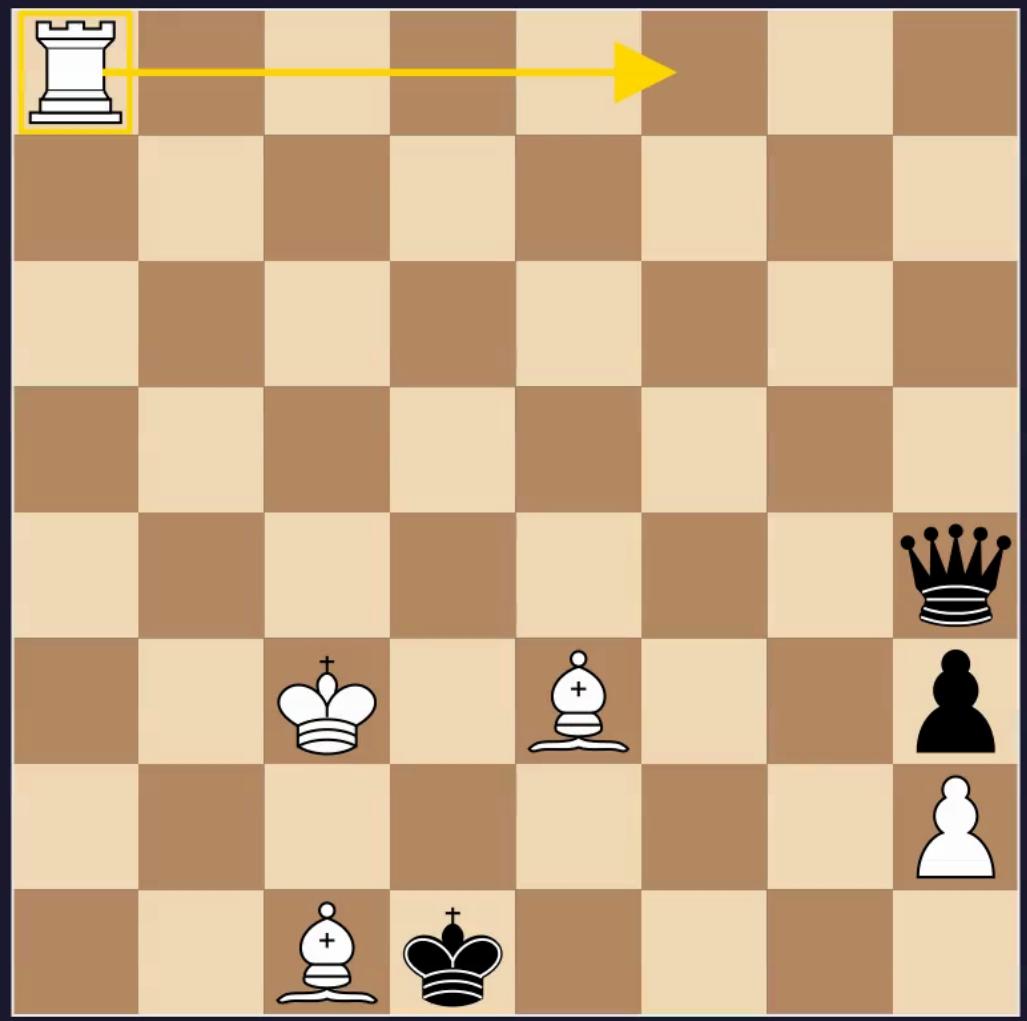
moves to win



584

moves to win

The ONLY winning move.



584

moves to win

One slip and the win is gone.

"584 moves with just 8 of 32 pieces on the board! Further evidence that not only will chess never be solved, but that should such miraculous technology ever appear, the results will be practically meaningless for human players."

never be solved

— *Garry Kasparov*

x.com/Kasparov63/status/2022016470826545287

"584 moves with just 8 of 32 pieces on the board! Further evidence that not only will chess never be solved, but that should such miraculous technology ever appear, the results will be practically meaningless for human players."

never be solved

meaningless

— *Garry Kasparov*

x.com/Kasparov63/status/2022016470826545287

"584 moves with just 8 of 32 pieces on the board! Further evidence that not only will chess never be solved, but that should such miraculous technology ever appear, the results will be practically meaningless for human players."

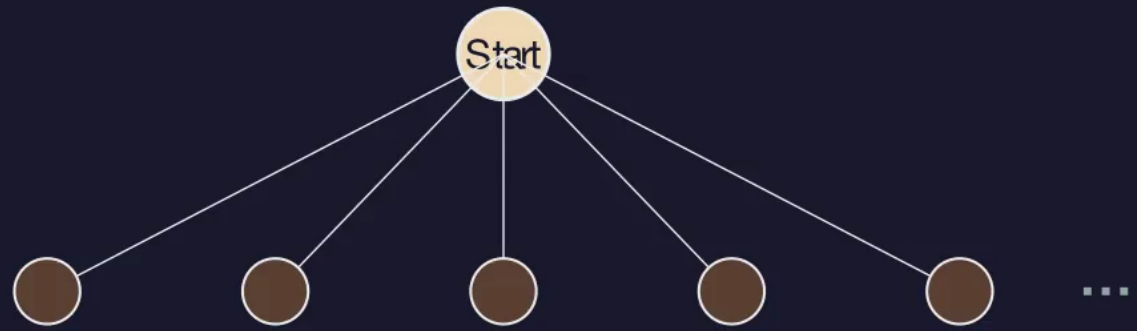
never be solved

meaningless

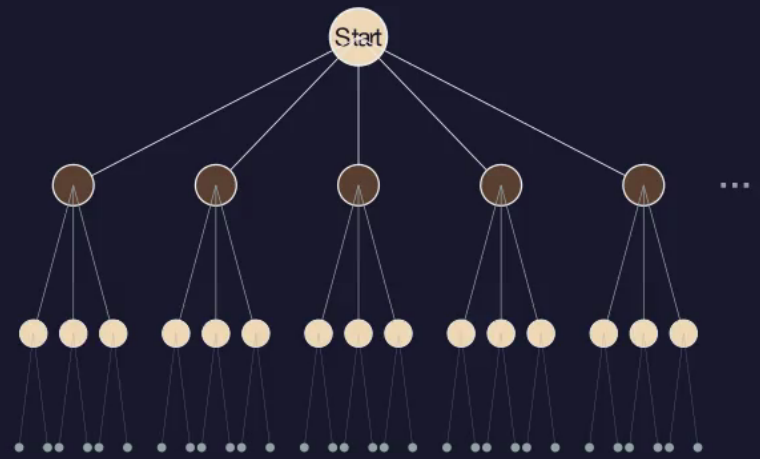
— Garry Kasparov

x.com/Kasparov63/status/2022016470826545287

But is he right?

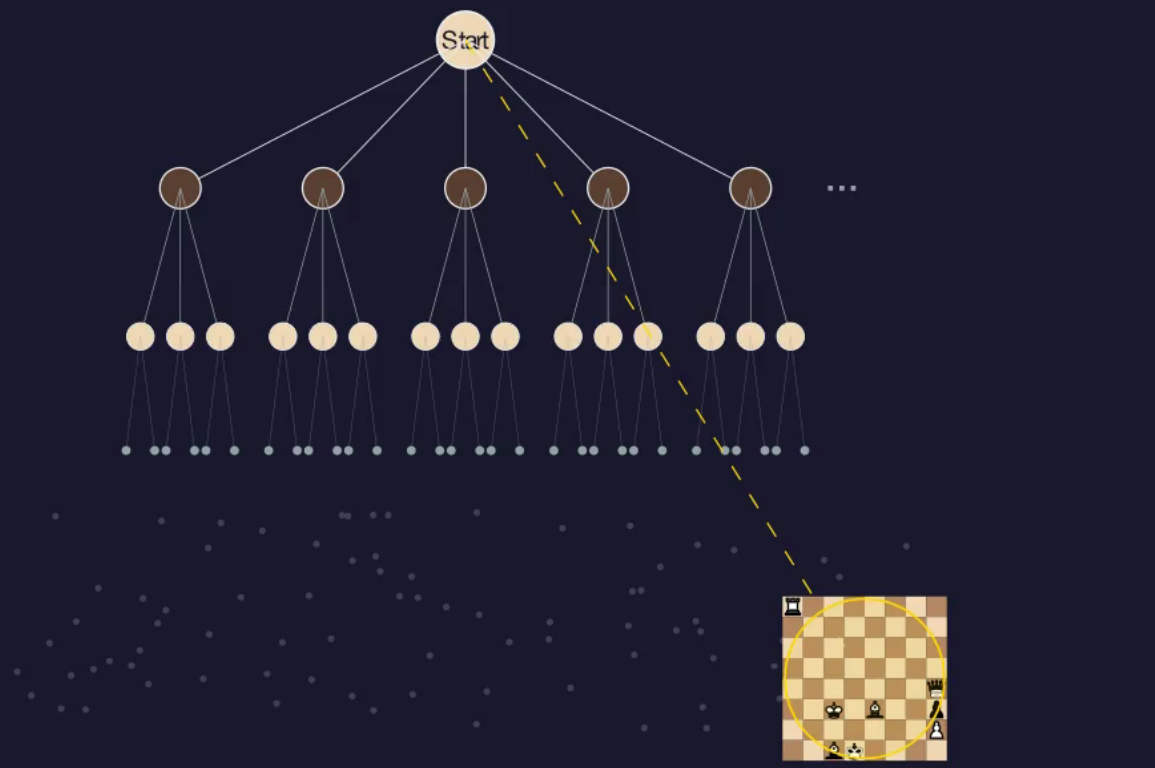


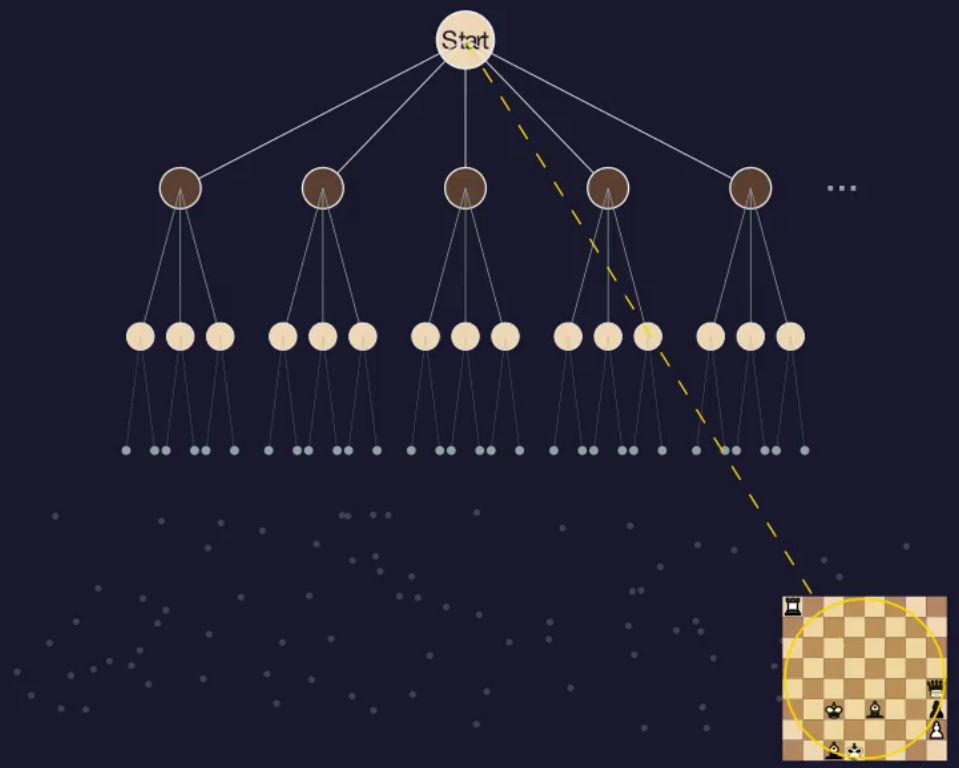
20 possible first moves



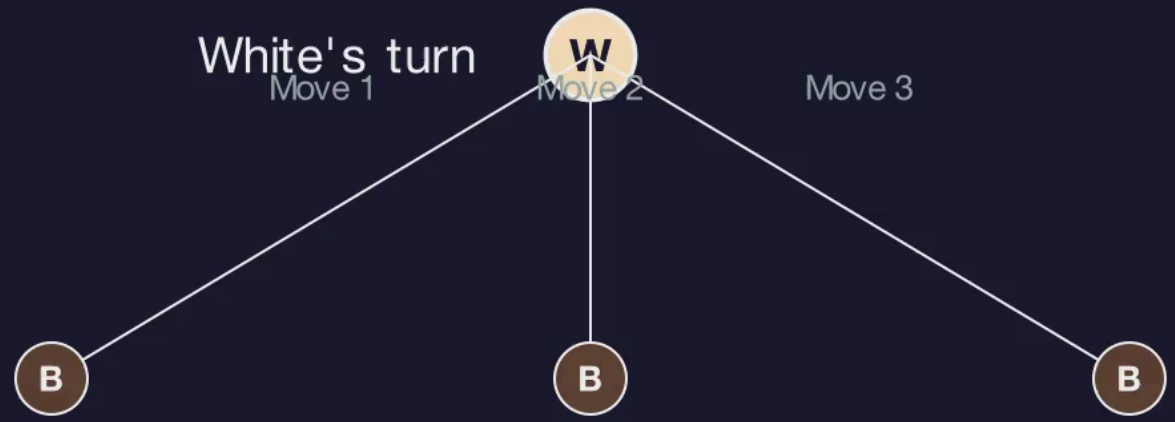
$\sim 10^{44}$

legal positions

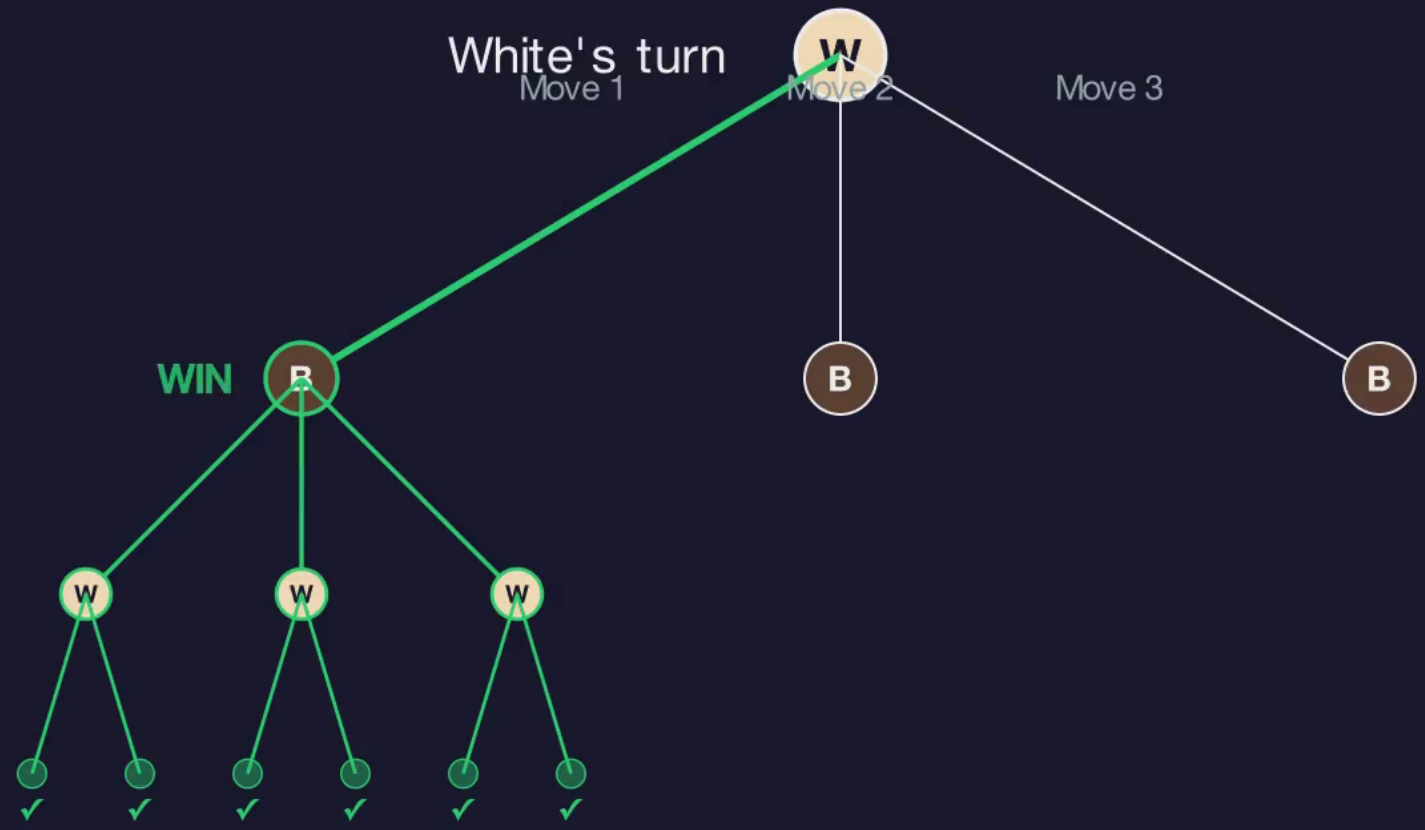

Start
...
This position is in here. Somewhere.



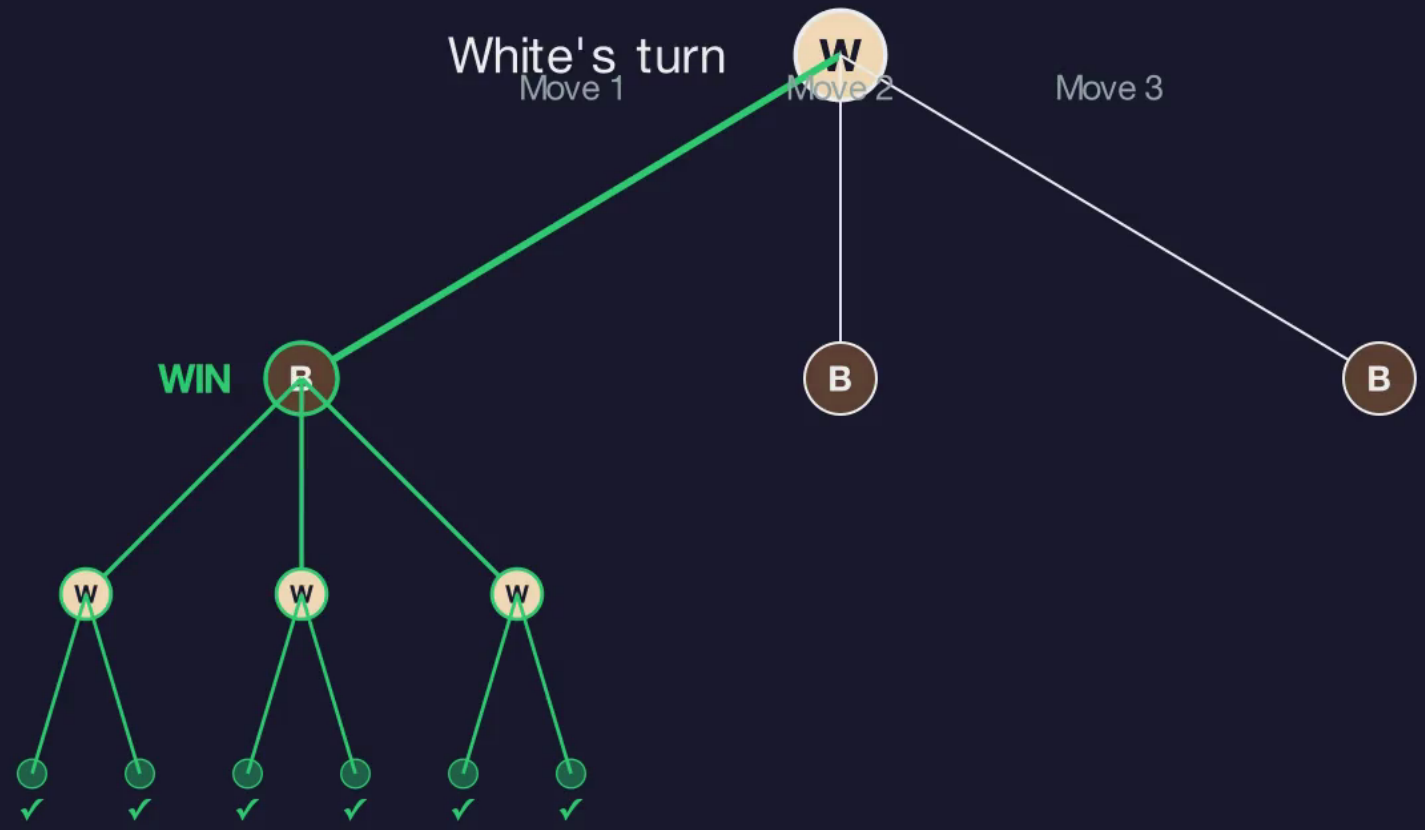
But does a solution need to visit it?



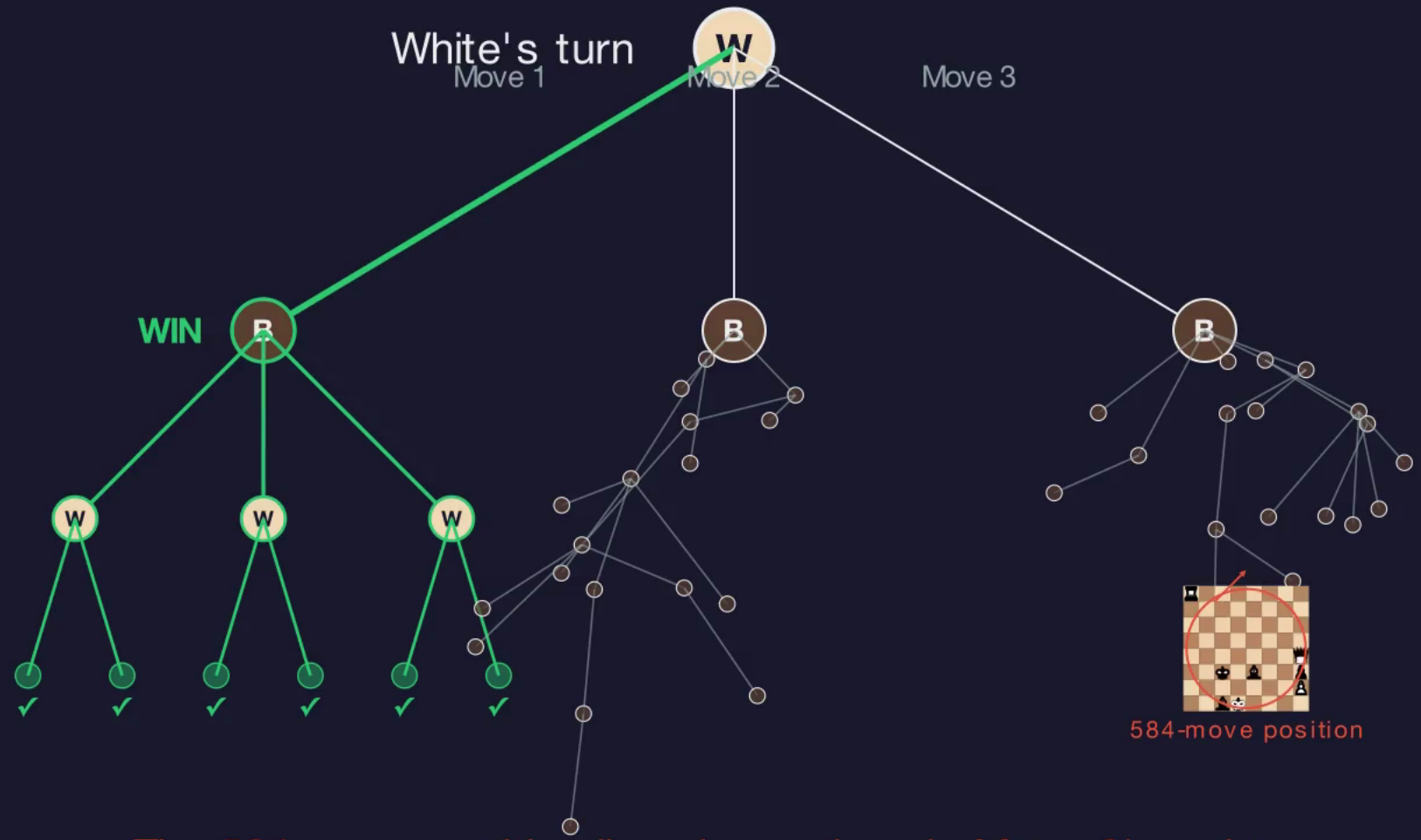
White picks the best move.



Every branch explored. Move 1 wins!

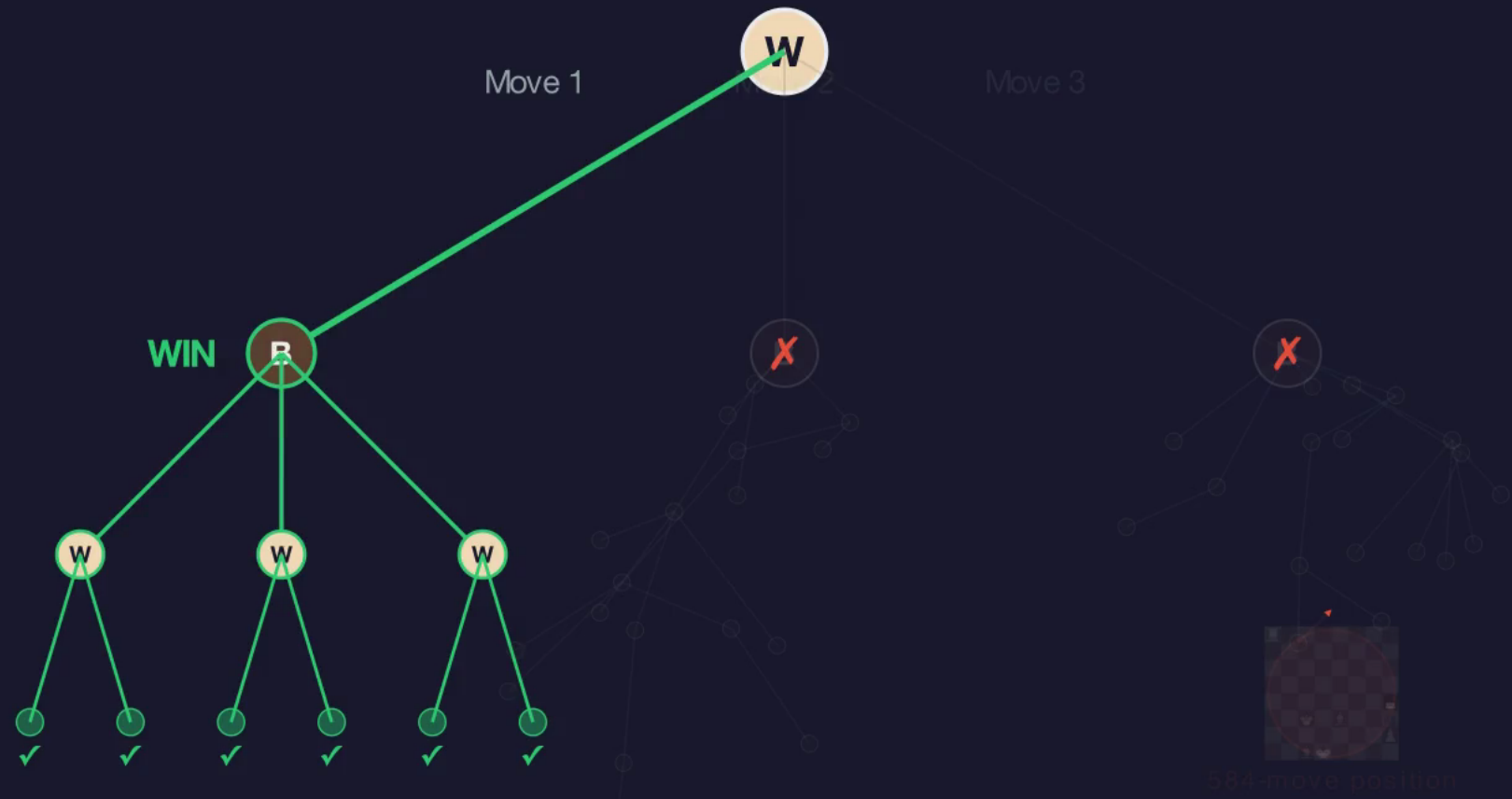


You can't do better than winning.



The 584-move position lives here, deep in Move 3's subtree.

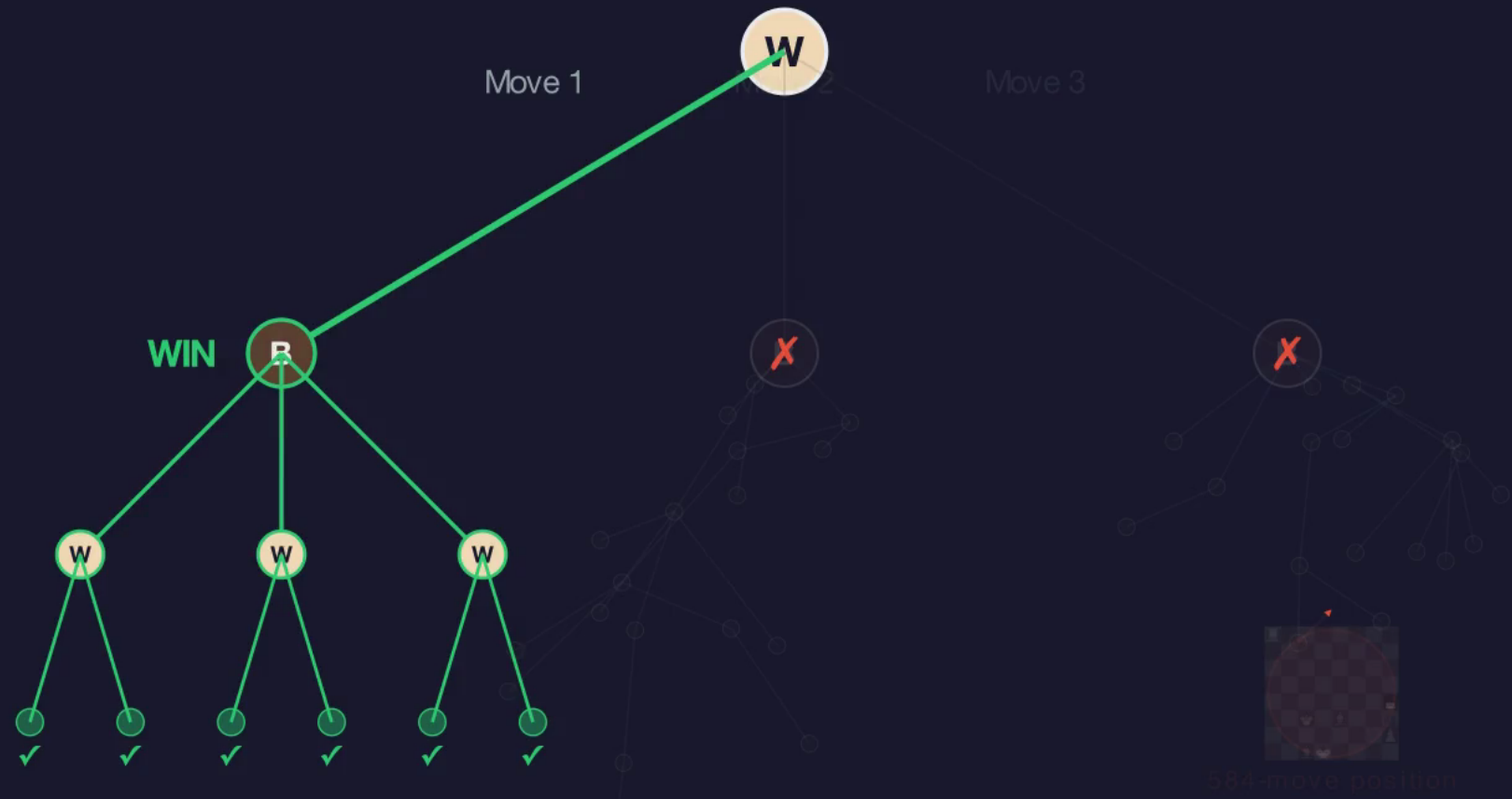
White already wins with Move 1. Cut it all.



The pattern repeats at every level:

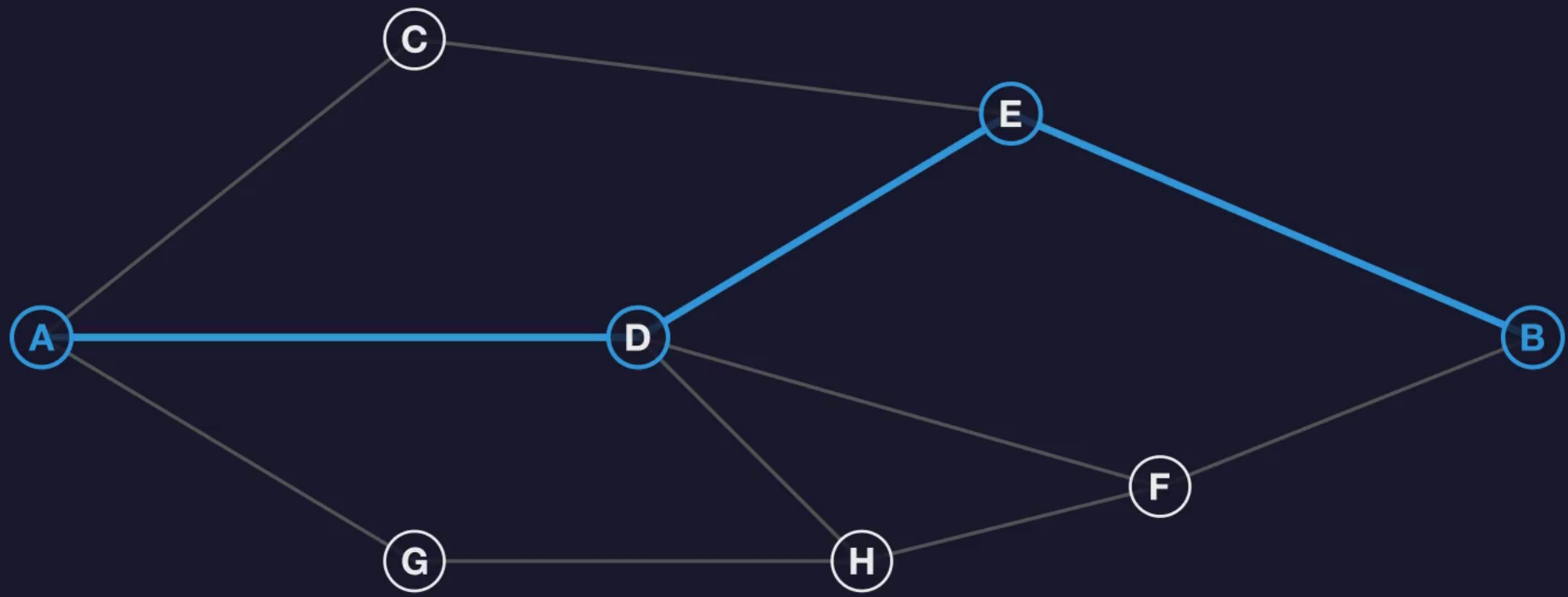
Your turn → find ONE winning move, skip the rest

Opponent's turn → must survive ALL responses



Trillions of positions — but only a tiny fraction matters.

Route planning

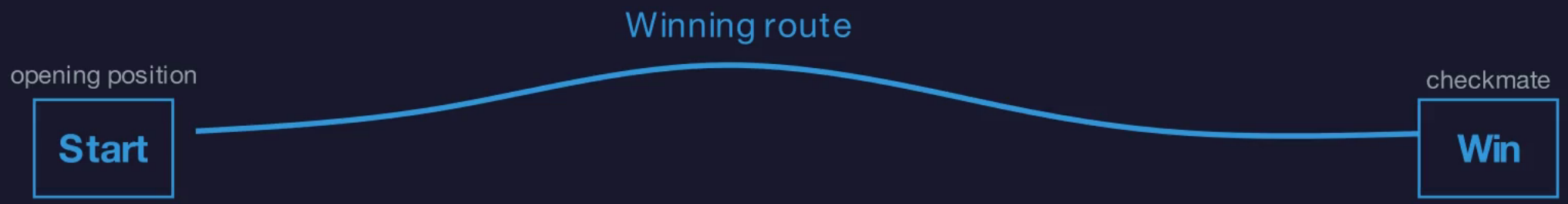


One verified route: A → D → E → B

Route planning

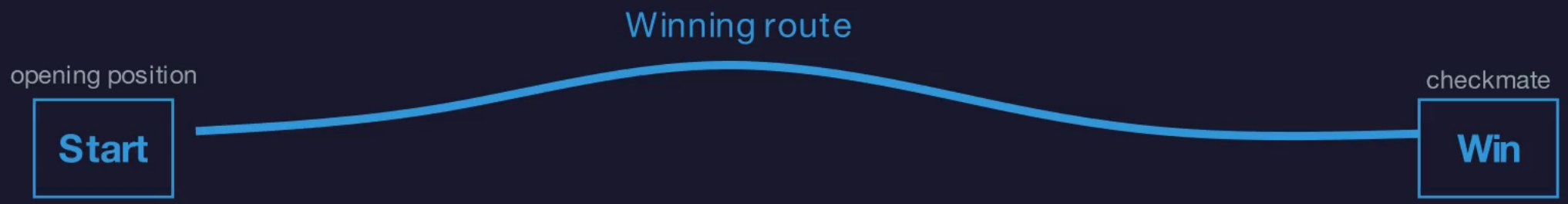
Done. Roads C, G, H? Irrelevant.

Proving a winning strategy exists



Each cave can be infinitely complex.

Proving a winning strategy exists



Their complexity is irrelevant.

Proving a winning strategy exists

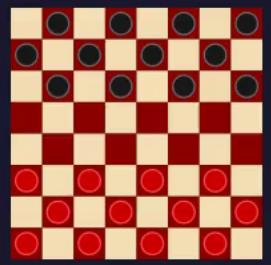
You don't need to analyze every position in chess.

One guaranteed winning strategy is enough.

Exhibit one robust strategy.

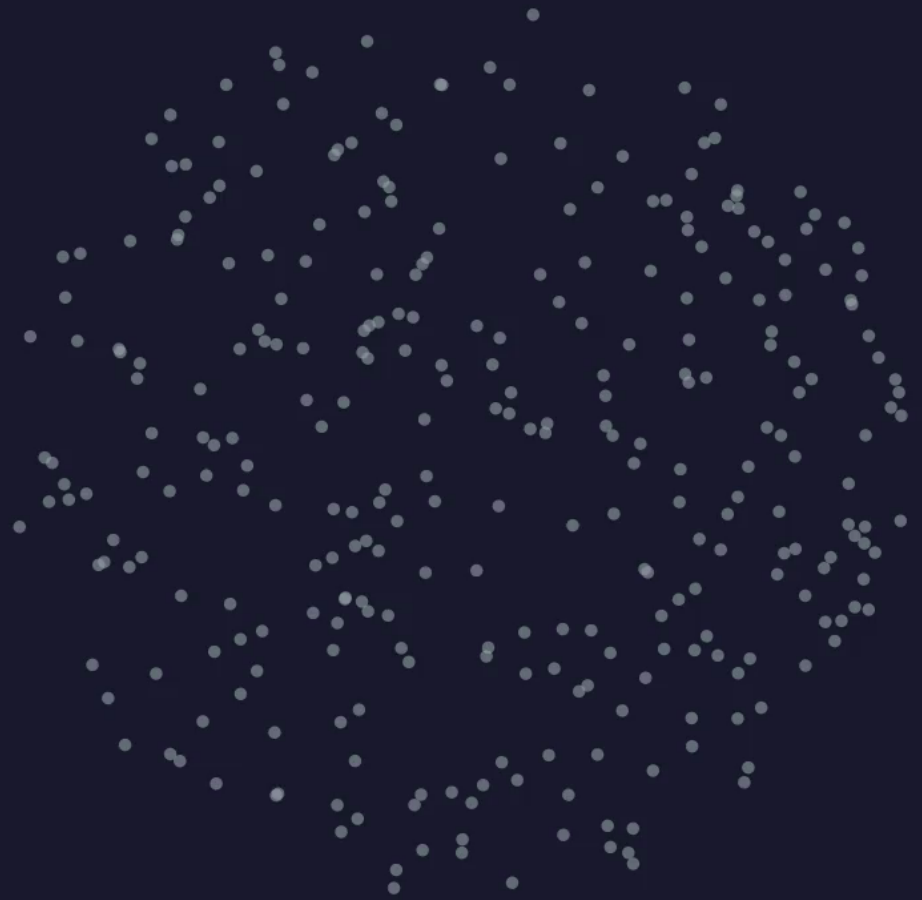
Everything outside it is irrelevant.

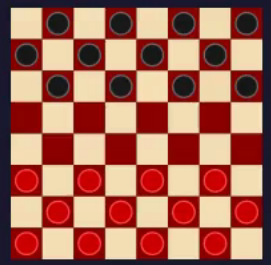
This is how you solve a game.



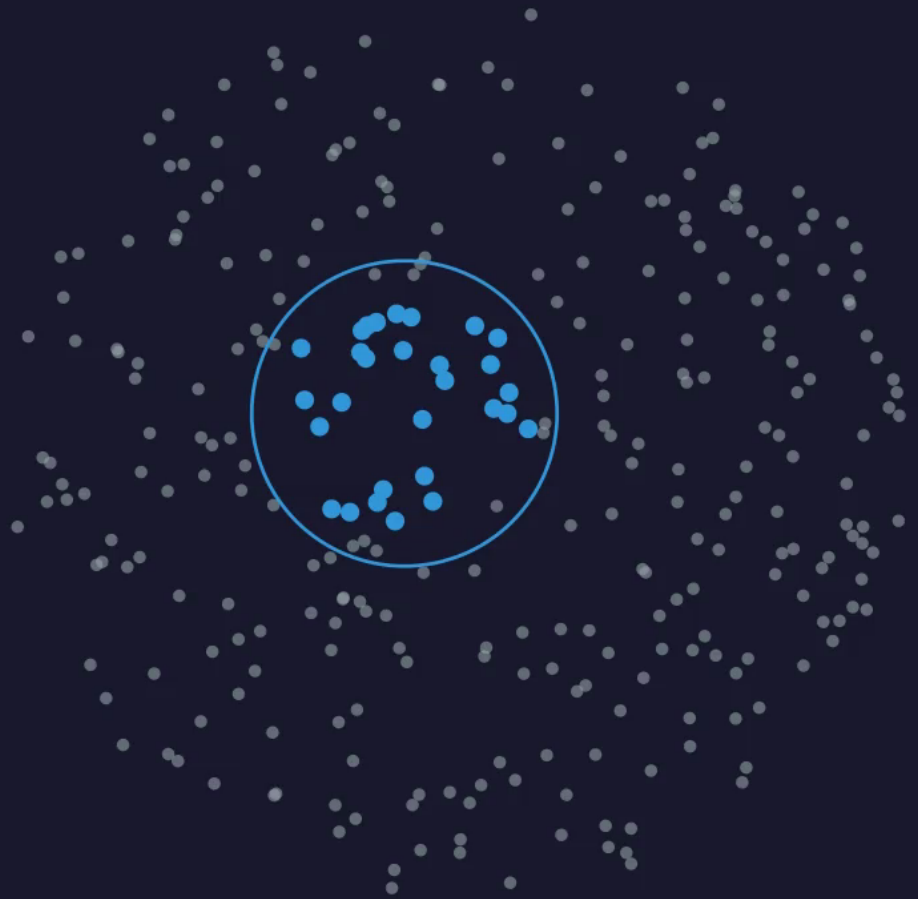
5×10^{20}

possible positions

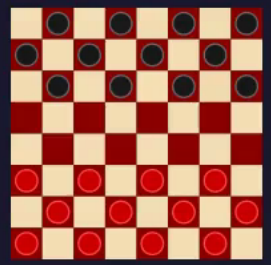




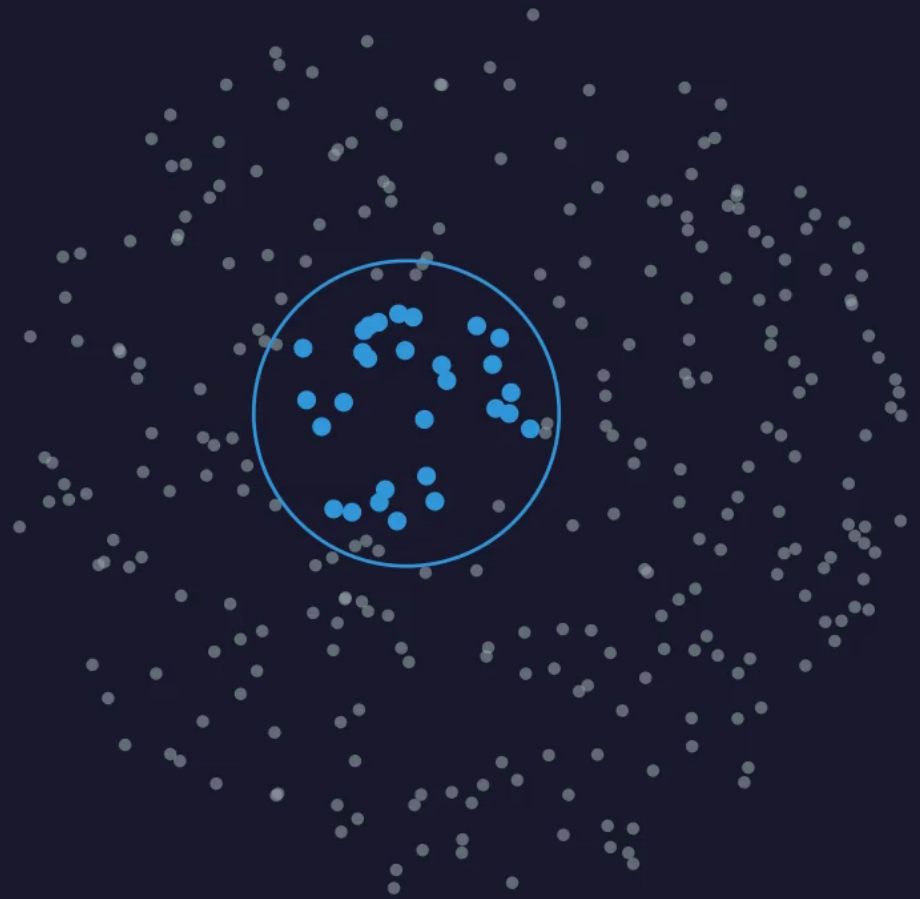
5×10^{20}
possible positions



Positions the proof
actually needed



5×10^{20}
possible positions



2007: Solved by Schaeffer's team

CHECKERS

DRAW ✓

CHECKERS

DRAW ✓

Could chess work the same way?

What does "solved" actually mean?

Ultra-Weak Know the outcome (win/draw/loss)

e.g., Hex — "first player wins" (no strategy known!)

Weak Have a strategy from the start

e.g., Checkers — draw, with a proven strategy

Strong Know the best move from EVERY position

e.g., Tic-tac-toe, Connect Four

When Kasparov says "chess will never be solved,"

which kind of solving does he mean?

Ultra-Weak Know the outcome (win/draw/loss)

e.g., Hex — "first player wins" (no strategy known!)

Weak Have a strategy from the start

e.g., Checkers — draw, with a proven strategy

Strong Know the best move from EVERY position

e.g., Tic-tac-toe, Connect Four

When Kasparov says "chess will never be solved,"

which kind of solving does he mean?

Ultra-Weak Know the outcome (win/draw/loss)

e.g., Hex — "first player wins" (no strategy known!)

Weak Have a strategy from the start

e.g., Checkers — draw, with a proven strategy

Strong Know the best move from EVERY position

e.g., Tic-tac-toe, Connect Four

There is a hidden assumption: strong solving.

But we can disagree with that assumption.

Ultra-Weak Know the outcome (win/draw/loss)

e.g., Hex — "first player wins" (no strategy known!)

Weak Have a strategy from the start

e.g., Checkers — draw, with a proven strategy

Strong Know the best move from EVERY position

e.g., Tic-tac-toe, Connect Four

584

Weak solving is arguably the useful problem we care about.

But we can disagree with that assumption.

Ultra-Weak Know the outcome (win/draw/loss)

e.g., Hex — "first player wins" (no strategy known!)

Weak Have a strategy from the start

e.g., Checkers — draw, with a proven strategy

Strong Know the best move from EVERY position

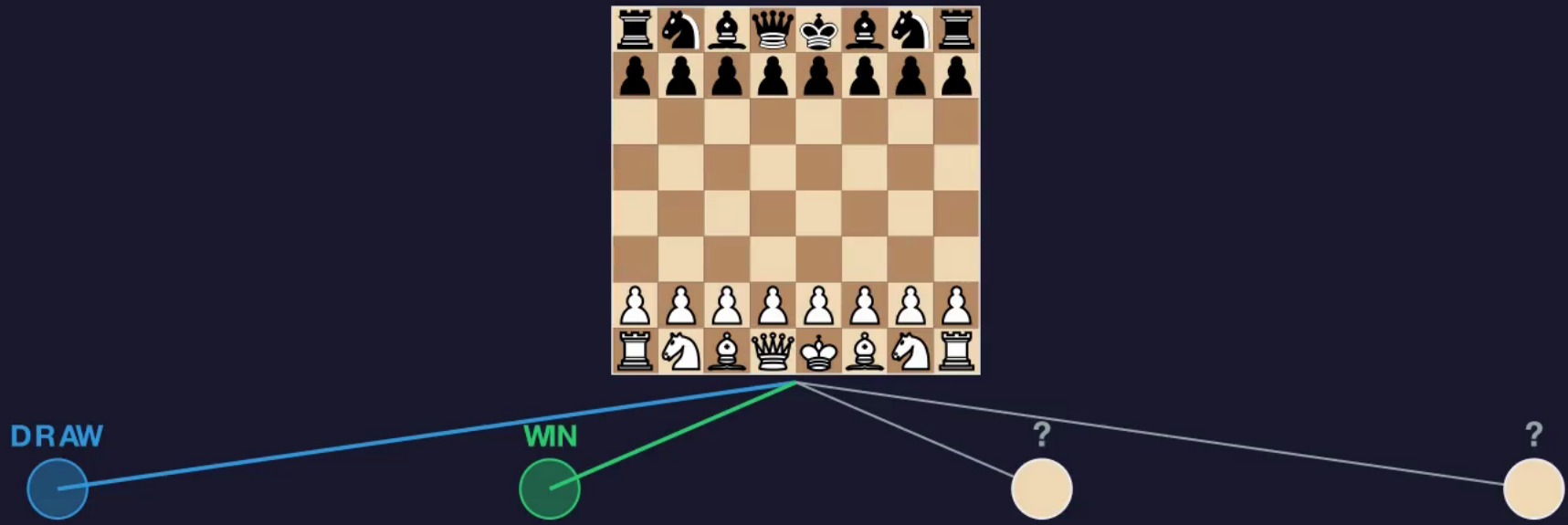
e.g., Tic-tac-toe, Connect Four

If we consider weak solving sufficient,

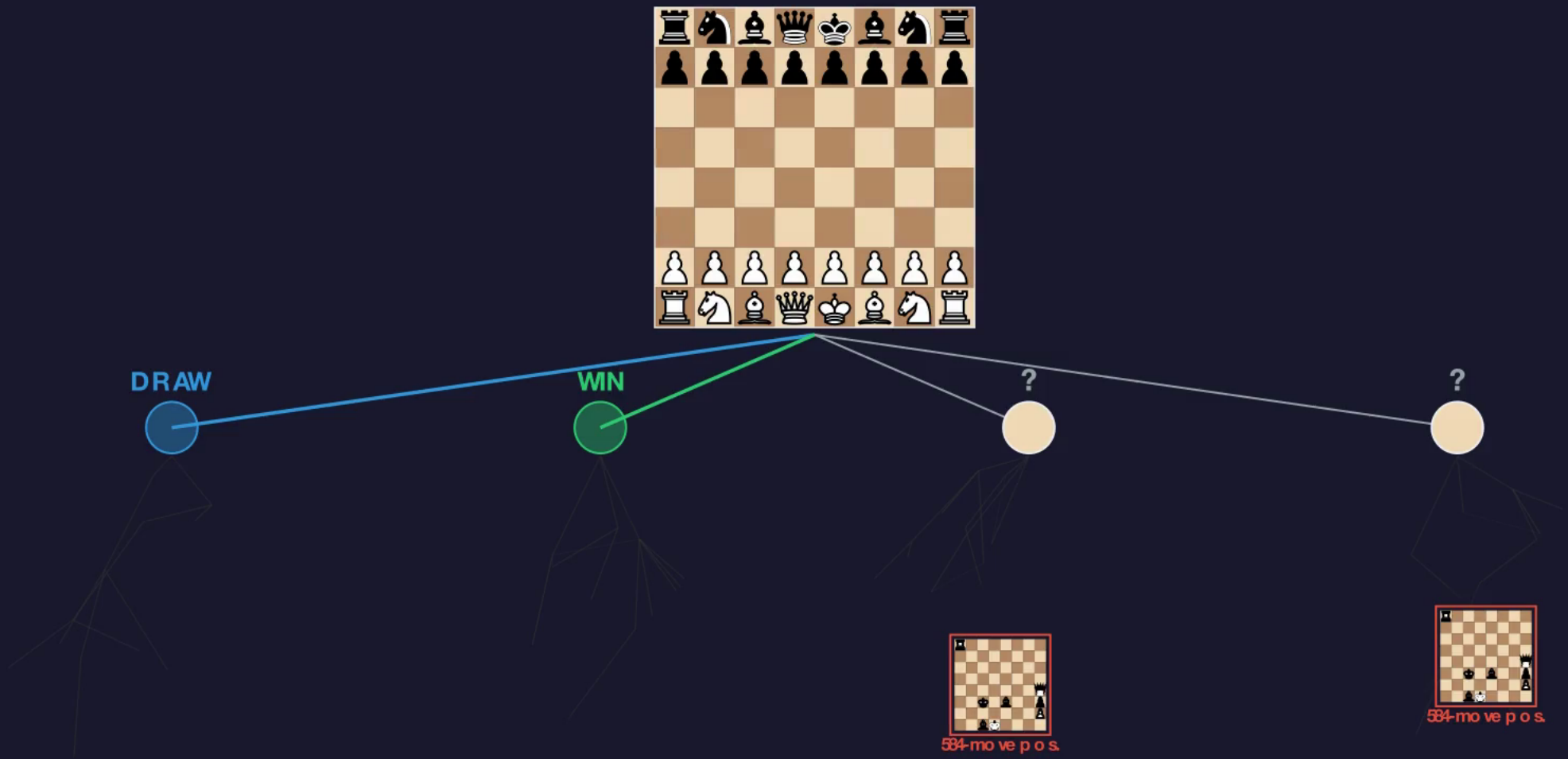
the 584-move position might never need to be reached.

Kasparov is right:
chess contains astonishing depth.

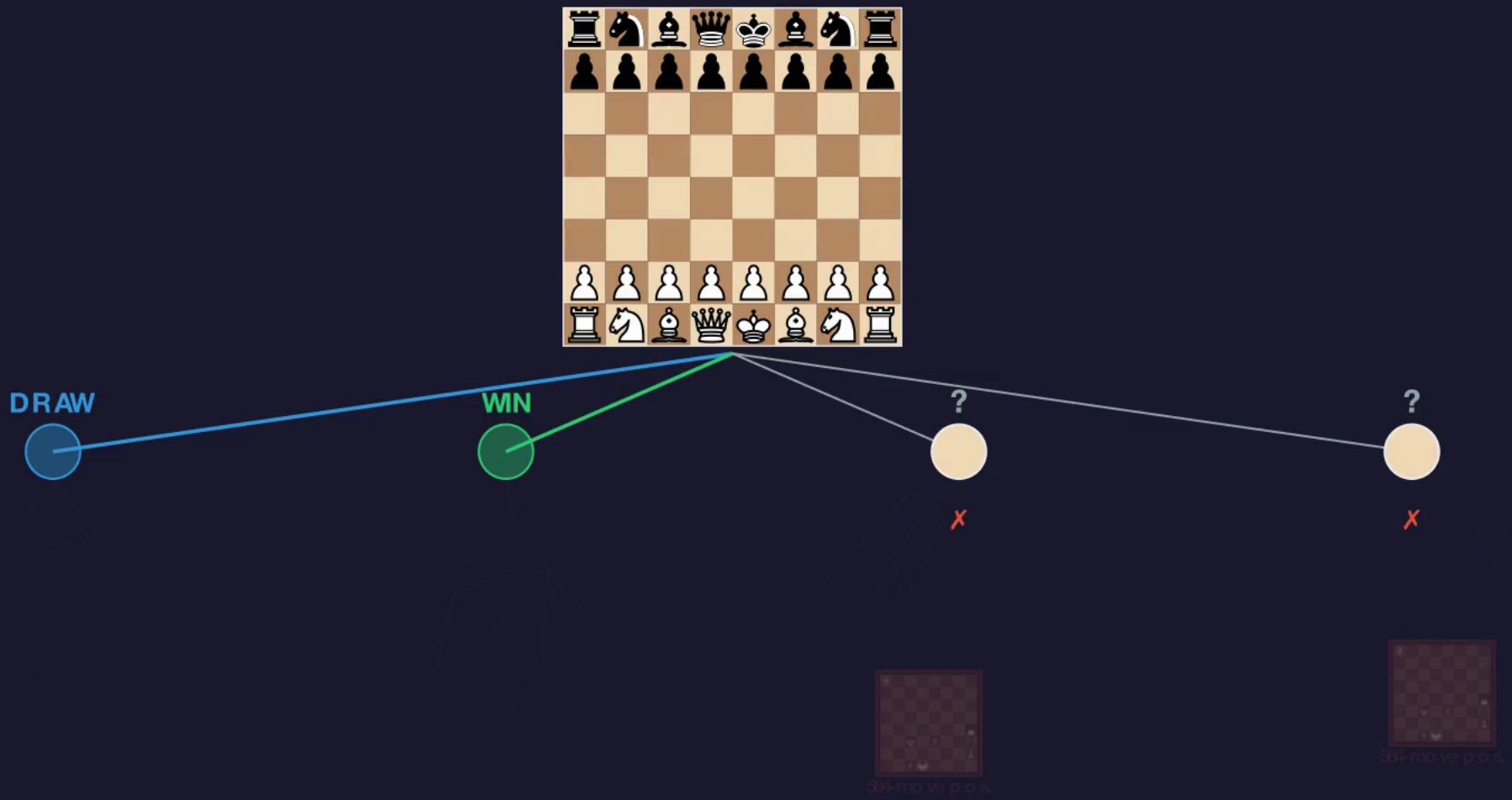
But depth in the corners
doesn't necessarily prove unsolvability.



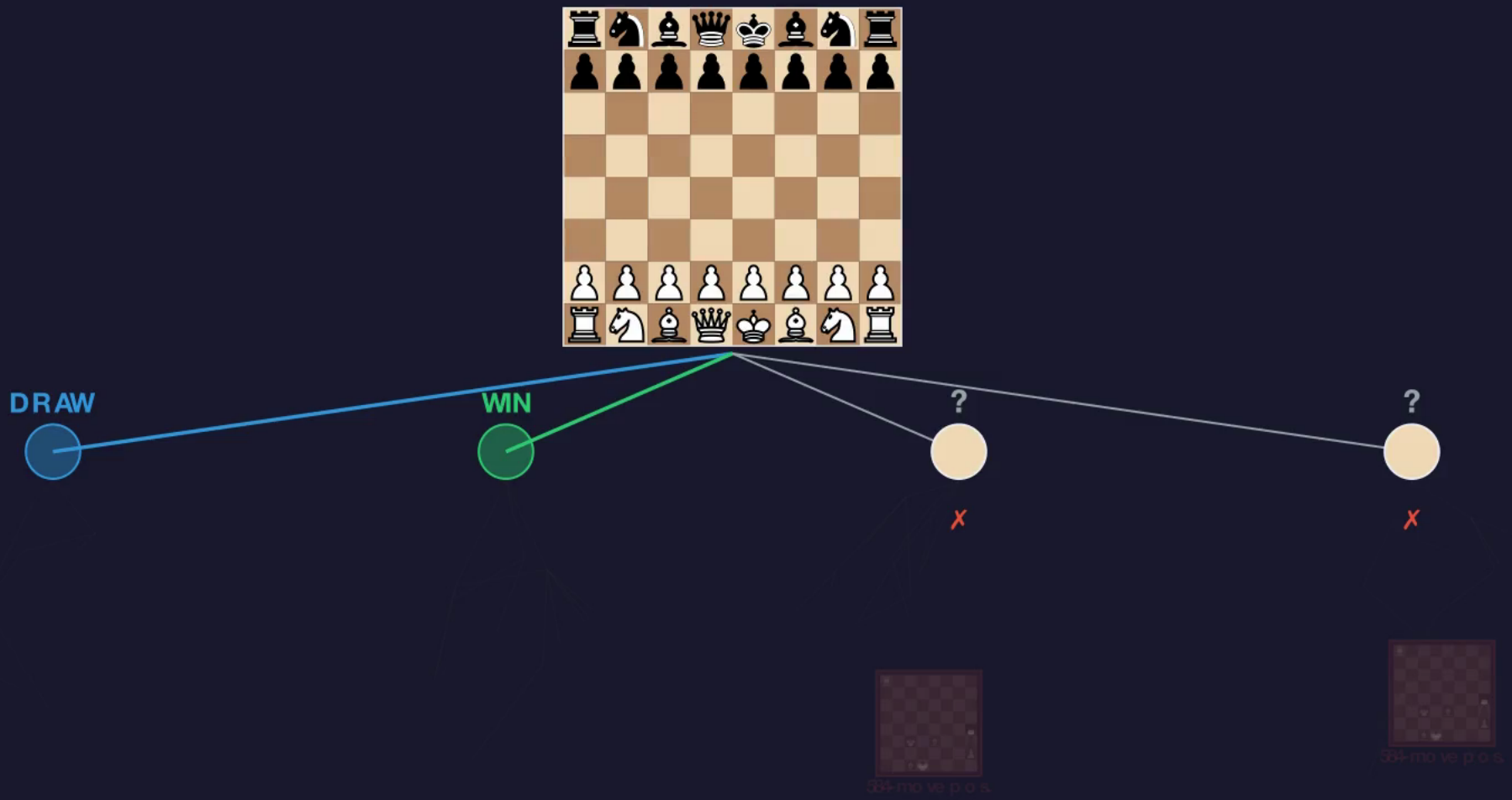
Some positions in the tree are already decided.



The 584-move position could appear in multiple subtrees.



No need to explore their subtrees — they are cut.



Is the 584-move position even reachable under perfect play?

If we accept weak solving as sufficient,

a winning strategy only needs to cover reachable positions.

Exotic positions — like the 584-move one —
may simply never arise under perfect play.

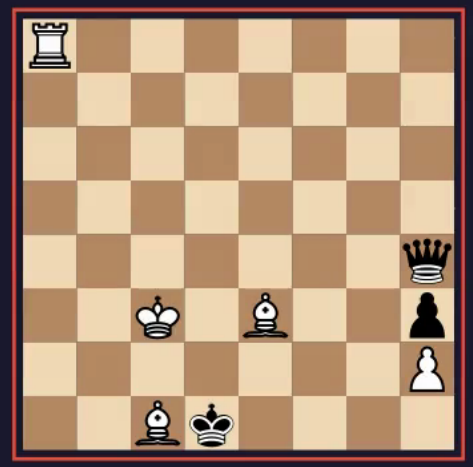
Is the 584-move position reachable under perfect play?

There is reason for hope.

TL;DR

The argument in 4 slides

The Claim

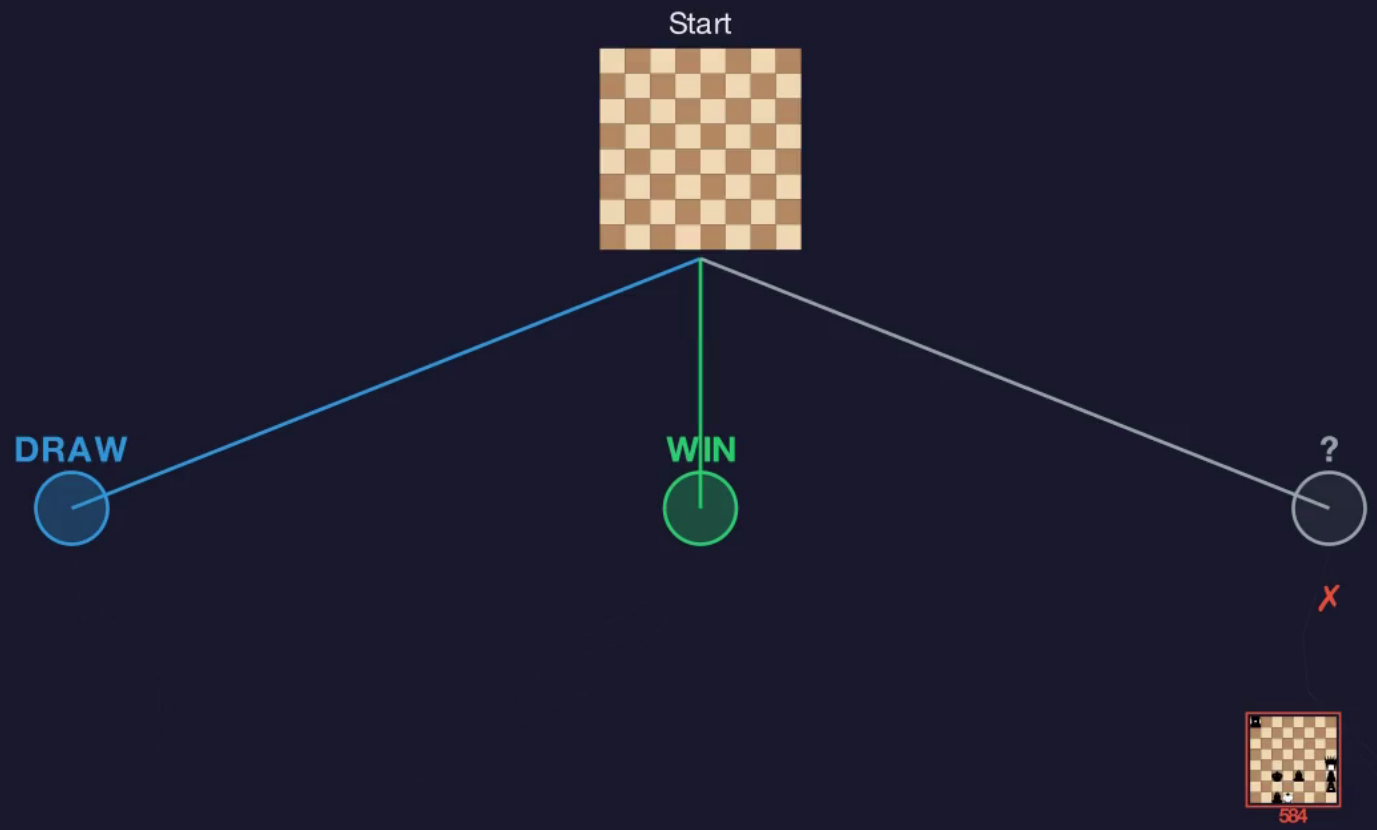


584 moves to win

"Chess will never be solved."
— Garry Kasparov

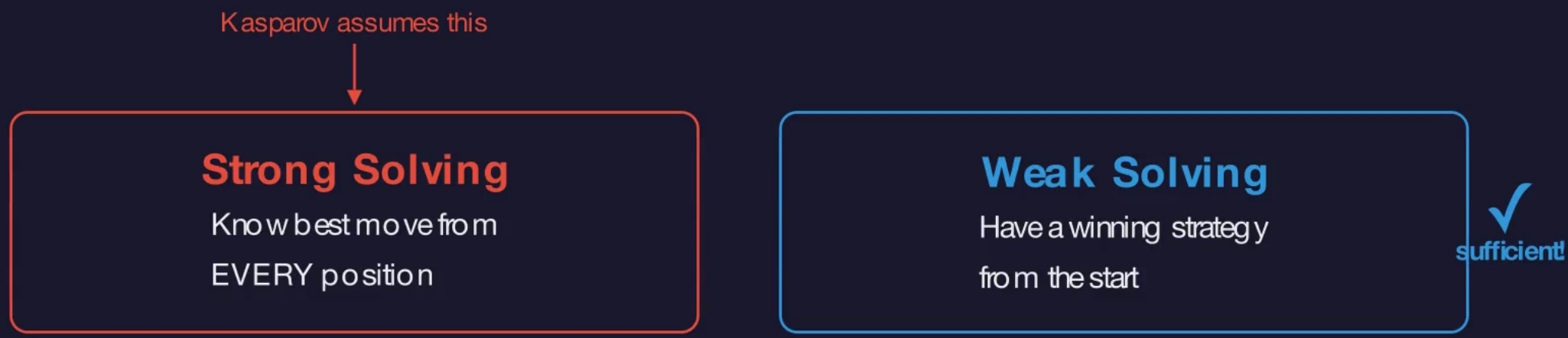
A position so complex it takes 584 perfect moves to win.

But: You Don't Explore Every Branch



Decided branches are pruned — no need to go deeper.

The Hidden Assumption



If weak solving is enough, unreachable positions don't matter.

Is the 584-move position reachable
under perfect play?

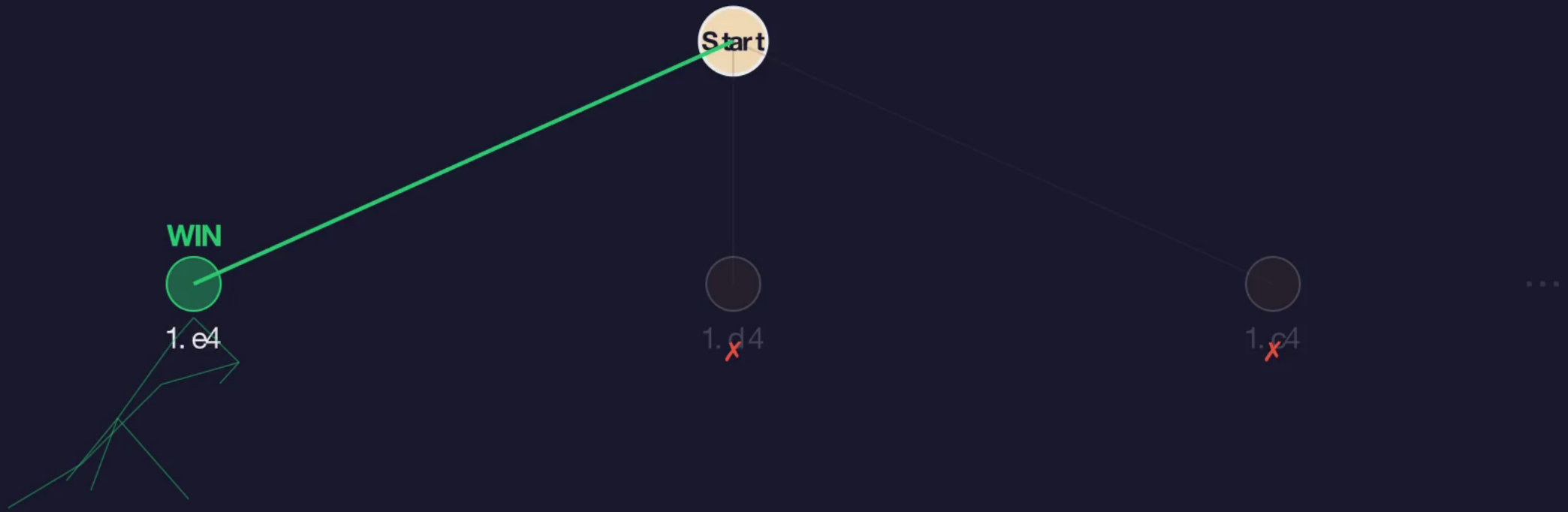
There is reason for hope.

BONUS

The cons of weak solving

Let's imagine that 1. e4 is winning.

(This is an assumption — we don't know that!)



Weak solution: 1.e4 wins — done. Other moves ignored.

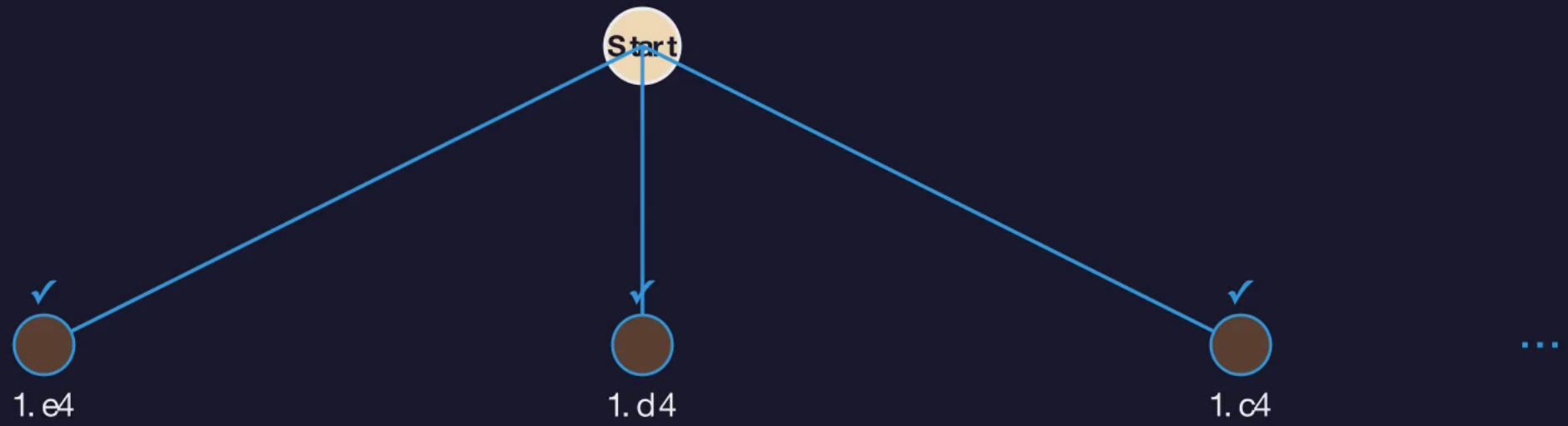
But here's the catch.

Is 1. d4 also winning? Drawing? We simply don't know.

But here's the catch.

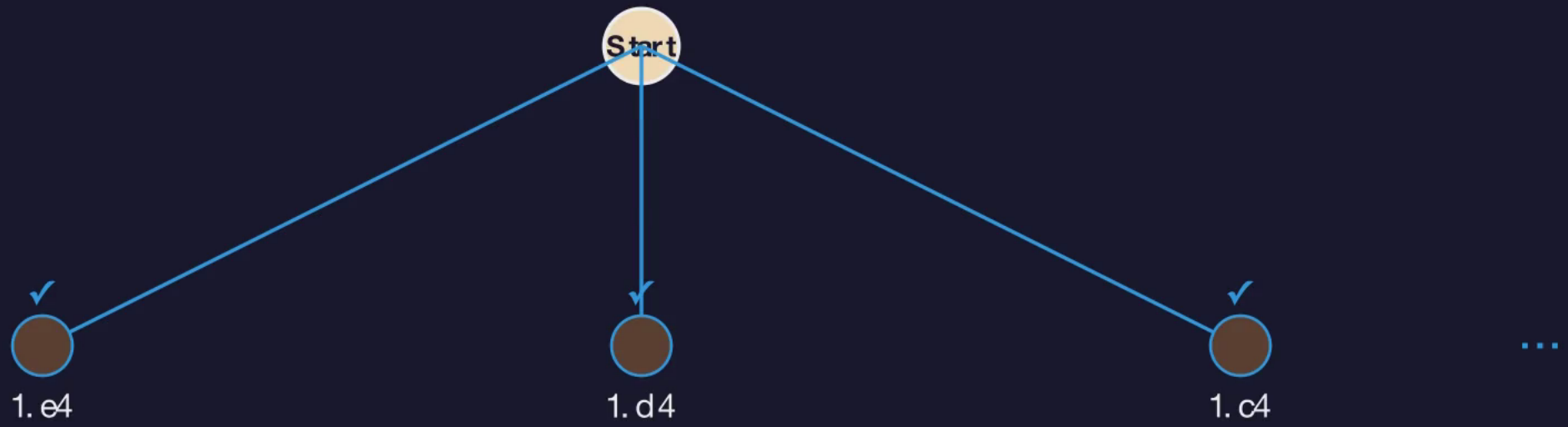
To learn the truth about 1. d4, you'd have to redo weak solving from there.

But the most likely scenario...



1. e4, 1. d4, 1. c4... all must be covered. No shortcut.

But the most likely scenario...



the 584-move position

Even in a draw proof, unreachable positions are still irrelevant.

Weak solving: the trade-off

If White wins

One winning move suffices

But other moves remain unknown

Incomplete picture of optimal plays

If chess is a draw

All first moves must be covered

More work — but more complete

Still skips unreachable positions

Weak solving gives the verdict — not the full map.

Mathieu Acher

@acherm

https://mathieuacher.com/

Professor in Computer Science, FIDE Master

Slides made with Manim

Thanks to Claude Code and GPT 5.2 Pro for the discussions