The rules of Freedom Dice Chess

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July 2025

1 Introduction

There is evidence that at various times in the history of Chess, the game and its relatives were played with dice to determine which pieces were able to move, with a side of the dice for each piece type [1], but that there is limited evidence to determine whether or not the original Chess game was played with dice [2]. Various modern versions of Dice Chess have been invented [3], generally involving rolling multiple dice with king capture as the goal and some even involving multiple piece moves per turn [4], but I found these diverged too much from what makes Chess a great game. As someone who enjoys both Backgammon and Chess, often likening Backgammon to Chess with dice (or **very** strategic snakes and ladders), I thought of how I would go about introducing dice to Chess in a way that would maintain the tactics and strategy while elevating and extending the game. For those convinced that Chess is already complete and doesn't need a chance element added, this will lead to greater variability in games avoiding the drab obligation of studying standard openings, add genuine risk-reward strategy with probabilities (which is mathematically more interesting than perfect information strategy without chance), and greater volatility so that games are not effectively over after the first major mistake. I also imagine these rules would reduce draw rates at the highest levels. This is what I came up with through experimentation with a good Chess friend Paul Jeffery, who made key suggestions for rules such as reallocating unusable rolls to pawns and also helped figure out strategy in play testing. The variant largely plays like "Hand and Brain" Chess [5] except with dice instead of the "Brain" player. I now find this variant more fun and interesting than standard Chess, I hope you find so too!

2 Equipment

All you need to play Freedom Dice Chess are:

1. Standard Chess board and pieces.

2. A single standard 6 sided dice (or 6 sided dice with Chess symbols).

3. Chess 960 starting position generator (optional).

3 Rules

1. The normal rules of Chess (or Chess 960) apply with the following additional rules:

2. Unless the player to move has "Freedom", the player to move must roll the dice to determine which type of piece they are allowed to move. The dice rolls are allocated as follows:

   (a) $1 \rightarrow$ pawn
   (b) $2 \rightarrow$ knight
   (c) $3 \rightarrow$ bishop
   (d) $4 \rightarrow$ rook
   (e) $5 \rightarrow$ queen
   (f) $6 \rightarrow$ king

   Castling can count as a king or rook move.

3. If there are no legal moves for the piece type rolled, then instead it is reallocated so they must move their lowest value piece type that has legal moves (eg if you roll a rook but have no legal rook moves, you must instead move a pawn. If you have no pawn moves either, you must move a knight, and failing that a bishop and so on).

4. If the player to move has Freedom, they may either choose a move that satisfies a Freedom condition or choose to roll the dice and move as described above. After rolling the dice the player cannot claim Freedom for that move, unless they are in check and rolled by mistake.

5. The Freedom conditions are:

   (a) Freedom to recapture: If an enemy piece captured on the previous turn, the player to move may recapture with any piece able to recapture on the square of the enemy piece that moved on the previous turn. This ensures direct trades work normally.
   (b) Freedom to defend check: If the player to move is in check, they may make any legal move. This ensures defence of the king works normally.
   (c) Freedom to give check: The player to move may make any legal move that puts the enemy king in check. This ensures checkmate attacks with a series of checks work normally. Check should be called to avoid any confusion with Freedom.

6. Deema's rule: An unofficial rule for casual games to encourage good etiquette and mutually fun games. The rule is that if you think your opponent has rolled particularly unfavourable dice and are not enjoying the game as a result, you may offer a re-roll. If the re-roll is accepted, the replacement dice roll must be played and in exchange the player who offered the re-roll has unconditional Freedom on the next move.

4 Basic theory and strategy tips

After playing around with the game, we found that although the game plays and feels like the Chess we enjoy, there are also significant differences in the optimal strategy from standard Chess. These observations can be summarised by the following tips:

1. Develop in the opening to give yourself good options but avoid giving yourself unlucky forced bad moves especially with the king, don't Bongcloud yourself. Playing the opening in a "hypermodern" style with fianchetto bishops and not moving the e and d pawns gives good results for maximising chances for castling (kingside seems like the only viable option), although a forced premature king move can still prevent castling so it's not guaranteed. The e and d pawns can also be great attackers for giving threats to the knights and bishops as it's harder to stop them advancing.

2. Be wary of dice induced zugzwang in tight inflexible positions, even in middle games.

3. Play solid with good structure so you have defensive Freedom to recapture.

4. Making "quiet threats" that position attackers ready to capture but don't give the opponent Freedom by checking or capturing is very powerful. For this reason it's often dangerous to play too actively with the high value pieces as they can get quite vulnerable to threats and are not guaranteed the option to retreat when threatened.

5. It's much harder to stop passed pawns without standing right in front of them. There are also some situational underpromotion tactics to avoid giving Freedom by avoiding giving checks.

6. Although the ranking of piece value is unchanged, the relative values are quite different. Intuitively, I get the feeling that knights are worth significantly less than bishops, perhaps 2 instead of 3 pawns. This is largely due to the number of moves and therefore favourable dice rolls needed to maneuver them, and that with fewer movement options a forced knight move can be much worse than a forced bishop move which can play waiting moves better. Queens are also far less valuable, perhaps worth less than a rook+bishop combination but more than rook+knight, and only really useful in checkmates and windmill attacks once the king is exposed. It's much harder to keep the queen safe, you can get unlucky and lose it anyway, so it's harder to make full use of it. This is intuitive guesswork but some rough material values might be pawn=1, knight=2, bishop=3, rook=4, and queen = 6.5.

7. A variety of piece types can help diversify dice rolls, a knight+bishop may even be better than a bishop pair, but eliminating a piece type through trades can also help by getting more pawn moves.

8. Since there is Freedom to recapture but no Freedom to capture, there are bizarre new risk-reward tactical possibilities involving making "quiet threats" while seemingly hanging a piece (eg. moving a knight to threaten a queen even though it could be taken for free on the next move by another piece if they roll well) leading to strange stand-offs with both players waiting for the right dice rolls. The odds of success for the players waiting for the right numbers can be elegantly worked out using classical probability. The risk-reward strategic calculation would not only depend on the probabilities and piece values, but also on the broader context of who is otherwise winning the game and who is strategically more desperate to go for it.

5 Dice odds in infinite stand-off

A key feature of this variant and the most interesting aspect of the probability modeling of the game is the "stand-off", in which there are one or more threats on the board and both players are waiting for the right dice numbers to either attack or defend. Each player has a certain number of dice roll outcomes that lets them achieve their goal, and they take turns rolling the dice until a player succeeds by rolling the dice number they need. For simplicity, we will imagine that the dice rolls needed are fixed (in practice this is not the case as pieces can enter or leave the stand-off situation) and the dice are rolled as many times as it takes until a player succeeds. If we let W and B represent the events for White and Black respectively winning the stand-off, and let p_w and p_b represent the probabilities for White and Black respectively winning on any single dice roll, and let White have the first roll in the stand-off, then it follows that:

$$
\begin{aligned}
P(W) =& P(\text{White wins first roll}) + P(\text{White loses first roll} \cap \text{Black loses first roll}) \cdot P(W) \\
P(W) =& p_w + (1-p_w)(1-p_b) \cdot P(W) \\
0 =& p_w + ((1-p_w)(1-p_b) - 1)P(W) \\
P(W) =& \frac{p_w}{1 - (1-p_w)(1-p_b)} \\
P(W) =& \frac{p_w}{p_w + (1-p_w)p_b} \\
P(B) =& P(\text{White loses first roll} \cap \text{Black wins first roll}) + P(\text{White loses first roll} \cap \text{Black loses first roll}) \cdot P(B) \\
P(B) =& (1-p_w)p_b + (1-p_w)(1-p_b) \cdot P(B) \\
0 =& (1-p_w)p_b + ((1-p_w)(1-p_b) - 1)P(B) \\
P(B) =& \frac{(1-p_w)p_b}{1 - (1-p_w)(1-p_b)} \\
P(B) =& \frac{(1-p_w)p_b}{p_w + (1-p_w)p_b} \\
\frac{P(W)}{P(B)} =& \frac{p_w}{(1-p_w)p_b}
\end{aligned}
$$

This derivation shows that for the simple 2 outcome stand-off, the odds between the White and Black winning are the same as the odds between White and Black winning on their first rolls, since if both players miss then the situation repeats. In order to calculate if initiating a stand-off is worth it, the player would need to compare the probability odds of success as derived above with the risk reward-ratio for the 2 outcomes based on material gain/loss and situational context. Accurate judgement in stand-offs then becomes more a matter of strategic intuition rather than quantitative calculation.

6 References

[1] https://en.wikipedia.org/wiki/Chaturaji
[2] Chess stack exchange discussion available at
https://chess.stackexchange.com/questions/19785/did-predecessors-of-modern-chess-use-dice-to-determine-which-piece-to-move
[3] https://en.wikipedia.org/wiki/Dice_chess
[4] https://www.dicechess.com/
[5] https://en.wikipedia.org/wiki/Hand_and_brain