

# Reversi

**Reversi** is a strategy board game for two players, played on an 8×8 unchecked board. There are sixty-four identical game pieces called *disks* (often spelled "discs"), which are light on one side and dark on the other. Players take turns placing disks on the board with their assigned color facing up. During a play, any disks of the opponent's color that are in a straight line and bounded by the disk just placed and another disk of the current player's color are turned over to the current player's color.

The object of the game is to have the majority of disks turned to display your color when the last playable empty square is filled.

The game of Reversi was invented in 1883. A modern Mattel game, published as **Othello** and with a change to the board's initial setup, was patented in 1971.

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## History

### Original version

Englishmen Lewis Waterman<sup>[1]</sup> and John W. Mollett both claim to have invented the game of Reversi in 1883, each denouncing the other as a fraud. The game gained considerable popularity in England at the end of the nineteenth century.<sup>[2]</sup> The game's first reliable mention is in 21 August 1886 edition of *The*

### Reversi



Othello, a modern variation of reversi

<b>Years active</b>	Since 1883 (perhaps earlier)
<b>Genre(s)</b>	Board game <div>Abstract strategy game</div> <div>Mind sport</div>
<b>Players</b>	2
<b>Setup time</b>	< 10 seconds
<b>Playing time</b>	5–60 minutes
<b>Random chance</b>	None
<b>Skill(s) required</b>	Strategy, tactics, observation
<b>Synonym(s)</b>	<i>Othello</i>

*Saturday Review*. Later mention includes an 1895 article in *The New York Times*, which describes Reversi as "something like Go Bang, [...] played with 64 pieces."<sup>[3]</sup> In 1893, the German games publisher Ravensburger started producing the game as one of its first titles. Two 18th-century continental European books dealing with a game that may or may not be Reversi are mentioned on page fourteen of the Spring 1989 *Othello Quarterly*, and there has been speculation, so far without documentation, that the game has older origins.

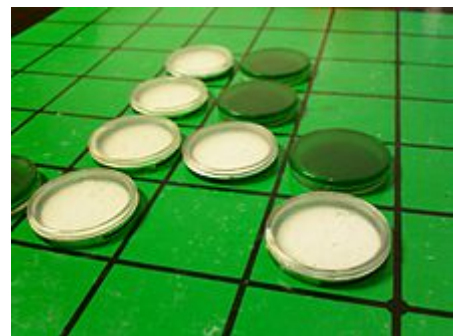


Othello was one of Nintendo's first arcade games, and was later ported to a dedicated home game console in 1980.

## Modern version

The modern version of the game—the most regularly used rule-set, and the one used in international tournaments—is marketed and recognized as Othello. It was patented in Japan in 1971<sup>[4]</sup> by Goro Hasegawa (autonym: Satoshi Hasegawa), then a 38-year-old salesman.<sup>[5]</sup>

The game differs from Reversi in that the first four pieces go in the center, but in a standard diagonal pattern, rather than being placed by players. According to Ben Seeley, another difference is that where Reversi ends as soon as either player cannot make a move, in Othello the player without a move simply passes.<sup>[6]</sup>



A modern plastic Othello set

Hasegawa established the Japan Othello Association on March 1973, and held the first national Othello championship on 4 April 1973 in Japan.<sup>[7]</sup> The Japanese game company Tsukuda Original launched Othello in late April 1973 in Japan under Hasegawa's license, which led to an immediate commercial success.<sup>[8][9][10][11][12]</sup>

The name was selected by Hasegawa<sup>[12]</sup> as a reference to the Shakespearean play *Othello, the Moor of Venice*, referring to the conflict between the Moor Othello and Iago, and more controversially, to the unfolding drama between Othello, who is black, and Desdemona, who is white. The green color of the board is inspired by the image of the general Othello, valiantly leading his battle in a green field. It can also be likened to a jealousy competition (jealousy being the central theme in Shakespeare's play, which popularized the term "green-eyed monster"), since players engulf the pieces of the opponent, thereby turning them to their possession.<sup>[13]</sup>

Othello was first launched in the U.S. in 1975 by Gabriel Industries and it also enjoyed commercial success there. Reportedly, Othello game sales have exceeded \$600 million and more than 40 million classic games have been sold in over 100 different countries.

Hasegawa also wrote *How to Othello (Osero No Uchikata)*<sup>[14]</sup> in Japan in 1974, which was later translated into English and published in the U.S. in 1977 as *How to Win at Othello*.<sup>[15]</sup>

Kabushiki Kaisha Othello, which is owned by Hasegawa, registered the trademark "OTHELLO" for board games in Japan and Tsukuda Original registered the mark in the rest of the world. All intellectual property regarding Othello outside Japan is now owned by MegaHouse, a Japanese toy company that acquired PalBox, the successor to Tsukuda Original.<sup>[16]</sup>

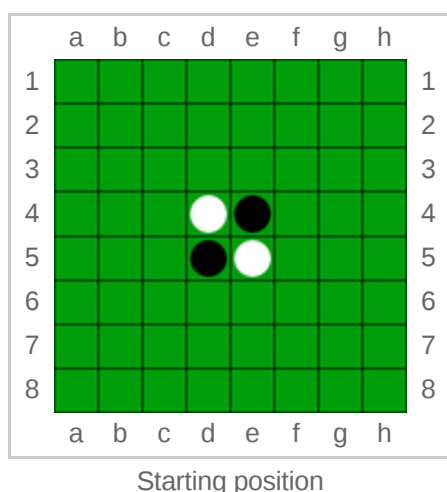
# Rules

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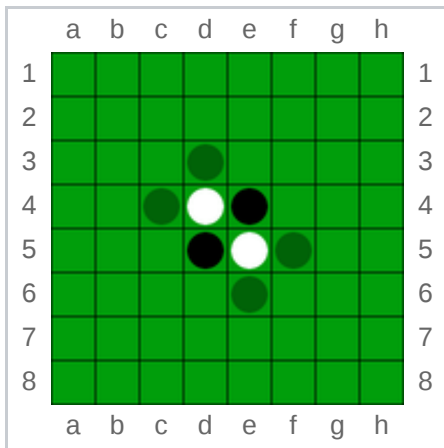
Each of the disks' two sides corresponds to one player; they are referred to here as *light* and *dark* after the sides of *Othello* pieces, but any counters with distinctive faces are suitable. The game may for example be played with a chessboard and Scrabble pieces, with one player *letters* and the other *backs*.

The historical version of Reversi starts with an empty board, and the first two moves made by each player are in the four central squares of the board. The players place their disks alternately with their colors facing up and no captures are made. A player may choose to not play both pieces on the same diagonal, different from the standard *Othello* opening. It is also possible to play variants of Reversi and *Othello* where the second player's second move may or must flip one of the opposite-colored disks (as variants closest to the normal games).

For the specific game of *Othello* (differing from the historical Reversi), the rules state that the game begins with four disks placed in a square in the middle of the grid, two facing white side up, two pieces with the dark side up, with same-colored disks on a diagonal with each other. Convention has initial board position such that the disks with dark side up are to the north-east and south-west (from both players' perspectives), though this is only marginally meaningful to play (where opening memorization is an issue, some players may benefit from consistency on this). If the disks with dark side up are to the north-west and south-east, the board may be rotated by 90° clockwise or counterclockwise. The dark player moves first.



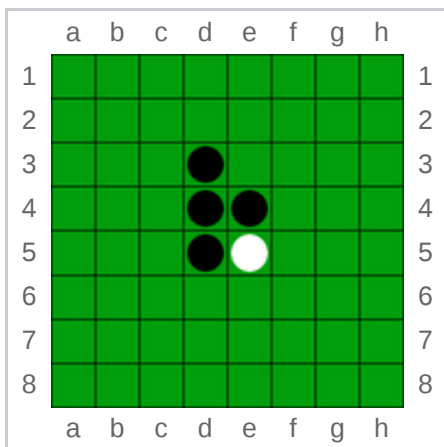
Dark must place a piece with the dark side up on the board, in such a position that there exists at least one straight (horizontal, vertical, or diagonal) occupied line between the new piece and another dark piece, with one or more contiguous light pieces between them. In the below situation, dark has the following options indicated by translucent pieces:



Where dark may play

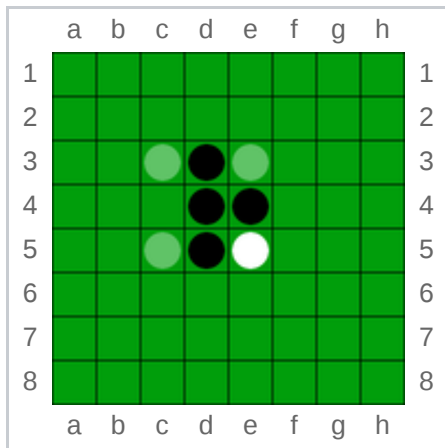
After placing the piece, dark turns over (flips, captures) all light pieces lying on a straight line between the new piece and any anchoring dark pieces. All reversed pieces now show the dark side, and dark can use them in later moves—unless light has reversed them back in the meantime. In other words, a valid move is one where at least one piece is reversed.

If dark decided to put a piece in the topmost location (all choices are strategically equivalent at this time), one piece gets turned over, so that the board appears thus:



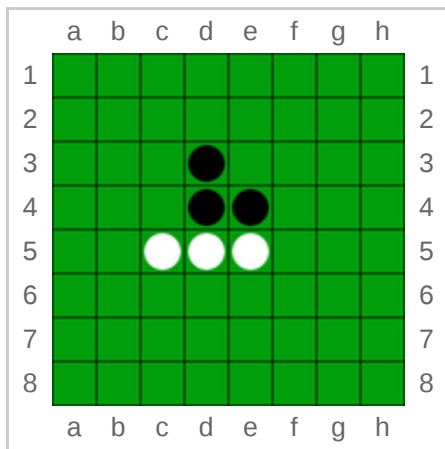
After dark play

Now light plays. This player operates under the same rules, with the roles reversed: light lays down a light piece, causing a dark piece to flip. Possibilities at this time appear thus (indicated by transparent pieces):



Where light may play

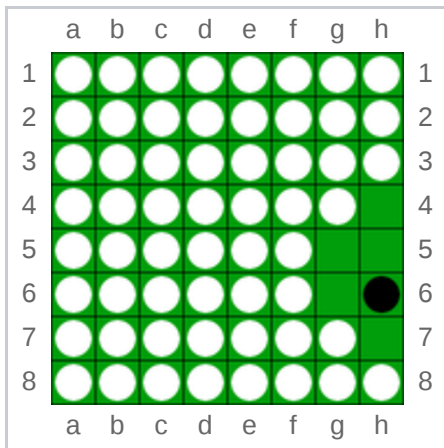
Light takes the bottom left option and reverses one piece:



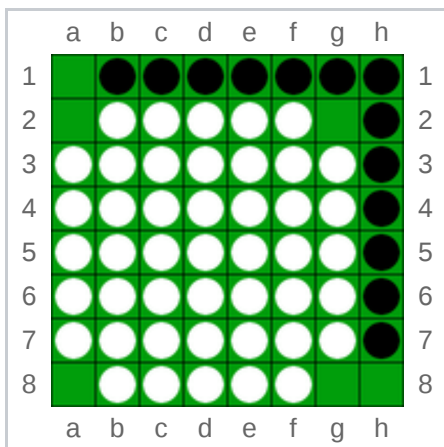
After light play

Players take alternate turns. If one player can not make a valid move, play passes back to the other player. When neither player can move, the game ends. This occurs when the grid has filled up or when neither player can legally place a piece in any of the remaining squares. This means the game may end before the grid is completely filled. This possibility may occur because one player has no pieces remaining on the board in that player's color. In over-the-board play this is generally scored as if the board were full (64–0).

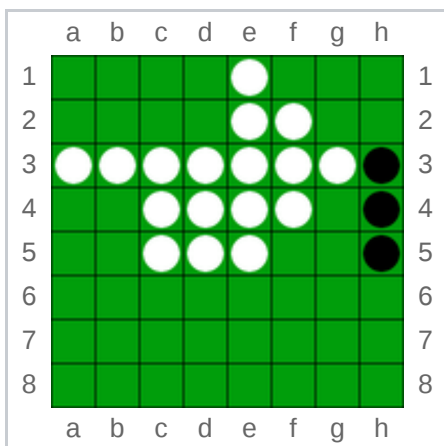
Examples where the game ends before the grid is completely filled:



Vlasáková 1 – 63 Schotte (European Grand Prix Prague 2011)



Vecchi 13 – 51 Nicolas (World Othello Championship 2017, Ghent)



Hassan 3 – 61 Verstuyft J.  
(European Grand Prix Ghent 2017)

The player with the most pieces on the board at the end of the game wins. An exception to this is that if a clock is employed then if one player defaults on time that player's opponent wins regardless of the board configuration, with varying methods to determine the official score where one is required.

In common practice over the internet, opponents agree upon a time-control of, typically, from one to thirty minutes per game per player. Standard time control in the World Championship is thirty minutes, and this or something close to it is common in over-the-board (as opposed to internet) tournament play generally. In time-defaulted games, where disk differential is used for tie-breaks in tournaments or for

rating purposes, one common over-the-board procedure for the winner of defaulted contests to complete both sides' moves with the greater of the result thereby or one disk difference in the winner's favor being the recorded score. Games in which both players have the same number of disks their color at the end (almost always with a full-board 32–32 score) are not very common, but also not rare, and these are designated as 'ties' and scored as half of a win for each player in tournaments. The term 'draw' for such may also be heard, but is somewhat frowned upon.

What are generally referred to as *transcript sheets* are generally in use in tournament over-the-board play, with both players obligated to record their game's moves by placing the number of each move in an 8×8 grid. This both enables players to look up past games of note and tournament directors and players to resolve disputes (according to whatever specific rules are in place) where claims that an illegal move, flip or other anomaly are voiced. An alternative recording method not requiring a grid is also in use, where positions on a board are labeled left to right by letters *a* through *h* and top to bottom (far-to-near) by digits *1* through *8* (Note that this is the opposite of the chess standard, with numerals running upward away from the side (White) that has *a* through *h* left to right, and also that the perspective may be that of either player (with no fixed standard)), so that the very first move of a game may be (based upon standard starting setup) d3, c4, f5 or e6. This alternate notational scheme is used primarily in verbal discussions or where a linear representation is desirable in print, but may also be permissible as during-game transcription by either or both players.

Tournament play using ordinary sets rather than a computer interface—where this can not be an issue—have various ways of handling illegal moves and over- or underflipping (flips that should not be made but are or should be but are not). For example, permitting either player (perpetrator or its opponent) to make a correction going back some fixed number of moves (after which no remedy is available) is one procedure that has been used.

Significant variants of the game, such as where the starting position differs from standard or the objective is to have the fewest pieces one's color at the end, are sometimes—but rarely—played.

## Brightwell Quotient

Invented by the British Mathematician and three times runner-up at the World Championship and five times British Champion Graham Brightwell, this is the tie-breaker that is now used in many tournaments including the W.O.C. If two players have the same number of points in the thirteen rounds W.O.C. Swiss, the tie is resolved in favour of the player with the higher Brightwell Quotient.

The Brightwell Quotient (BQ) is calculated as follows:<sup>[17]</sup>

1. A constant *c* is calculated. It is the integer nearest to (number of squares on the board) divided by (number of rounds in the tournament).
2. If any of the player's opponents have withdrawn in the course of the tournament, or if a player has been paired against *bye*, ignore such games for the moment.
3. Calculate the total number of discs scored by the player in all games not covered by step 2 and add *c* times the sum of points scored by all of the player's opponents, except those who have withdrawn.
4. For each game against an opponent who has withdrawn, and each bye received, add half the number of squares on the board plus (*c* times the player's own tournament score) to the result calculated in step 3. The number resulting is the player's BQ.

## Computer opponents and research

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Good Othello computer programs play very strongly against human opponents. This is mostly due to difficulties in human look-ahead peculiar to Othello: The interchangeability of the disks and therefore apparent strategic meaninglessness (as opposed to chess pieces for example) makes an evaluation of different moves much harder. This can be demonstrated with blindfold games, as the memorization of the board demands much more dedication from the players than in blindfold chess. Also the game has been particularly attractive to programmers. Therefore, the best Othello computer programs have easily defeated the best humans since 1980, when the program *The Moor* beat the reigning world champion. In 1997, Logistello defeated the human champion Takeshi Murakami with a score of 6–0.

Analysts have estimated the number of legal positions in Othello is at most  $10^{28}$ , and it has a game-tree complexity of approximately  $10^{58}$ .<sup>[18]</sup> Mathematically, Othello still remains unsolved. Experts have not absolutely resolved what the outcome of a game will be where both sides use perfect play. However, analysis of thousands of high-quality games (most of them computer-generated) appears to lead to a reliable conclusion (pending actual proof if true) that, on the standard  $8 \times 8$  board, perfect play on both sides results in a draw.<sup>[19]</sup> When generalizing the game to play on an  $n \times n$  board, the problem of determining if the first player has a winning move in a given position is PSPACE-complete.<sup>[20]</sup> On  $4 \times 4$  and  $6 \times 6$  boards under perfect play, the second player wins.<sup>[21]</sup> The first of these proofs is relatively trivial, and the second dates to around 1990.

## World Othello Championship

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Year	Location	World Champion	Team	Runner-Up	Female Champion	Youth Champion
1977	<u>Tokyo</u>	 Hiroshi Inoue	N/A	 Thomas Heiberg	N/A	N/A
1978	<u>New York City</u>	 Hidenori Maruoka	N/A	 Carol Jacobs	N/A	N/A
1979	<u>Rome</u>	 Hiroshi Inoue	N/A	 Jonathan Cerf	N/A	N/A
1980	<u>London</u>	 Jonathan Cerf	N/A	 Takuya Mimura	N/A	N/A
1981	<u>Brussels</u>	 Hidenori Maruoka	N/A	 Brian Rose	N/A	N/A
1982	<u>Stockholm</u>	 Kunihiro Tanida	N/A	 David Shaman	N/A	N/A
1983	<u>Paris</u>	 Ken'ichi Ishii	N/A	 Imre Leader	N/A	N/A
1984	<u>Melbourne</u>	 Paul Ralle	N/A	 Ryoichi Taniguchi	N/A	N/A
1985	<u>Athens</u>	 Masaki Takizawa	N/A	 Paolo Ghirardato	N/A	N/A
1986	<u>Tokyo</u>	 Hideshi Tamenori	N/A	 Paul Ralle	N/A	N/A
1987	<u>Milan</u>	 Ken'ichi Ishii	 United States	 Paul Ralle	N/A	N/A
1988	<u>Paris</u>	 Hideshi Tamenori	 United Kingdom	 Graham Brightwell	N/A	N/A
1989	<u>Warsaw</u>	 Hideshi Tamenori	 United Kingdom	 Graham Brightwell	N/A	N/A
1990	<u>Stockholm</u>	 Hideshi Tamenori	 France	 Didier Piau	N/A	N/A
1991	<u>New York City</u>	 Shigeru Kaneda	 United States	 Paul Ralle	N/A	N/A
1992	<u>Barcelona</u>	 Marc Tastet	 United Kingdom	 David Shaman	N/A	N/A
1993	<u>London</u>	 David Shaman	 United States	 Emmanuel Caspard	N/A	N/A
1994	<u>Paris</u>	 Masaki Takizawa	 France	 Karsten Feldborg	N/A	N/A
1995	<u>Melbourne</u>	 Hideshi Tamenori	 United States	 David Shaman	N/A	N/A

			States			
1996	<u>Tokyo</u>	 Takeshi Murakami ( <a href="https://skatgame.net/mburo/press.html">https://skatgame.net/mburo/press.html</a> )	 United Kingdom	 Stéphane Nicolet	N/A	N/A
1997	<u>Athens</u>	 Makoto Suekuni	 United Kingdom	 Graham Brightwell	N/A	N/A
1998	<u>Barcelona</u>	 Takeshi Murakami	 France	 Emmanuel Caspard	N/A	N/A
1999	<u>Milan</u>	 David Shaman	 Japan	 Tetsuya Nakajima	N/A	N/A
2000	<u>Copenhagen</u>	 Takeshi Murakami	 United States	 Brian Rose	N/A	N/A
2001	<u>New York City</u>	 Brian Rose	 United States	 Raphael Schreiber	N/A	N/A
2002	<u>Amsterdam</u>	 David Shaman	 United States	 Ben Seeley	N/A	N/A
2003	<u>Stockholm</u>	 Ben Seeley	 Japan	 Makoto Suekuni	N/A	N/A
2004	<u>London</u>	 Ben Seeley	 United States	 Makoto Suekuni	N/A	N/A
2005	<u>Reykjavík</u>	 Hideshi Tamenori	 Japan	 Kwangwook Lee	 Hisako Kinoshita	N/A
2006	<u>Mito</u>	 Hideshi Tamenori	 Japan	 Makoto Suekuni <sup>[22]</sup>	 Toshimi Tsuji	N/A
2007	<u>Athens</u>	 Kenta Tominaga	 Japan	 Stéphane Nicolet	 Yukiko Tatsumi	N/A
2008	<u>Oslo</u>	 Michele Borassi	 Japan	 Tamaki Miyaoka	 Liya Ye	N/A
2009	<u>Ghent</u>	 Yusuke Takanashi	 Japan	 Matthias Berg	 Mei Urashima	N/A
2010	<u>Rome</u>	 Yusuke Takanashi	 Japan	 Michele Borassi	 Jiska Helmes	N/A
2011	<u>Newark</u>	 Hiroki Nobukawa	 Japan	 Piyanat Aunchulee	 Jian Cai	N/A
2012	<u>Leeuwarden</u>	 Yusuke Takanashi	 Japan	 Kazuki Okamoto	 Veronica Stenberg	N/A

2013	<u>Stockholm</u>	 Kazuki Okamoto	 Japan	 Piyanat Aunchulee	 Katie Wu	N/A
2014	<u>Bangkok</u>	 Makoto Suekuni	 Japan	 Ben Seeley	 Joanna William	N/A
2015	<u>Cambridge</u>	 Yusuke Takanashi	 Japan	 Makoto Suekuni	 Yoko Sano Rose	N/A
2016	<u>Mito</u>	 Piyanat Aunchulee	 Japan	 Yan Song	 Zhen Dong	 Masaki Wada
2017	<u>Ghent</u>	 Yusuke Takanashi	 Japan	 Akihiro Takahashi	 Misa Sugawara	 Akihiro Takahashi
2018	<u>Prague</u>	 Keisuke Fukuchi	 Japan	 Piyanat Aunchulee	 Misa Sugawara	 Keisuke Fukuchi
2019	<u>Tokyo</u>	 Akihiro Takahashi	 Japan	 Yusuke Takanashi	 Joanna William	 Akihiro Takahashi

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- Note: He was not the Lewis Waterman who patented the Waterman fountain pen in 1884.
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## External links

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- World Othello Federation (<http://www.worldothello.org/>)
- World Othello Rating List (<https://www.worldothello.org/ratings>)
- Reversi – An Animated Guide (<http://www.samsoft.org.uk/reversi/>)
- Othello (<https://www.boardgamegeek.com/boardgame/2389>) at BoardGameGeek
- Pictures of the 19th century reversi boards ([https://web.archive.org/web/20060622193543/http://www.fothello.org/musee/musee.php?param\\_sous\\_categorie=vieux\\_reversi](https://web.archive.org/web/20060622193543/http://www.fothello.org/musee/musee.php?param_sous_categorie=vieux_reversi))

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