The Game of "Face Off"

1 Introduction

This game is designed to help calibrate your eyes into viewing and thinking in the fourth dimension. The game is a little like the familiar games 'Connect 4', 'Tic Tac Toe', and 'Dots and Lines', only it is played in 4-D.

The game arose from discussions between David Bulger and Di Cook, in 2004, as a first attempt grow a 2-D game into higher dimensions. It has been further developed by Spencer Bradley, Barret Schloerke, Hadley Wickham and Heike Hofmann.

2 Objective of the Game

The goal of the game is to connect the four vertices of a 2-D face of a 4-D cube before your opponent.

3 How to Play

Players take turns coloring a vertex of the 4-D cube in their color. The cube can be rotated to a different position at any time.

The game is over when one player has marked all of the four vertices on a 2-D face in their color or it is clear that no remaining 2-D face can have all vertices in one color.

There is some strategy useful to ensure a win, or draw. The first player has an advantage, like in Tic Tac Toe. And the second player may find themselves defending against the moves of the first player, marking a vertex on a 2-D face that already has some vertices marked by their opponent's color.

4 Game Controls

4.1 Setting Up the Game

The game is implemented in R and GGobi, through the package `faceoff`. You will need these installed on the computer, along with X11. To start, open R and X11, and then run these R commands:

```
library(faceoff)
faceoff()
```

A playing board will appear that looks Figure 1.

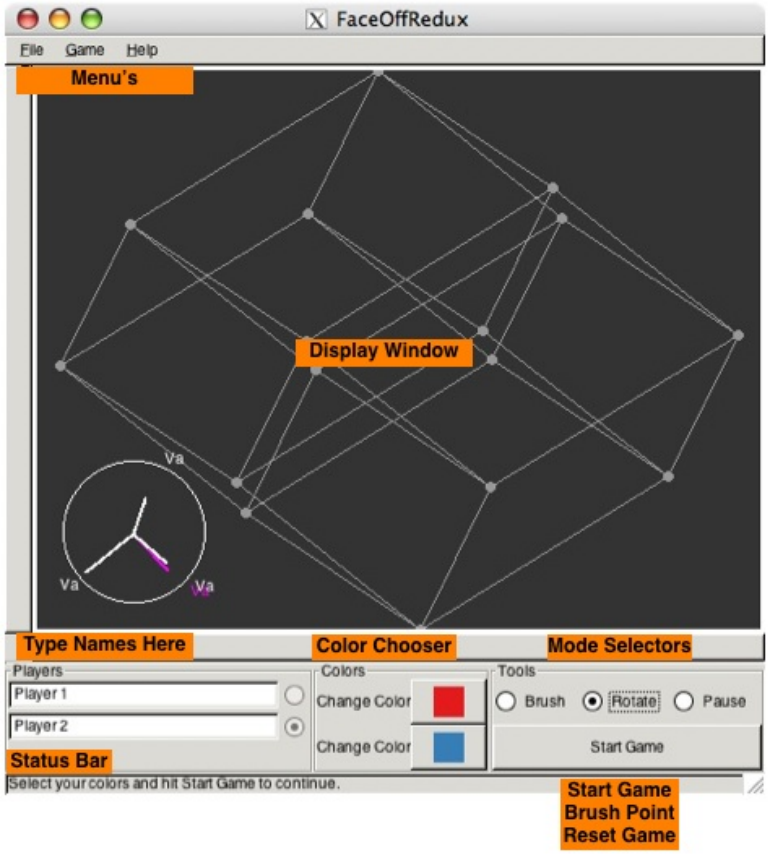

Figure 1: Playing board, with main components annotated.

and at the bottom of the window are the controls.

4.2 Players

The default is that two people play against each other. The names can be entered into the text boxes at the bottom of the playing board (Figure 2). If a player would prefer to play against the computer, they would select computer

as an option on the `Game` menu above the playing board. The computer has no strategic play as yet. It is easy to beat!

Figure 2: Text boxes for player names, and marker color choosers.

4.3 Choosing marker color

If either player wishes to change their color they may do so before starting a game. To change a player's color click on the respective color icon and choose the new color. (Colors may not be changed once the game has begun.)

4.4 Start game

Click the button `Start Game`. (Once the game has begin this button is relabelled to `Brush Point` and used to indicate that a decision on which vertex is colored has been made.) The cube will start spinning. Wait until it is in a desirable projection, and click the `Pause` or `Brush` radio button to stop it and start playing.

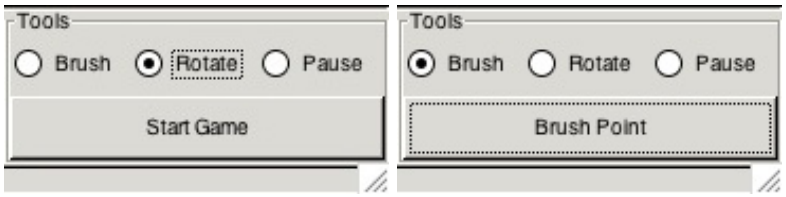

Figure 3: (Left) Start button, to begin a game. (Right) Ready to play, rotation is paused.

4.5 Making a play

The player should click near (or drag the brush to) the vertex of choice, highlighting the vertex within the yellow box (Figure 4). The player should then click the `Brush Point` button to confirm the choice of vertex, and release the playing board for the next player.

4.6 Game over

Players repeat this process of choosing vertices until the game is over either a win or a tie. They can rotate the cube whenever it is their turn.

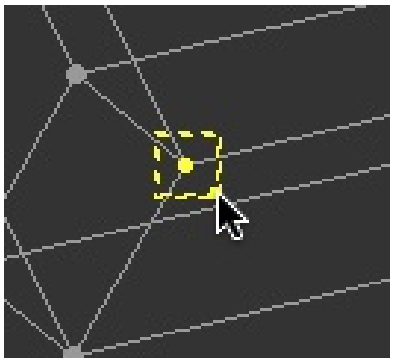

Figure 4: Choosing a vertex to color.

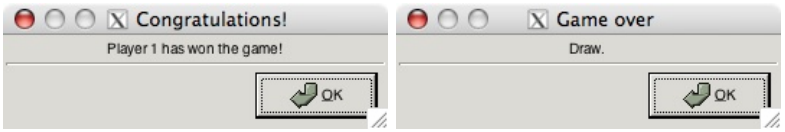

Figure 5: The computer announces the result of the game, either a win or draw.

4.7 New game

When the game is over, the button at bottom right is relabelled to `Reset Game` (Figure 6). Click on it to start a new game.

Figure 6: To start a new game.

5 Example of Play

This series of pictures documents a game being played. For a video of game play, please visit the website `http://www.ggobi.org/packages/faceoff`.

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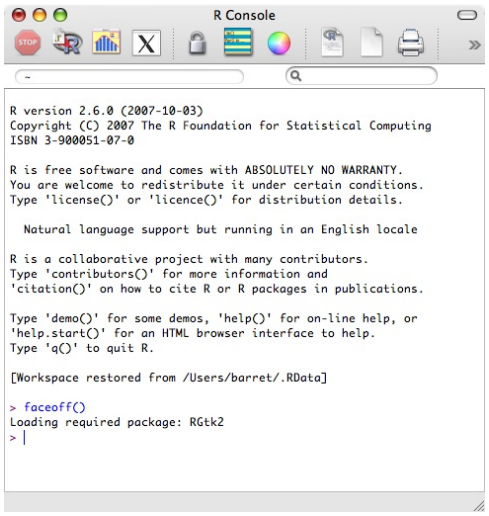

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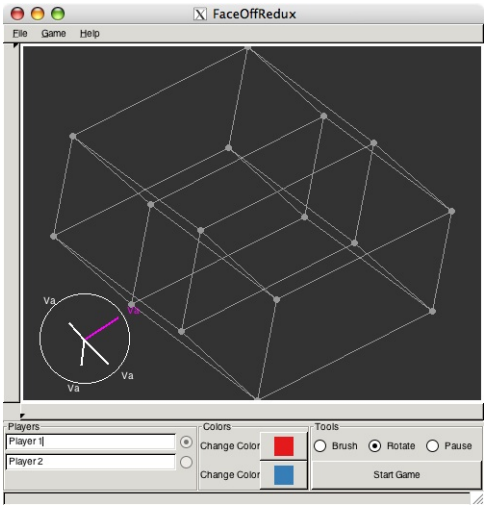

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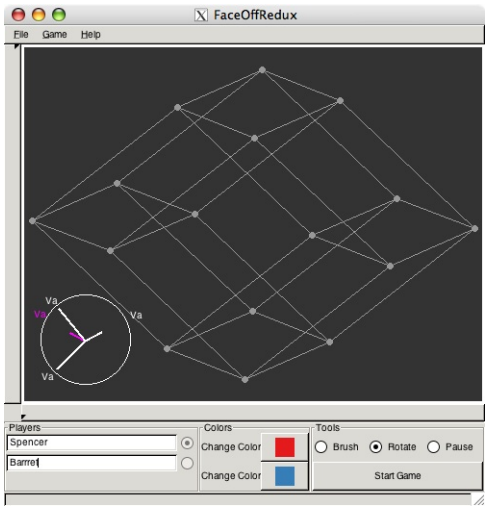

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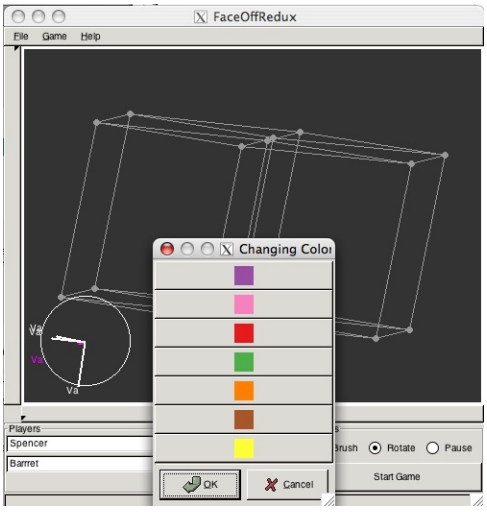

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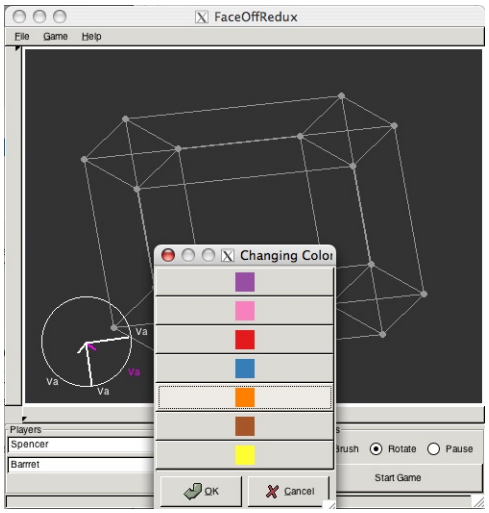
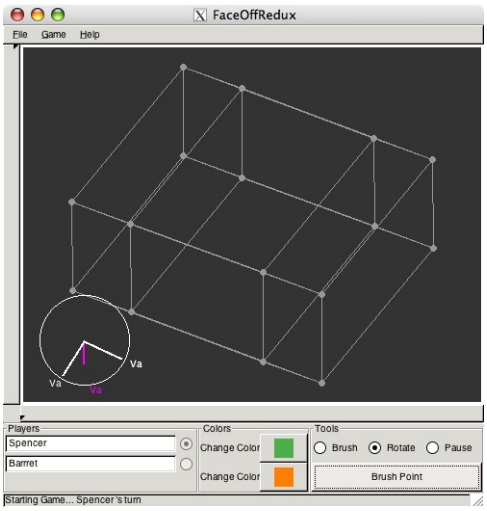

FaceOffRedux
File Game Help
Changing Color
OK
Cancel
Players
Spencer
Barrret
Start Game

6


FaceOffRedux
File Game Help
Players
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Barrret
Colors
Change Color
Change Color
Tools
Brush
Rotate
Pause
Brush Point
Starting Game... Spencer's turn

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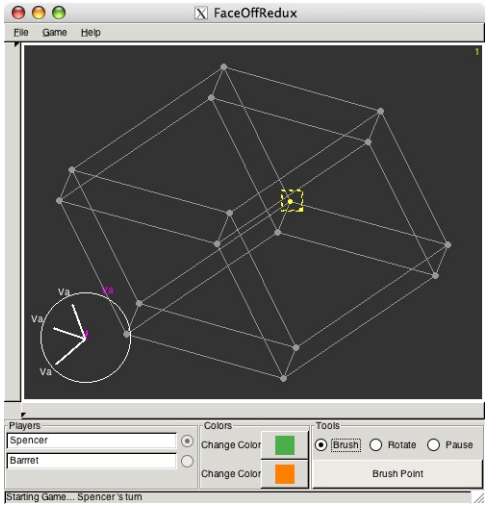
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Starting Game... Spencer's turn

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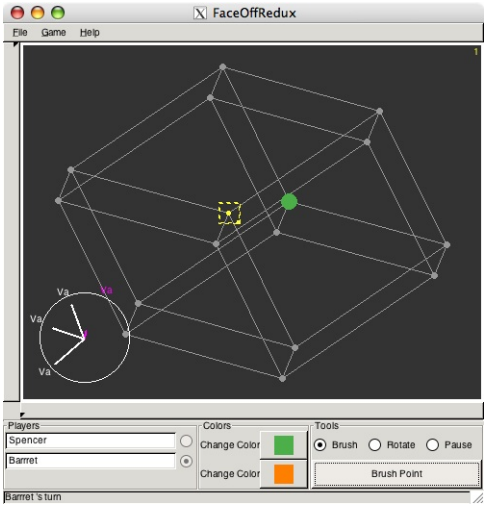
FaceOffRedux
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Brush Point
Barret's turn

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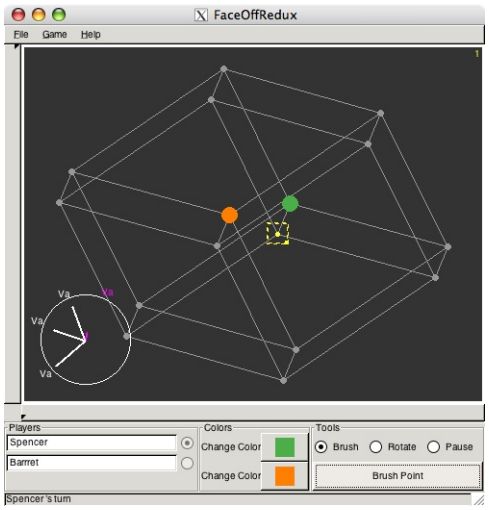
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Pause
Brush Point
Spencer's turn

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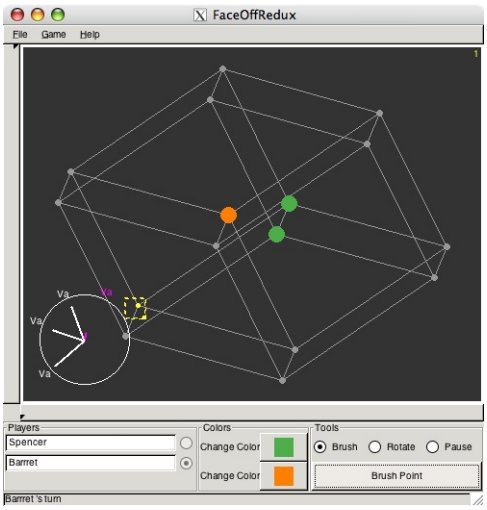
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Brush Point
Barret's turn

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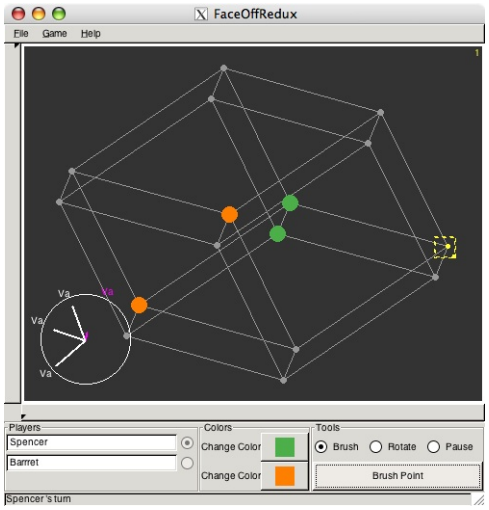

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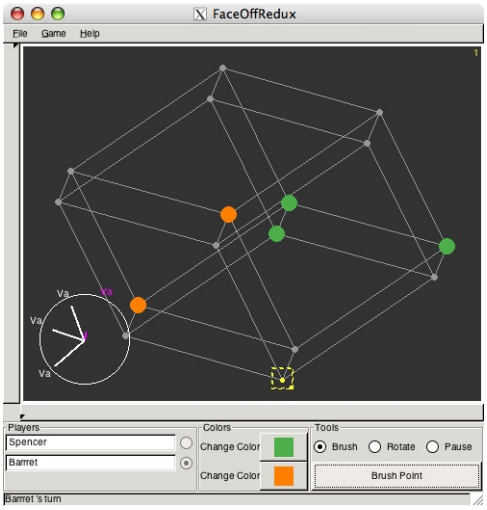

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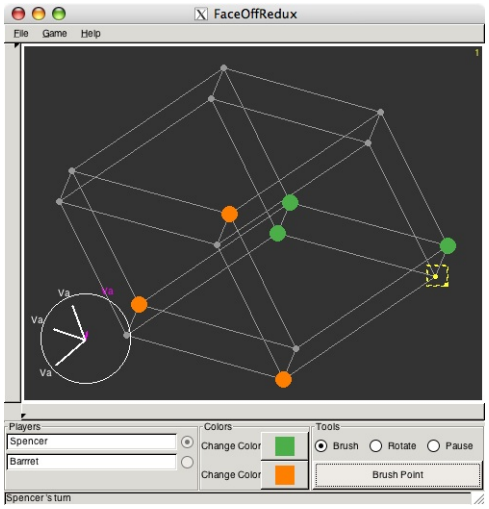

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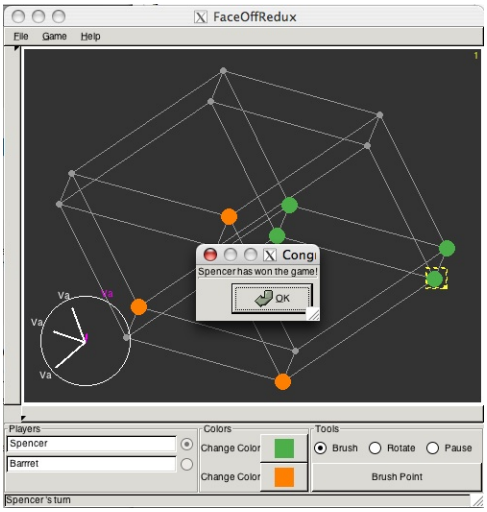

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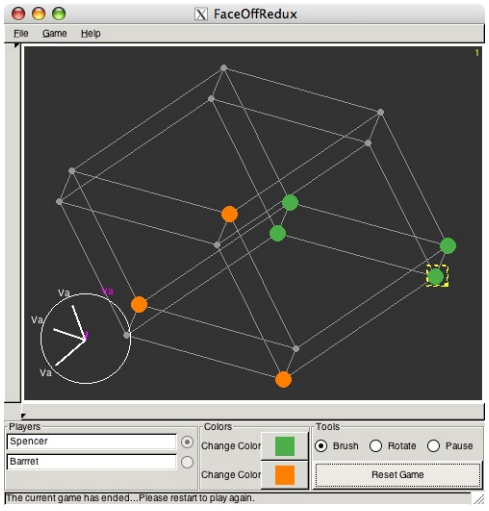

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