CE810 GD2

CE810 - Game Design 2 Game Balance

Joseph Walton-Rivers & Piers Williams Friday, 18 May 2018 University of Susex

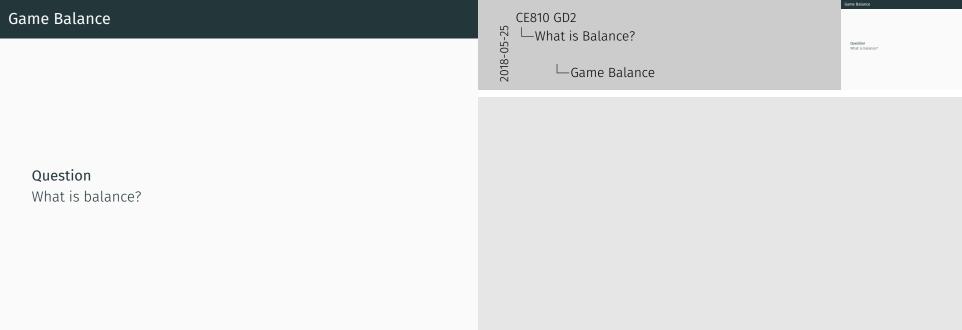
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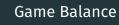
Game Balance

Joseph Walton-Rivers & Piers Williams Friday, 18 May 2018

University of Essex

What is Balance?





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Richard covered a combat example in the first part of the

"All players have an equal chance of winning"

"All players have an equal chance of winning"

– Richard Bartle

Richard covered a combat example in the first part of the module.

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On Strategies

On Strategies

· What about higher level strategies?

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└─On Strategies

└─Game Balance

· What about higher level strategies?





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└─On Strategies └─Game Balance

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- · What about higher level strategies?
- · Zerg rush?

Game Balance

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└─On Strategies

└─Game Balance

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- Dominant strategies

- · What about higher level strategies?
- · Zerg rush?
- Dominant strategies

Game Balance

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Game Balance

What about righter breat strates Zerg rush? Dominant strategies Metagaming

- · What about higher level strategies?
- · Zerg rush?
- Dominant strategies
- Metagaming

Metagaming - Rock Paper Scissors

· A beats B, B beats C, C beats A

5

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2018-05-25 └─Metagaming - Rock Paper Scissors

Metagaming - Rock Paper Scissors

Metagaming - Rock Paper Scissors

· A beats B, B beats C, C beats A

• If there are lots of A players, people will play C

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—On Strategies

└─Metagaming - Rock Paper Scissors

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etagaming - Rock Paper Scissors

· A beats B. B beats C. C beats A · If there are lots of A players, people will play C

tagaming - Rock Paper Scissors

- · A beats B, B beats C, C beats A
- If there are lots of A players, people will play C
- Then there are a lot of C players, so people play B

- - └─Metagaming Rock Paper Scissors

5

tagaming - Rock Paper Scissors

- and so on.

- · A beats B, B beats C, C beats A
- If there are lots of A players, people will play C
- Then there are a lot of C players, so people play B
- · and so on...

- On Strategies
 - .
 - Metagaming Rock Paper Scissors

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☐ Metagaming - Dominant Strategies

tagaming - Dominant Strategies

· What if A is significantly stronger?

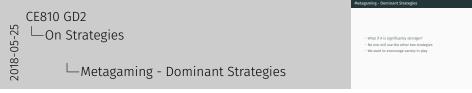
• What if A is significantly stronger?

tagaming - Dominant Strategies

- What if A is significantly stronger?
- No one will use the other two strategies

Metagaming - Dominant Strategies

- What if A is significantly stronger?
- · No one will use the other two strategies
- · We want to encourage variety in play



· Can we detect strategies which are overpowered?

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└─On Strategies

Can we detect this?

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Can we detect this?

· Can we detect strategies which are overpowered

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Can we detect this?

· Can we detect strategies which are overpowered · Try to punish strategies we don't want to see

Can we detect this?

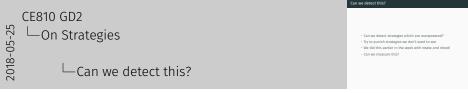
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Can we detect strategies which are overpowered?
 Try to punish strategies we don't want to see
 We did this earlier in the week with rotate and shoot!

Can we detect this?

- Can we detect strategies which are overpowered?
- Try to punish strategies we don't want to see
- We did this earlier in the week with rotate and shoot!

- Try to punish strategies we don't want to see
- We did this earlier in the week with rotate and shoot!
- · Can we measure this?



· Academics seem to think so...

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Automated Game Tuning

· Academics seem to think so...

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· Ryan Leigh et al (2008) - Co-evolution for game balancing

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Automated Game Tuning

Academics seem to think so... · Rvan Leigh et al (2008) - Co-evolution for game balancing

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Alexander Jaffe et al (2012) - Restricted-Play balance LAutomated Game Tuning

Automated Game Tuning

Academics seem to think so... Rvan Leigh et al (2008) - Co-evolution for game balancing

- · Academics seem to think so...
- · Ryan Leigh et al (2008) Co-evolution for game balancing
- · Alexander Jaffe et al (2012) Restricted-Play balance framework

- · Academics seem to think so...
- · Ryan Leigh et al (2008) Co-evolution for game balancing
- Alexander Jaffe et al (2012) Restricted-Play balance framework
- Mihail Morosan GAs for tuning parameters



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Game Curves

Game Curves

First Move Advantage

First Move Advantage



• Typically affects turn based games

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First Move Advantage

First Move Advantage

First Move Advantage

· Typically affects turn based games

First Move Advantage

• Typically affects turn based games

 \cdot Going first in tac tac toe means either a win or a draw

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└─First Move Advantage

—First Move Advantage

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First Move Advantage

Typically affects turn based games
 Going first in tac tac toe means either a win or a draw

- - └─First Move Advantage

└─First Move Advantage

- Typically affects turn based games Going first in tac tac toe means either a win or a draw - White has > 50% win rate over all games

First Move Advantage

- Typically affects turn based games
- · Going first in tac tac toe means either a win or a draw
- White has > 50% win rate over all games

First Move Advantage

- · Typically affects turn based games
- Going first in tac tac toe means either a win or a draw
- White has > 50% win rate over all games
- · Worse effects if you have resources



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First Move Advantage

└─First Move Advantage

First Move Advantage

Typically affects turn based games
 Going first in tac tac toe means either a win or a draw

White has > 50% win rate over all games
 Worse effects if you have resources

First Move Advantage

- · Typically affects turn based games
- Going first in tac tac toe means either a win or a draw
- White has > 50% win rate over all games
- Worse effects if you have resources
- · We need a way of dealing with this



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–First Move Advantage

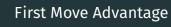
First Move Advantage

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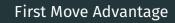


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First Move Advantage

Magic Second player gets an extra card



Magic Second player gets an extra card

Go Second player gets 7.5 bonus points

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└─First Move Advantage

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—First Move Advantage

First Move Advantage



Magic Second player gets an extra card

Hearthstone Second player gets

Go Second player gets 7.5 bonus points

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—First Move Advantage

—First Move Advantage

igic Second player gets an extra card Go Second player gets 7.5 bonus points tone Second player gets

First Move Advantage

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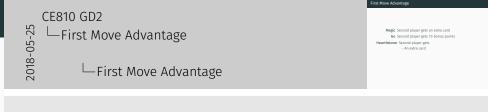
First Move Advantage

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An extra card



First Move Advantage

Magic Second player gets an extra card
Go Second player gets 7.5 bonus points
Hearthstone Second player gets

- · An extra card
- Mulligan an extra card

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-First Move Advantage

-First Move Advantage

Magic Second player gets an extra card
Go Second player gets 7.5 bonus points
Hearthstone Second player gets
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First Move Advantage

Magic Second player gets an extra card

Go Second player gets 7.5 bonus points

Hearthstone Second player gets

- · An extra card
- · Mulligan an extra card
- Special card worth one free Mana

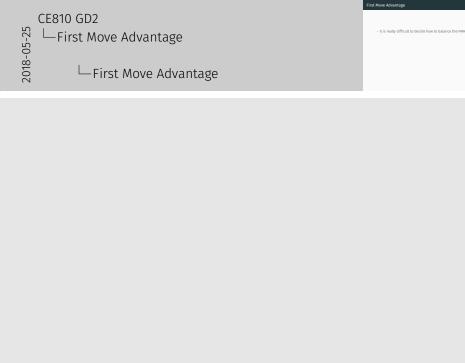
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First Move Advantage

Augic Society player gets an outra card Go Society p



• It is really difficult to decide how to balance the FMA



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• Go players spent 150 years slowly tuning the bonus points

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First Move Advantage

First Move Advantage

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First Move Advantage

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First Move Advantage

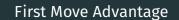
└─First Move Advantage

First Move Advantage

• It is really difficult to decide how to balance the FMA

• Go players spent 150 years slowly tuning the bonus points

• We do not have 150 years



- It is really difficult to decide how to balance the FMA
 Go players spent 150 years slowly tuning the bonus points
 - We do not have 150 years
- Many professional hearthstone players like to go second

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└─First Move Advantage

First Move Advantage

- It is really difficult to decide how to balance the FMA Go players spent 150 years slowly tuning the bonus points · We do not have 150 years
- Many professional hearthstone players like to go second

- It is really difficult to decide how to balance the FMA
- Go players spent 150 years slowly tuning the bonus points
 - We do not have 150 years
- · Many professional hearthstone players like to go second
 - · Second player bonus may be too much

2018-05-25 -First Move Advantage

- It is really difficult to decide how to balance the FMA
- Go players spent 150 years slowly tuning the bonus points
 - We do not have 150 years
- Many professional hearthstone players like to go second
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 - Hearthstone players will know what I mean



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└─First Move Advantage

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 We do not have 150 years

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- Go players spent 150 years slowly tuning the bonus points
 - We do not have 150 years
- · Many professional hearthstone players like to go second
 - · Second player bonus may be too much
 - Hearthstone players will know what I mean
 - · Which is good I don't



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-First Move Advantage

└─First Move Advantage

It is really difficult to decide how to balance the FMA
 Go players spent 150 years slowly tuning the bonus points
 We do not have 150 years

Many professional hearthstone players like to go second
 Second player bonus may be too much
 Hearthstone players will know what I mean

First Move Advantage

Second player bonus may be too much
 Hearthstone players will know what I mean
 Which is good - I don't

Static

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First Move Advantage

- Static
 - · All pieces available at start

└─Static or Developed

Static or Developed

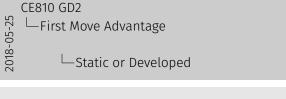
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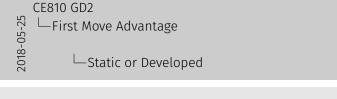
First Move Advantage

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- Static
 - · All pieces available at start
 - Don't build up the board over time



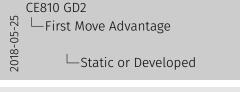
- Static
 - · All pieces available at start
 - · Don't build up the board over time
 - For example:



Static or Developed

. Don't build up the board over time

- Static
 - · All pieces available at start
 - · Don't build up the board over time
 - For example:
 - Chess

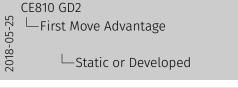


Static or Developed

· All pieces available at start

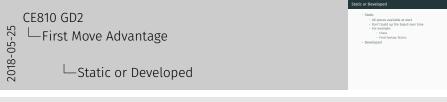
· For example:

- Static
 - · All pieces available at start
 - · Don't build up the board over time
 - · For example:
 - · Chess
 - Final Fantasy Tactics

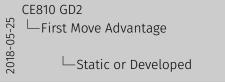


State
 All pieces available at start
 Once hold up the board over time
 For example,
 For example,

- Static
 - · All pieces available at start
 - · Don't build up the board over time
 - For example:
 - · Chess
 - Final Fantasy Tactics
- Developed



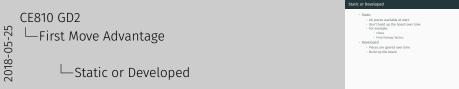
- Static
 - · All pieces available at start
 - · Don't build up the board over time
 - · For example:
 - · Chess
 - Final Fantasy Tactics
- Developed
 - · Pieces are gained over time



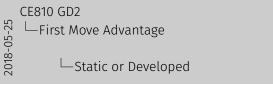
Static or Developed

- Static
- All pieces available at start
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- Static
 - · All pieces available at start
 - · Don't build up the board over time
 - For example:
 - · Chess
 - Final Fantasy Tactics
- Developed
 - · Pieces are gained over time
 - · Build up the board



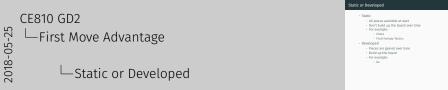
- Static
 - · All pieces available at start
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 - · Pieces are gained over time
 - Build up the board
 - · For example:



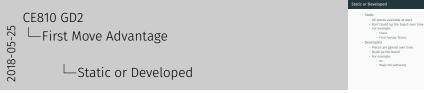
Static or Developed

- Static
- All proces available at part
- And proces available at part
- Constribute gap the least over time
- Processing the Constribute at part
- Fraid Featury British
- Processing gap and Grow time
- Necessing gap and Grow time
- Fraid soung pales of Grow Time
- Fraid soung pales
- For example

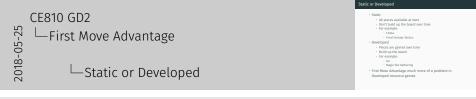
- Static
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 - Final Fantasy Tactics
- Developed
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 - Build up the board
 - For example:
 - Go
 - Magic the Gathering



- Static
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 - Chess
 - Final Fantasy Tactics
- Developed
 - · Pieces are gained over time
 - · Build up the board
 - For example:
 - Go
 - · Magic the Gathering
- First Move Advantage much more of a problem in Developed resource games





Gets worse over time

13

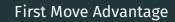
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First Move Advantage └─First Move Advantage

First Move Advantage

· Gets worse over time



- Gets worse over time
 - Even if you do nothing

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First Move Advantage

First Move Advantage

First Move Advantage

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—First Move Advantage └─First Move Advantage

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Even if you do nothing
 Players get more skilled over time

- · Gets worse over time
 - Even if you do nothing
- · Players get more skilled over time

- More skilled players exploit the advantage bette

- Gets worse over time
- Even if you do nothing
- · Players get more skilled over time
- More skilled players exploit the advantage better

• Ensure game has fine tuning of handicap

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—First Move Advantage

First Move Advantage - dealing with it

irst Move Advantage - dealing with it

· Ensure game has fine tuning of handicap

• Ensure game has fine tuning of handicap

• Go's point system easy to tune in small steps

CE810 GD2 2018-05-25 First Move Advantage First Move Advantage - dealing with it

· Go's point system easy to tune in small steps

irst Move Advantage - dealing with it

First Move Advantage - dealing with it

irst Move Advantage - dealing with it

- Ensure game has fine tuning of handicap
 - Go's point system easy to tune in small steps
 - Hearthstone's bonus much harder

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• Metrics help us - we can track win rates

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—First Move Advantage

First Move Advantage - dealing with it

· Metrics help us - we can track win rates

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First Move Advantage - dealing with it

First Move Advantage - dealing with it

- Metrics help us we can track win rates
- · Need ways of tweaking power levels small increments are better

15

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First Move Advantage - dealing with it

First Move Advantage - dealing with it

- Metrics help us we can track win rates
- Need ways of tweaking power levels small increments are better
- Als might help here known skill levels, running lots of games help us tune our values

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- Metrics help us we can track win rates
- Need ways of tweaking power levels small increments are better
- Als might help here known skill levels, running lots of games help us tune our values
- Careful, our AIs might not be good measures of possible skill levels

*_*__

–First Move Advantage

First Move Advantage - dealing with it

Investigate dominant strategy in Civ style game

- Download latest copy of the game engine

- Look at and run class "DominantStrategy"

- Create new maps that don't display this behaviour

Exercise

Investigate dominant strategy in Civ style game

- Download latest copy of the game engine
- · Look at and run class "DominantStrategy"
- · Create new maps that don't display this behaviour

Watching

Watching

Extra Credits

- https://www.youtube.com/watch?v=Bxszx60ZwGw Power Creep
- https://www.youtube.com/watch?v=M3b3hDvRjJA Power Creep in hearthstone
- https://www.youtube.com/watch?v=e31OSVZF77w Perfect Imbalance
- https://www.youtube.com/watch?v=EitZRLt2G3w -Balancing for skill
- https://www.youtube.com/watch?v=0V5eq4IQ6Go Delta of Randomness
- https://www.youtube.com/watch?v=TRHdIScOMWQ -Balancing Turn based games

