# 444 Lecture 2.7 - Iterated Deletion of Weakly Dominated Strategies

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# Plan

To look at two problems that arise when we delete strategies that are merely weakly dominated.

# Reading

Bonanno, section 2.5.2.

# Two Issues

- Order effects.
- Philosophical motivation.

# Order Effects

- As Bonanno goes over, when deleting weakly dominated strategies, it matters what order you do the deletions in.
- Whether a strategy weakly dominates another at a point in the process might depend on how you got to that point.
- And the result is that different ways of applying the process lead to different ‘solutions’.

# Way Around This

- Bonanno says (as I think is standard) that you solve this by saying that at each stage, you delete every strategy that you possibly can.
- There is still an issue I think about why that deletion process is justified as opposed to some other.
- It does have the nice advantage of actually being a well defined process, so that's nice.

# Philosophical Justification

- The bigger issue is that it is a little hard to say why we should care about the result of this procedure.
- Saying what's special about the result of this strategy is not completely obvious.
- Bonanno alludes to this - let's go over it in a bit more detail.

# Iterated Deletion

| | Left | Center | Right |
|---|---|---|---|
| Up | 1, 1 | 1, 1 | 0, 0 |
| Middle | 1, 1 | 0, 0 | 1, 0 |
| Down | 0, 0 | 0, 1 | 1, 1 |

- Middle weakly dominates Down, and Center weakly dominates Right.
- So let's delete them.

# Iterated Deletion

| | Left | Center |
|---|---|---|
| Up | 1, 1 | 1, 1 |
| Middle | 1, 1 | 0, 0 |

- Now Up weakly dominates Middle and Left weakly dominates Center.
- So the solution is Up/Left, right?
- Well, not so fast.

# Iterated Deletion

| | Left | Center | Right |
|---|---|---|---|
| Up | 1, 1 | 1, 1 | 0, 0 |
| Middle | 1, 1 | 0, 0 | 1, 0 |
| Down | 0, 0 | 0, 1 | 1, 1 |

- Think about it from Row's perspective.
- We have an argument that Column will play Left.
- If that argument works, Row shouldn't prefer Up - they should be indifferent between Up and Middle.
- Why does the argument say to play Up then?

# Iterated Deletion

| | Left | Center | Right |
|---|---|---|---|
| Up | 1, 1 | 1, 1 | 0, 0 |
| Middle | 1, 1 | 0, 0 | 1, 0 |
| Down | 0, 0 | 0, 1 | 1, 1 |

- The answer is that Middle is risky.
- In the game after deletion, Middle has a risk of getting 0, but Up is sure to get 1.
- But look at the original game - Up is risky too!

# Iterated Deletion

| | Left | Center | Right |
|---|---|---|---|
| Up | 1, 1 | 1, 1 | 0, 0 |
| Middle | 1, 1 | 0, 0 | 1, 0 |
| Down | 0, 0 | 0, 1 | 1, 1 |

- The answer is that Middle is risky.
- In the game after deletion, Middle has a risk of getting 0, but Up is sure to get 1.
- But look at the original game - Up is risky too!
- I think this makes it hard to philosophically defend IDWDS

# For Next Time

We will look at a famous example of iterated deletion that's not in the book.