The Prisoner's Sonata:

Modeling Music Improvisation With Game Theory

Caroline Marcks, Andrew Mendelsohn, Jayme Woogerd

Agenda

1. Motivation
2. Game Theory
3. Music as a Game
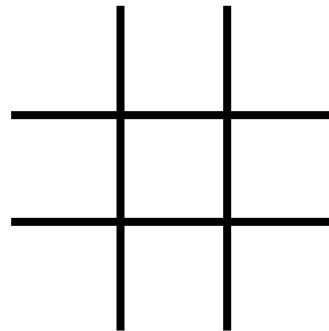4. Demos
5. Conclusion
6. Questions

Game Theory

- Decision Making
- What do you need?
- Game Theory in Real Life

Game Theory

- Decision Making
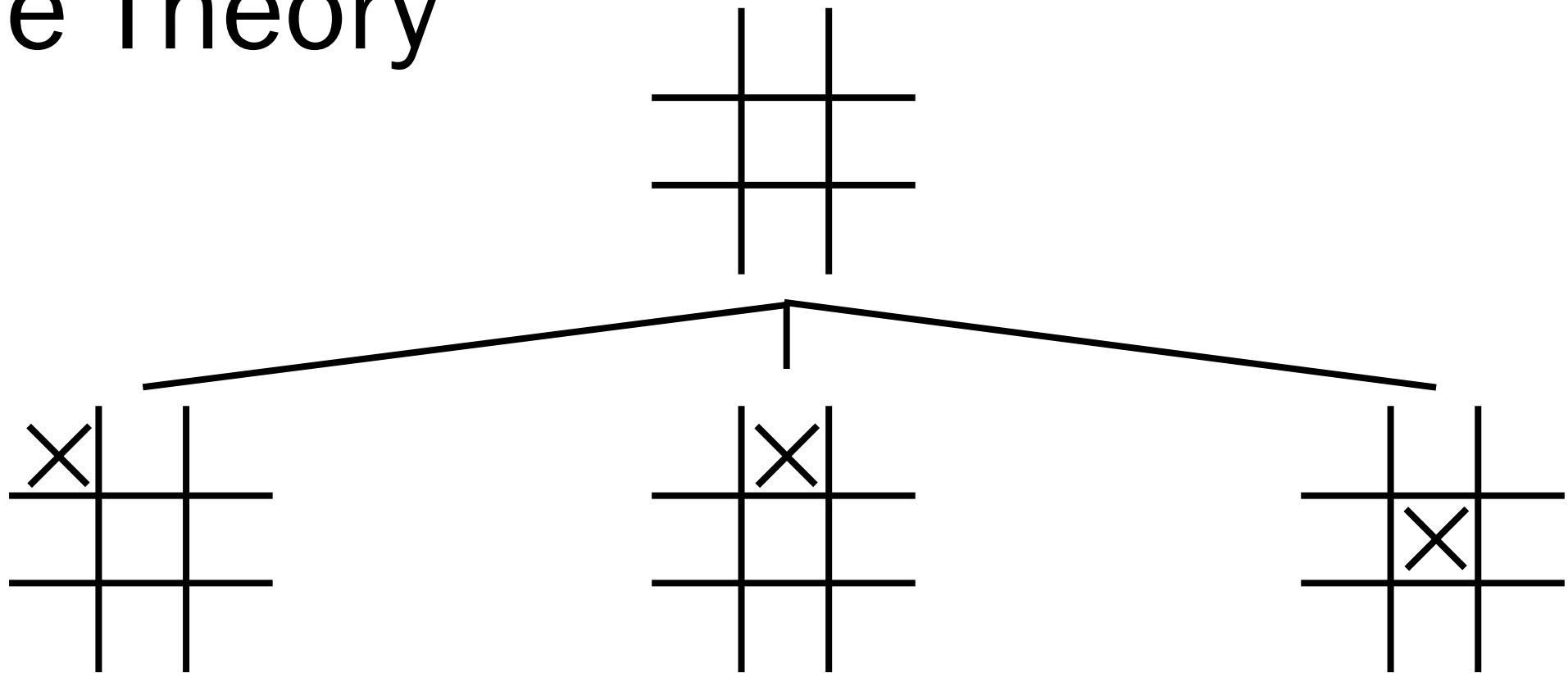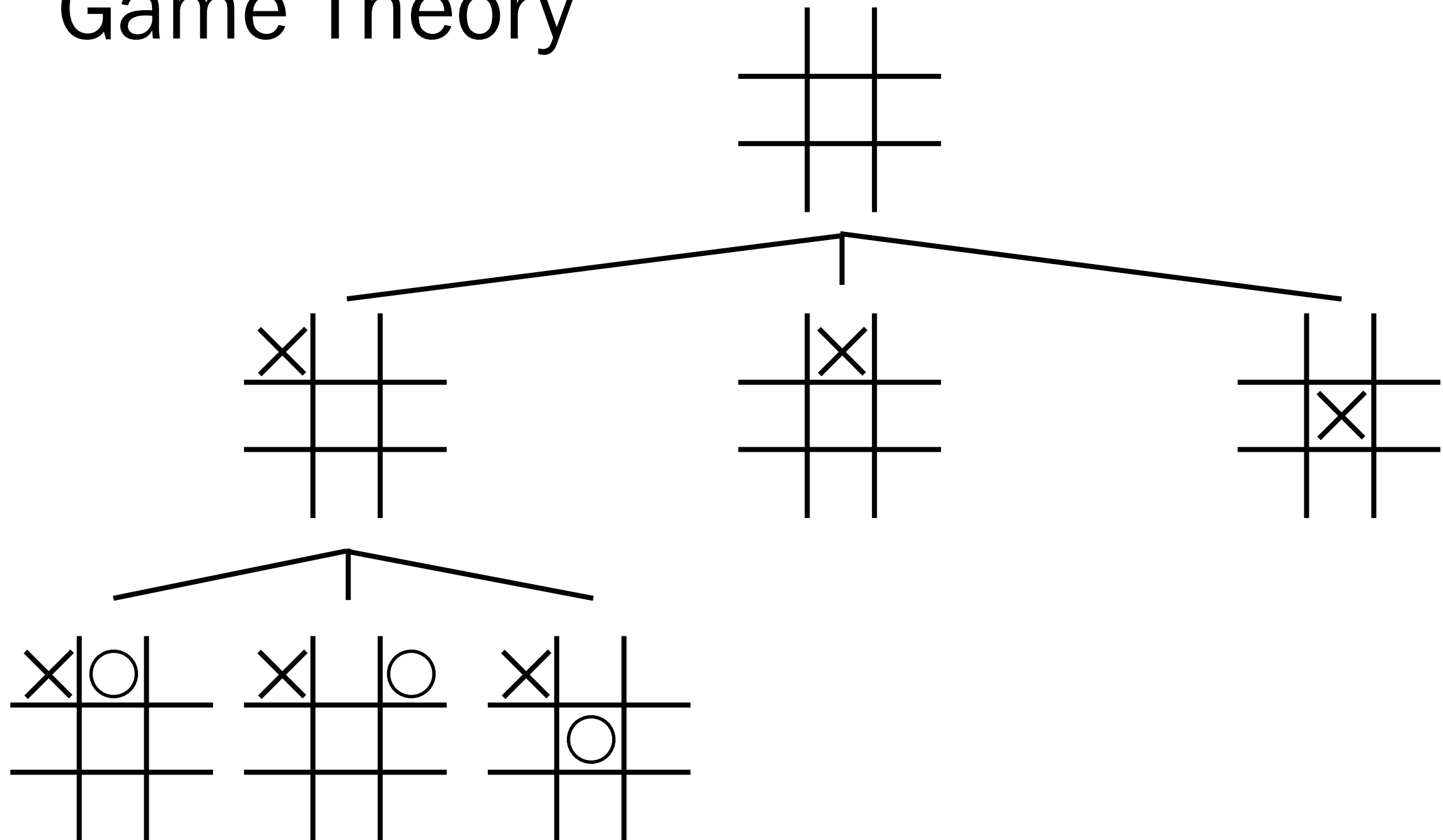- What do you need?
- Game Theory in Real Life

Game Theory

- Decision Making
- What do you need?
- Game theory in real life

Game Theory

Game Theory

Game Theory

Game Theory

```haskell
class GameTree (TreeType g) => Game g where

    type TreeType g :: * -> * -> *

    type State g

    type Move game

    gameTree :: g -> (TreeType g) (State g) (Move g)
```

Music as a Game

How do we represent:

- Moves?
- Payoffs?
- Strategies?

Music as a Game

```
data MusicMv = Begin  Pitch
             | Extend Pitch
             | Rest


data Singular Score   =
    SS { realization  :: [MusicMv]
       , future        :: [MusicMv] }


data RealizationState =
    RS { scores        :: [SingularScore]
       , accumulating :: [MusicMv] }
```

Music as a Game

How do we represent:

- Moves?
- Payoffs?
- Strategies?

Music as a Game

How do we represent:

- Moves?
- Payoffs?
- Strategies?

Music as a Game

Our design space for

- Moves?
- Payoffs?
- Strategies?

Music as a Game

Our design space for

- Moves?
- Payoffs?
- Strategies?

Music as a Game

Our design space for

- Moves?
- Payoffs?
- Strategies?
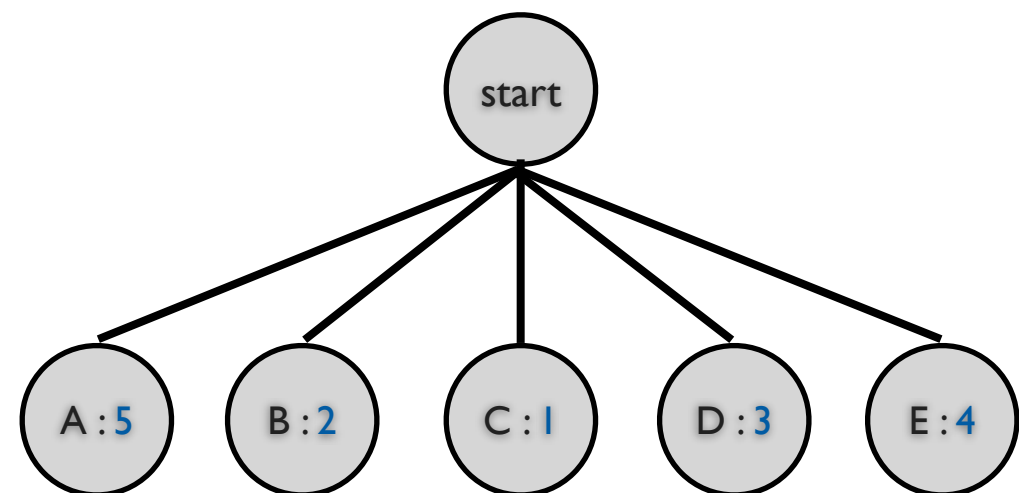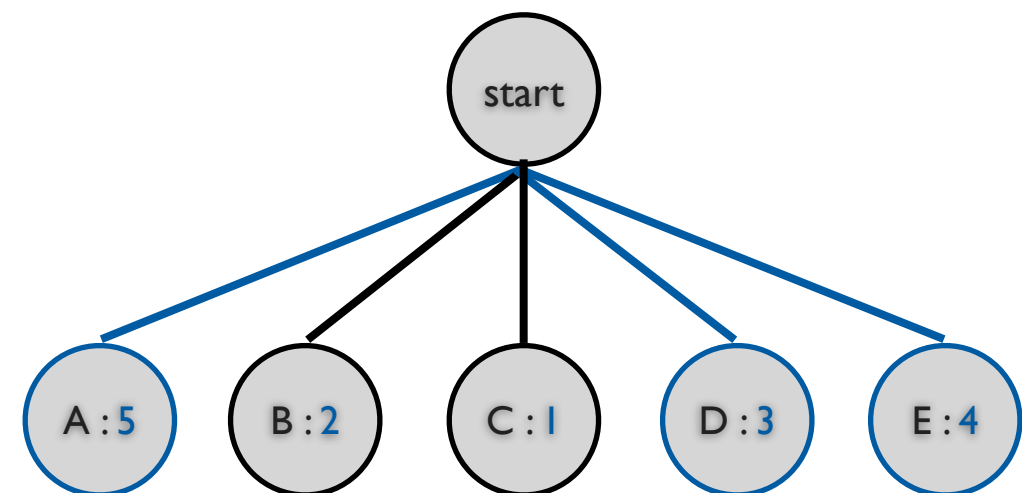
Major Second   Major Third

Music as a Game

Our design space for

- Moves?
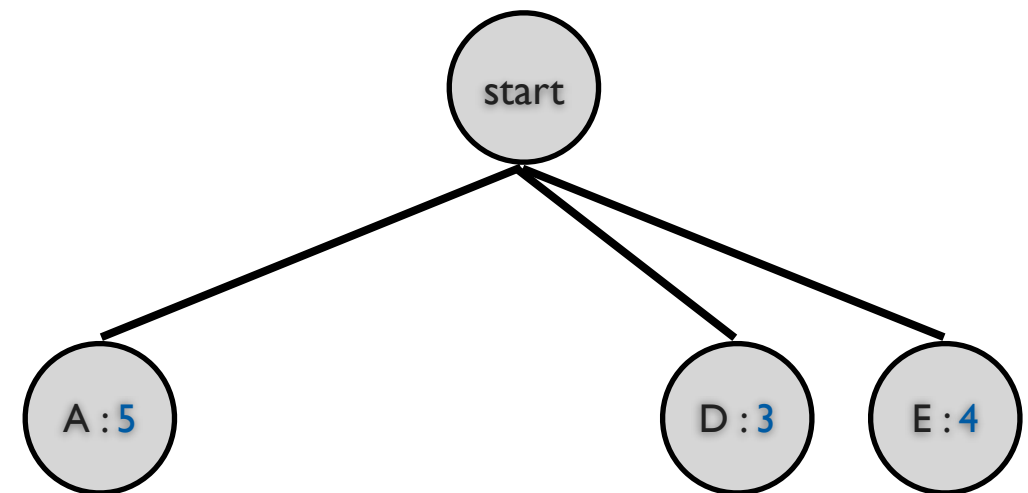- Payoffs?
- Strategies?

Music as a Game
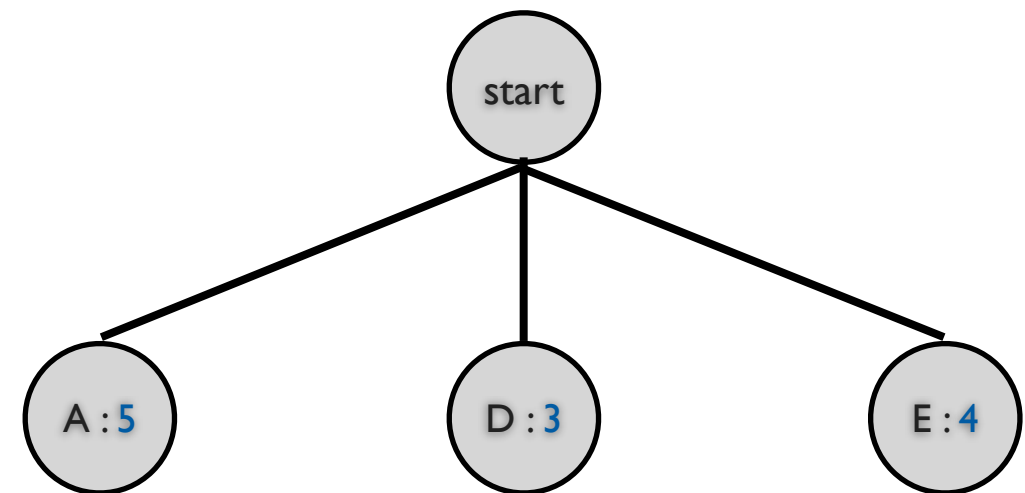
Player 1

Music as a Game

Player 1

Music as a Game

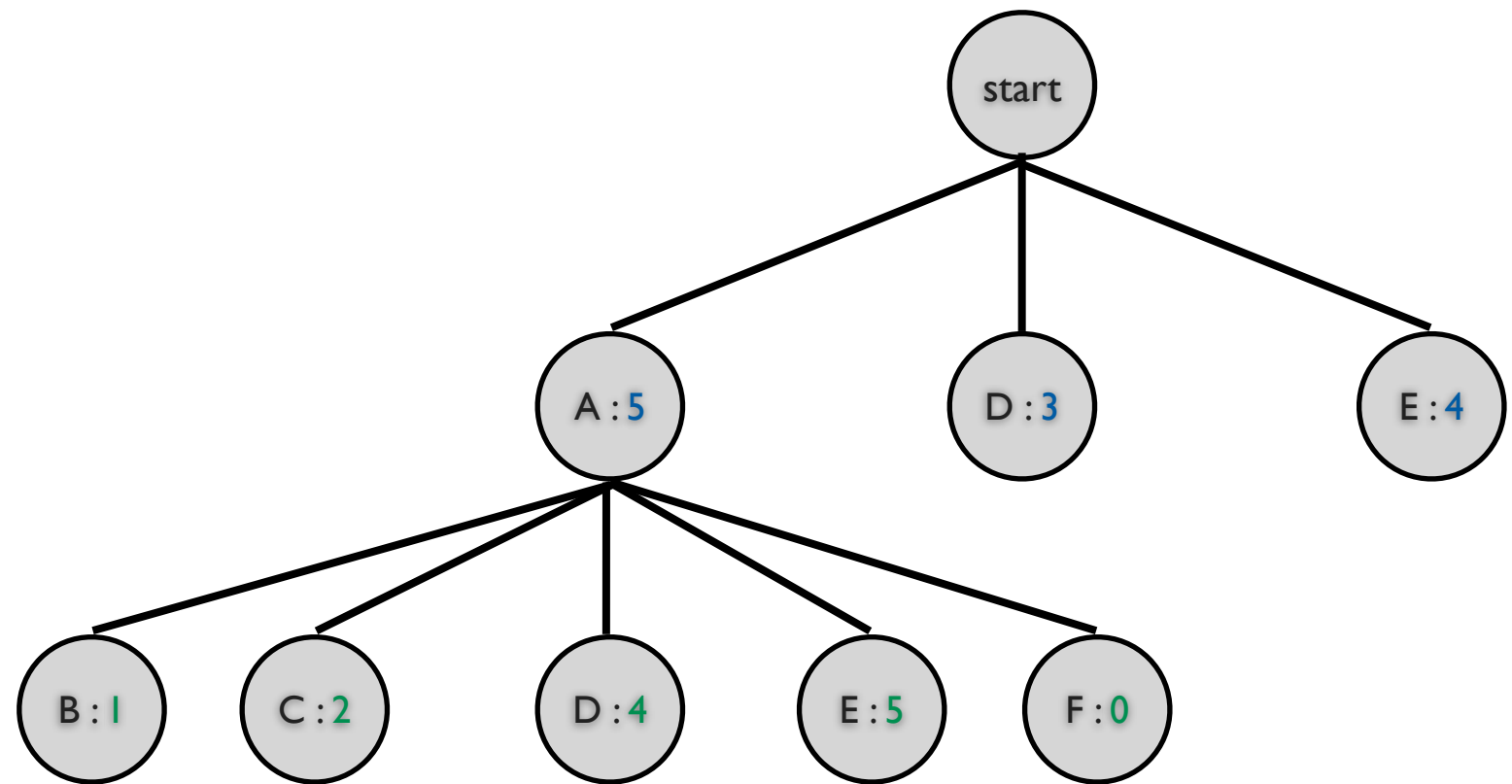Player 1

Music as a Game

Player 1

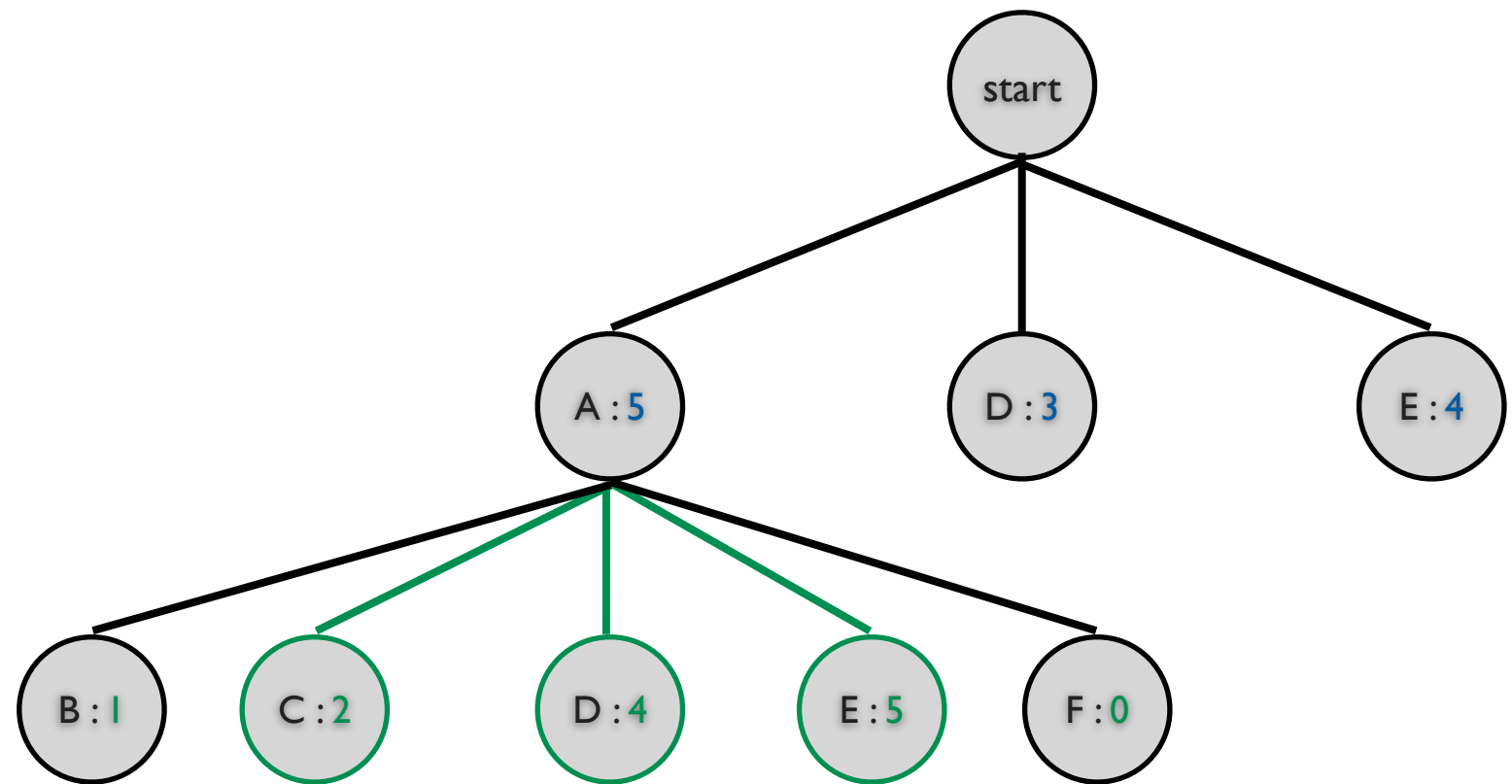# Music as a Game
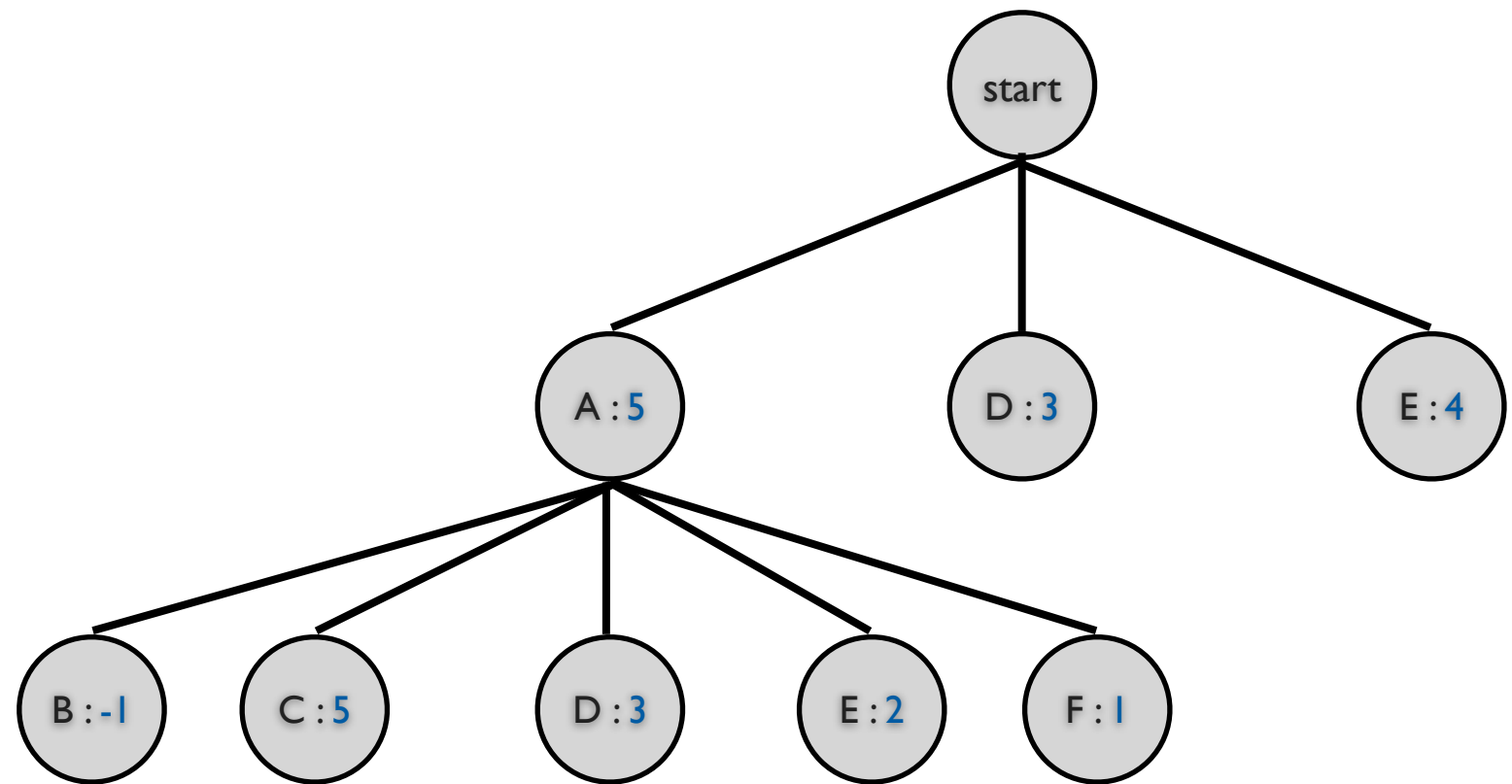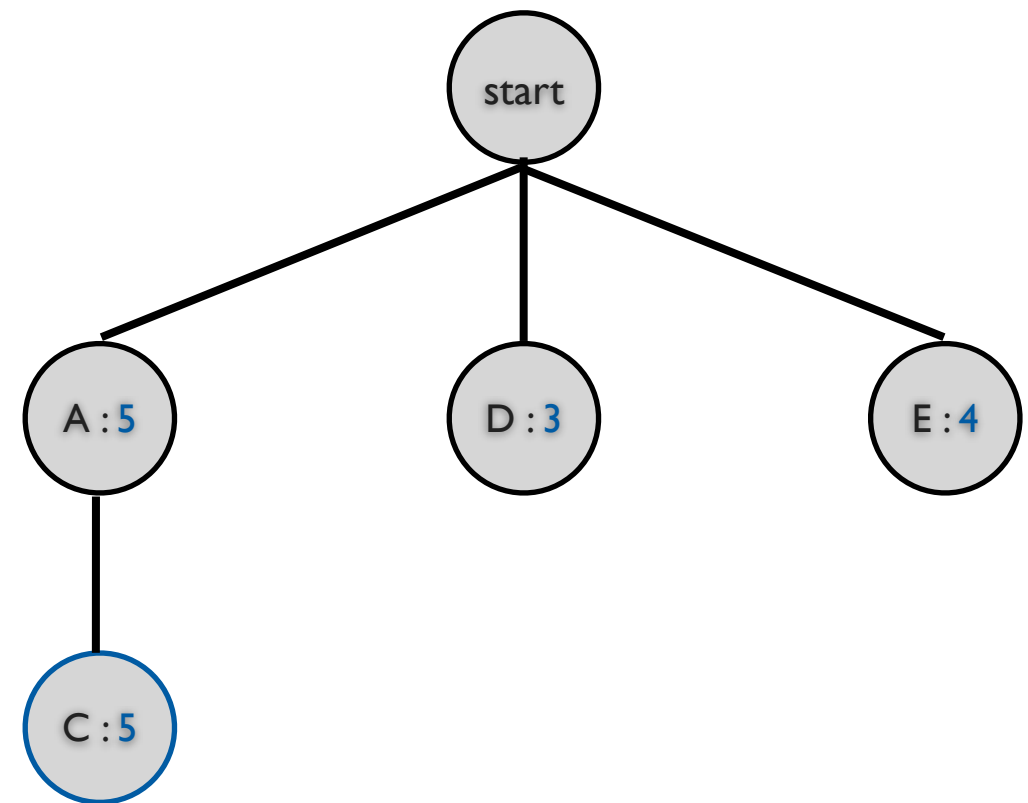

Player 1

Player 2

Music as a Game

Player 1

Player 2

Music as a Game

Player 1

Player 2

Music as a Game

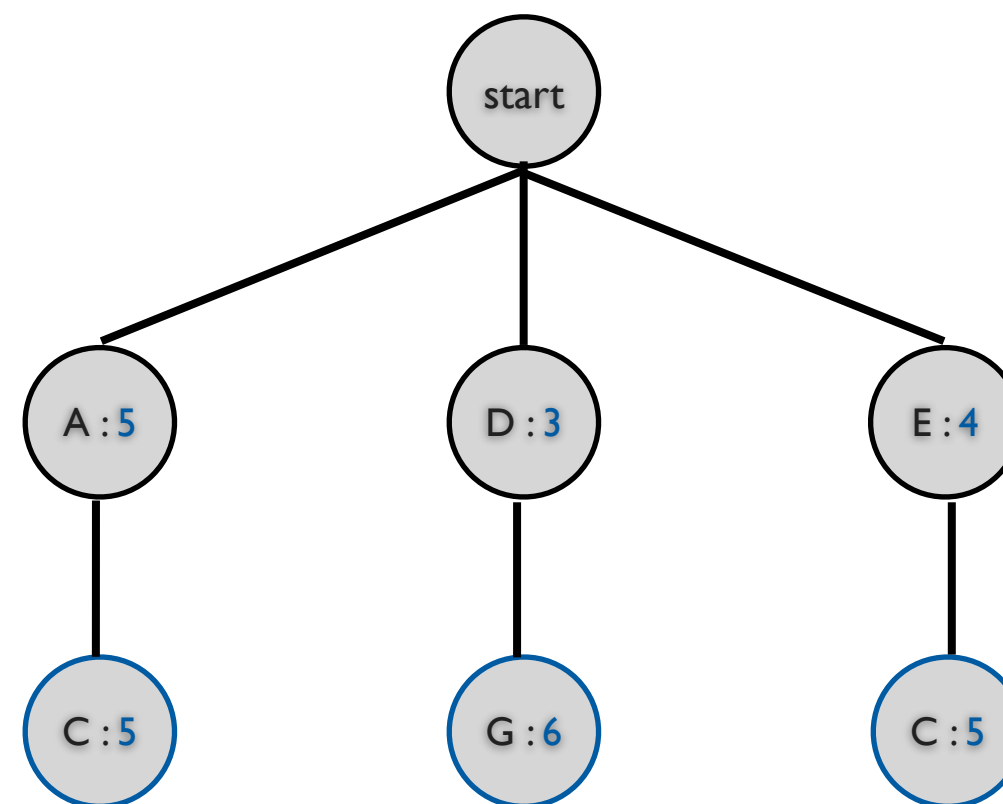Player 1

Player 2

Music as a Game
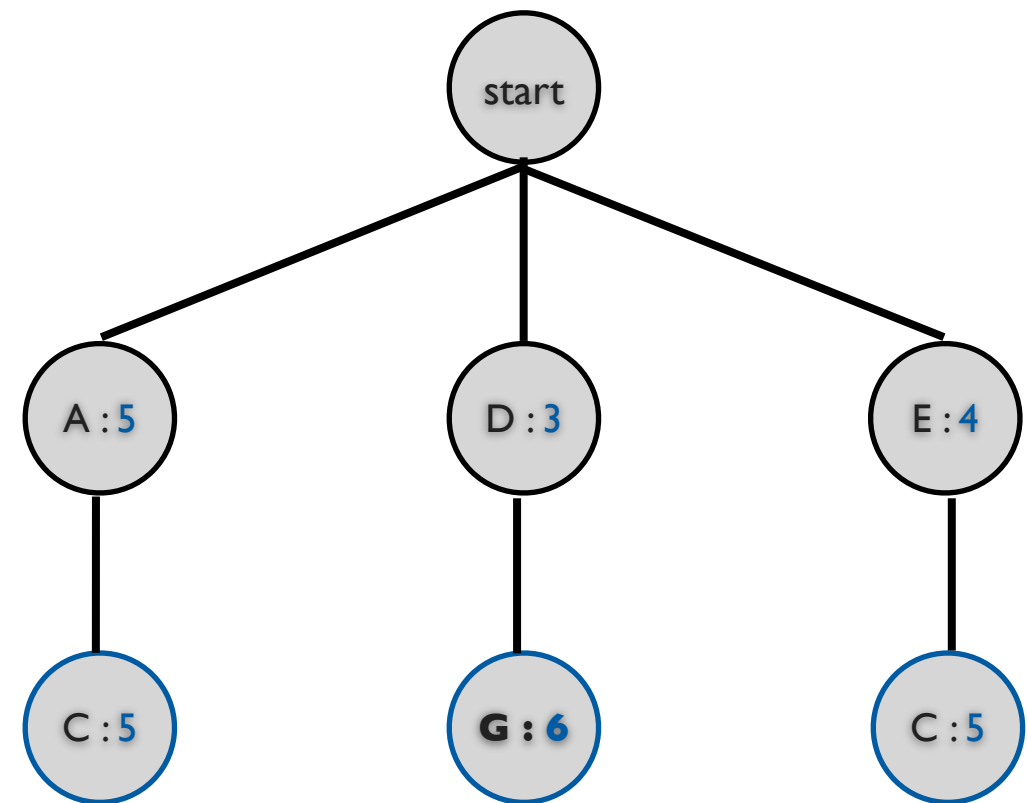
Player 1

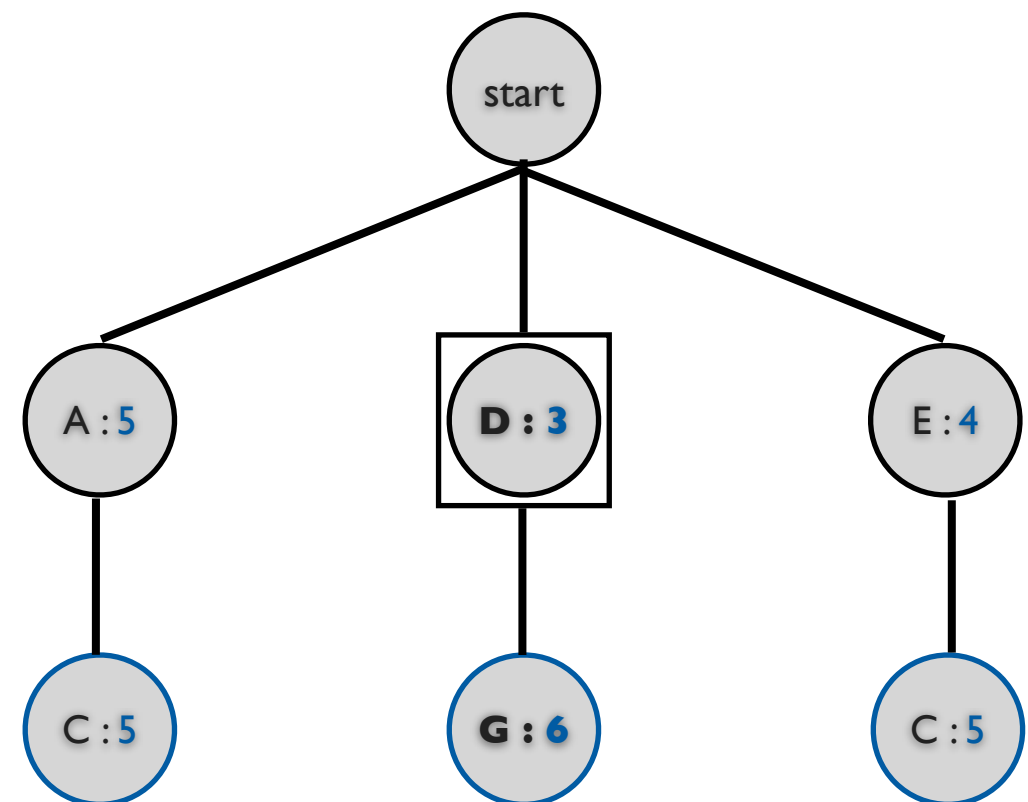Player 2

Music as a Game

Player 1

Player 2

Music as a Game

Player 1

Player 2

Demos!

Conclusion

- Humanlike method of music generation
- Can employ any definition of musical aesthetic
- YOLO