

# Gameplay in Strategy Games

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EECS 370 Spring 2017

# Overview

- Gameplay in strategy games
- Case Study: Age of Blah
- A History of Civilization (the game)
- Diplomacy in strategy games

# Gameplay in Strategy Games



<https://www.pcgamesn.com/sites/default/files/civilization%20%20guide%20header.jpg>

What is the player's experience?

# Gameplay

“Games are a series of interesting choices,” - Sid Meier

Key problems for designers:

- How do we make a player's choices interesting?
  - what options do we give them in terms of actions, micro and macro?
- How do we ease players into our world?
  - how do we teach them how to play? tutorials? exposition dump? sink-or-swim?
  - how do we teach them about the world? character dialogue? signposts? (literally?)
- How do we keep them interested as they gain experience?
  - difficulty curves?
  - shiny new things to touch?

# Interlude: LeBlanc's Taxonomy of Sources of Fun

## 1. Sensation

*Games as sense-pleasure*

## 2. Fantasy

*Games as make-believe*

## 3. Narrative

*Games as drama*

## 4. Challenge

*Games as obstacle course*

## 5. Fellowship

*Games as social framework*

## 6. Discovery

*Games as uncharted territory*

## 7. Expression

*Games as self-discovery*

## 8. Submission

*Games as pastime*

You should all read:

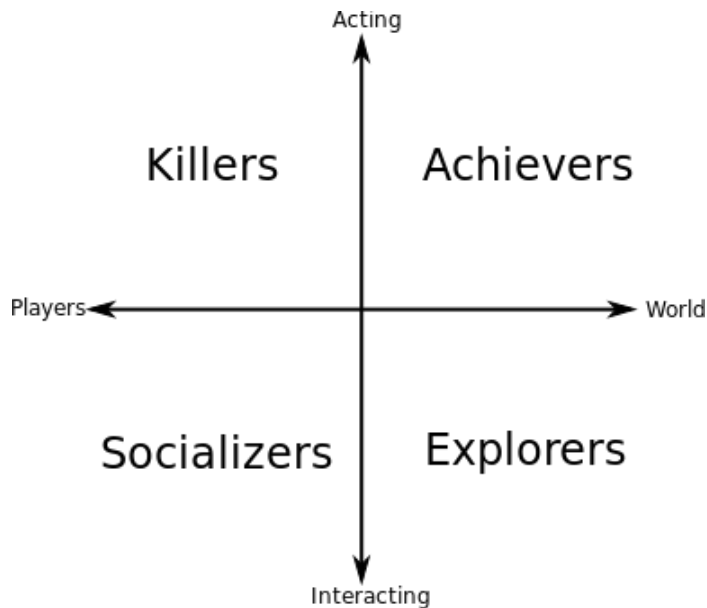
<http://www.cs.northwestern.edu/~hunicke/pubs/MDA.pdf>

# Interlude: Player Motivation Types

## Big Five: OCEAN

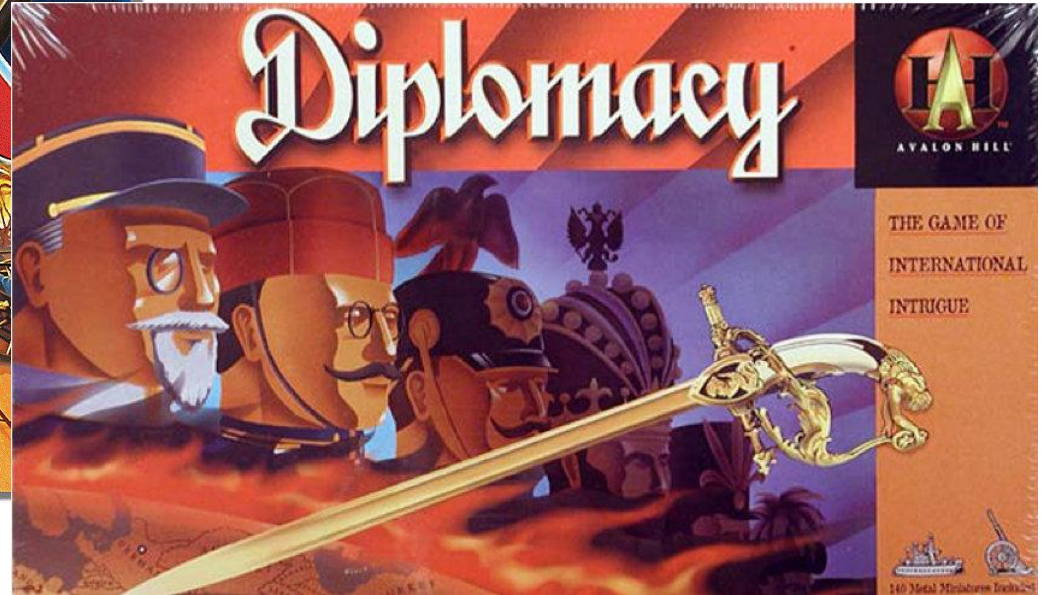
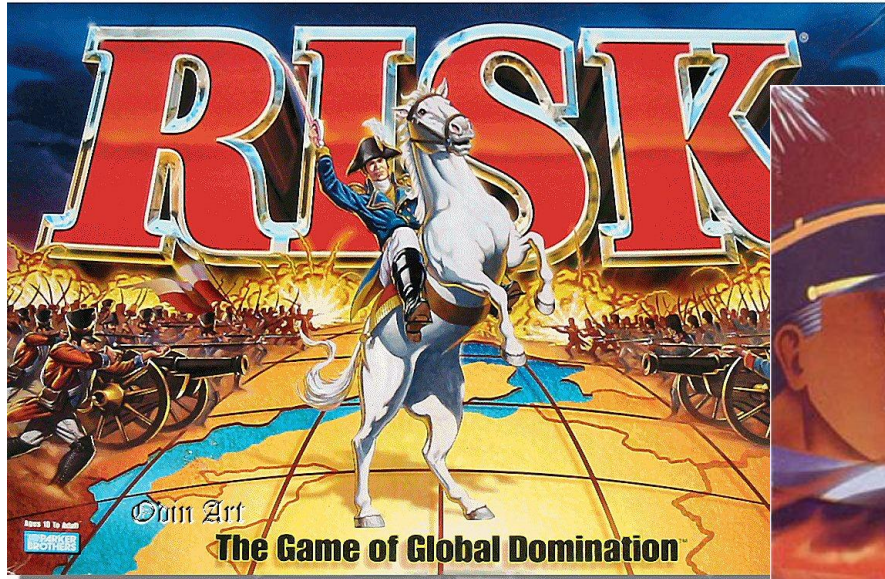
- Openness
- Conscientiousness
- Extraversion
- Agreeableness
- Neuroticism

## Bartle Taxonomy



[https://en.wikipedia.org/wiki/Bartle\\_taxonomy\\_of\\_player\\_types](https://en.wikipedia.org/wiki/Bartle_taxonomy_of_player_types)

# Risk & Diplomacy





# Risk & Diplomacy: Similar Mechanics

## *Risk:*

- World conquest
- Territorial control
- Army tokens
- Ruining friendships



## *Diplomacy:*

- World conquest
- Territorial control
- Army tokens
- Ruining friendships





# Risk & Diplomacy: Different Mechanics

## *Risk:*

- Sequential turns
- Probabilistic combat



## *Diplomacy:*

- Simultaneous turns
- Deterministic combat

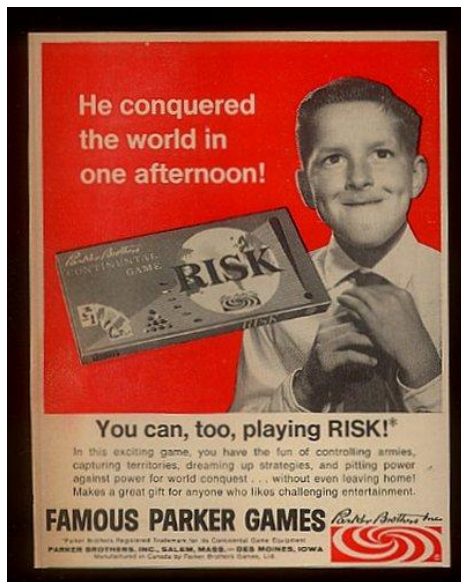


Gameplay arises from mechanics.

A game's mechanics give it meaning.

# Risk & Diplomacy: Mechanics Give Meaning

**Risk...** is about *risk*.



**Diplomacy...** is about *diplomacy*.



# Strategy Games: an Overview

- Strategy is different than tactics
  - strategy is thinking about long-term goals
  - tactics is (are?) how we go about achieving those goals
- You control an organization rather than an individual
  - armed forces
  - company
  - ant colony
- Winning requires managing your resources
  - noticing important conditions
  - short-term vs. long-term investments
  - multiple concurrent activities
  - self-motivated campaigns, plans, etc.



# Case Study: Age of Blah



<https://www.ageofempires.com/games/aoeii/>

# RTS Games in a Nutshell

- Continuous flow of time
- Map sets the stage
- Multiple agents requires substantial attention
- Player responsible for organizing production
- The (hopefully) right level of abstraction



<https://www.youtube.com/watch?v=2E6uGkotqKA>

# RTS Games in a Nutshell

Some kind of conflict, with a beginning, middle, and end

- Beginning
  - set up, start expansion, exploration
- Middle
  - move through multiple phases (e.g., ages), expand, exterminate
- End
  - final drive towards win condition

Similar in many ways to 4X games (explore, expand, exploit, exterminate)



# Game Features: Age of Blah

The Interesting: Get you a Game that can Do Both

- Campaigns
  - short, bounded experiences (play sessions measured in minutes, not hours)
  - simplifies AI design
    - limited range of necessary behaviors; strategies can be tailored
  - structured progress monitoring
- Relics & Wonders
  - introduce instability into the late-game
  - increase uncertainty of outcome



# Game Features: Age of Blah

## The Bad: Game Length

- “Open” = shorter game
  - think about “closed” maps
- Sensitive to map size and population cap
  - is this a bad thing?
- Closing the game
  - attrition through resource depletion
  - changing relative strength of defenses
  - long-range siege forces combat “turtling”
  - late-game super units
    - games should not be a race to the nuke



# Game Features: Age of Blah

~~The Ugly~~ The Possibility: Variations

Ways to make the world persistent?

- Renewable resources
  - currently, no more wood = no more units
  - removes a constraint on game length
- More capable AI
  - high-level strategic shifts as game conditions change
  - ability to orchestrate longer campaigns



# Interlude: Research Trees

They're pretty great!

- Staged introduction of capabilities
  - helps to manage complexity
- Chance to balance long-term and short-term investments
- Progress tracking
- **Important!** They offer sub-optimal strategies
  - this gives players a chance to experiment

# Balance

- Strategy games are all about making decisions
- In a balanced game, you can:
  - choose different civs/races
  - choose different economic strategies
  - choose different military strategies
- There's always some chance of winning *and* losing, depending on your opponent's actions
- Balance is super important, and leads to a long shelf life

# Balance

Fewer races, bigger differences

- StarCraft

More(r) races, smaller differences

- Total Annihilation

Somewhere in between

- AoE2: 18 civs, 90ish units
- AoE3: 8 civs, a million units

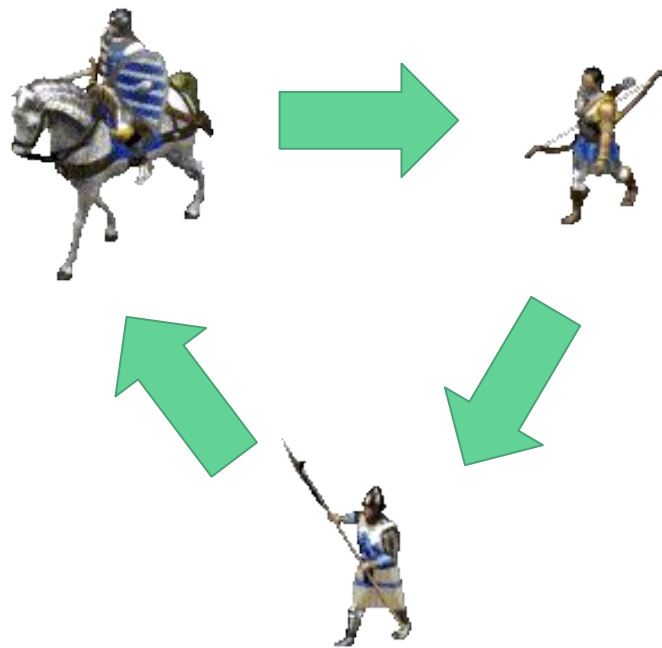
Standard paradigm for unit balancing

- Rock, Paper Scissors as a base
- General purpose units
- Specialized counter-units

# Balance: Unit Relationships

Here's a crappy version:

- Mounted beats ranged
- Ranged beats foot
- Foot beats mounted





# Balance: Roshambo

We all know Rock, Paper, Scissors!

It's a terrible game.

There is no optimal strategy! There's not even a way to reason about choosing one.\*

(if you don't know RPS, that's okay, here are the rules)

- Rock crushes scissors
- Scissors cuts paper
- Paper covers rock, presumably suffocating it

Choose the option that you think will beat your opponent's choice

\*World-class RPS players say that you should choose paper, since most people start with rock

# Balance: Roshambo 2.0

- Victory with \$Choice gives...
  - rock → 2 points
  - paper → 5 points
  - scissors → 10 points
- Winner has most points after 10 rounds

Look! An optimal strategy!

But which one is it...?

(if you don't know RPS, that's okay, here are the rules)

- Rock crushes scissors
- Scissors cuts paper
- Paper covers rock, presumably suffocating it

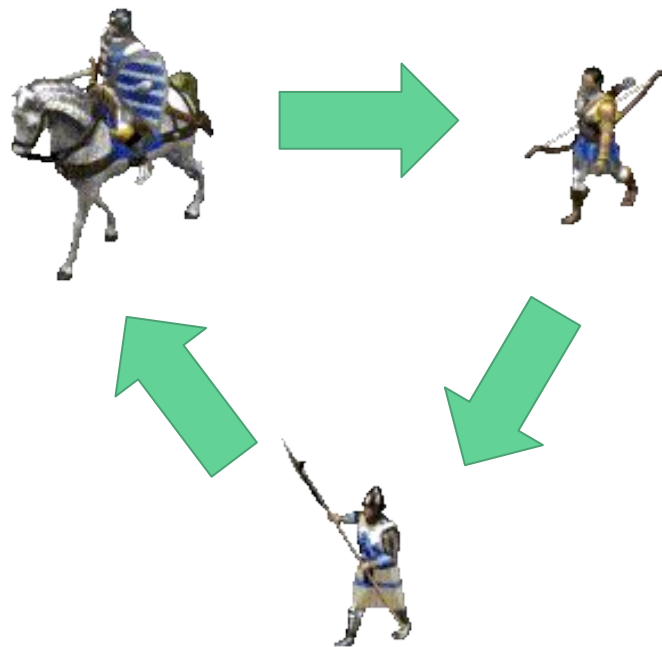
Choose the option that you think will beat your opponent's choice

# Balance: Unit Relationships

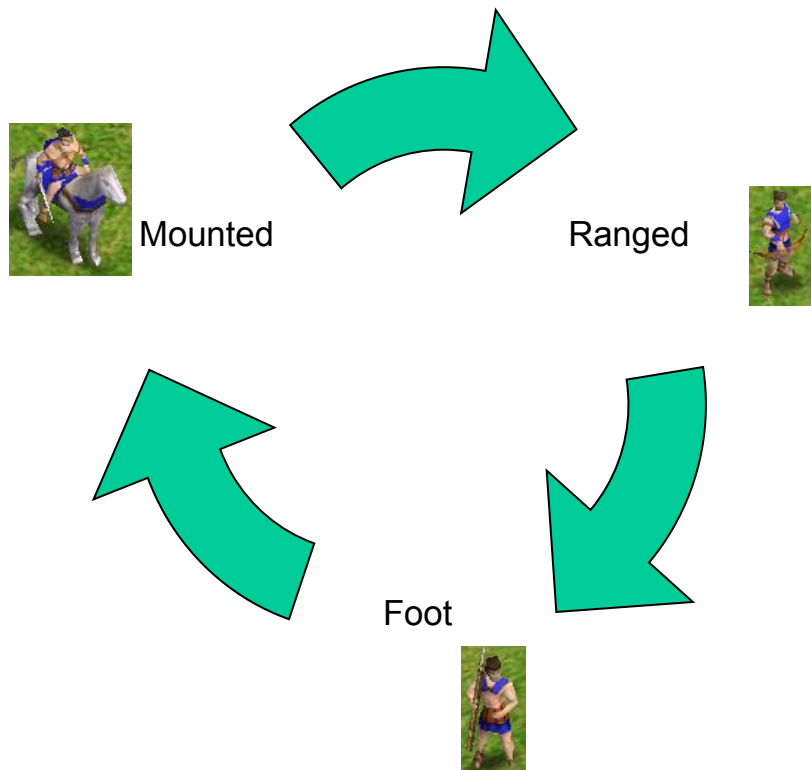
Here's a better version:

*Asymmetric Rewards:*

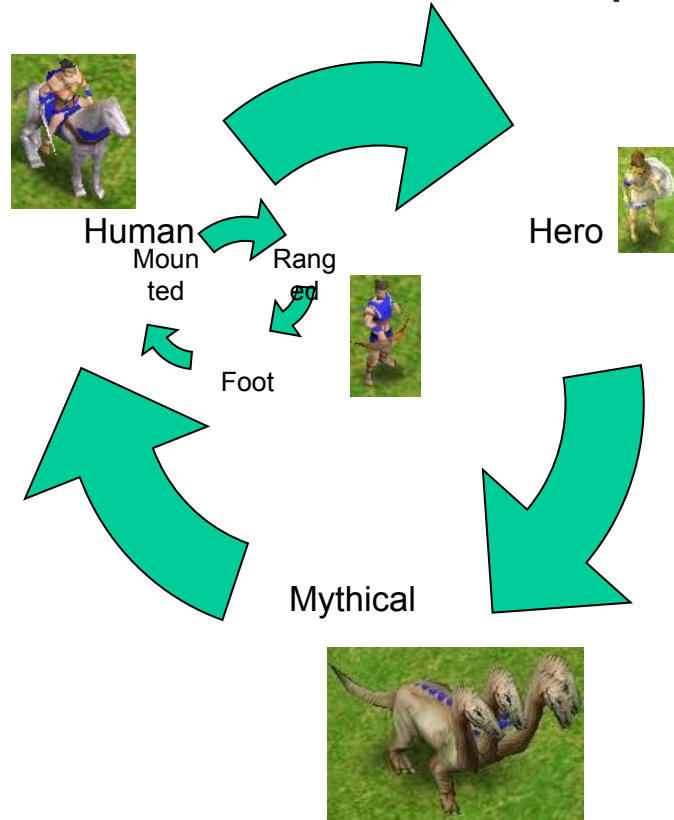
- Mounted
  - strong
  - fast
- Ranged
  - can garrison
  - have, you know range
- Foot
  - cheap!!



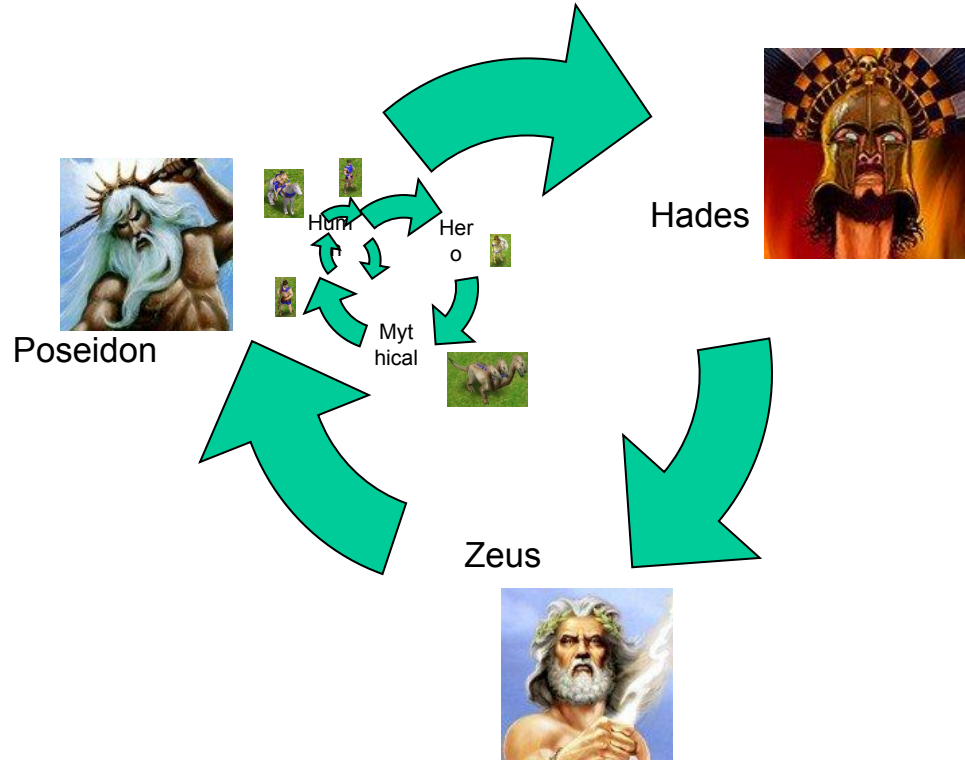
# Balance: Hierarchies of Relationships



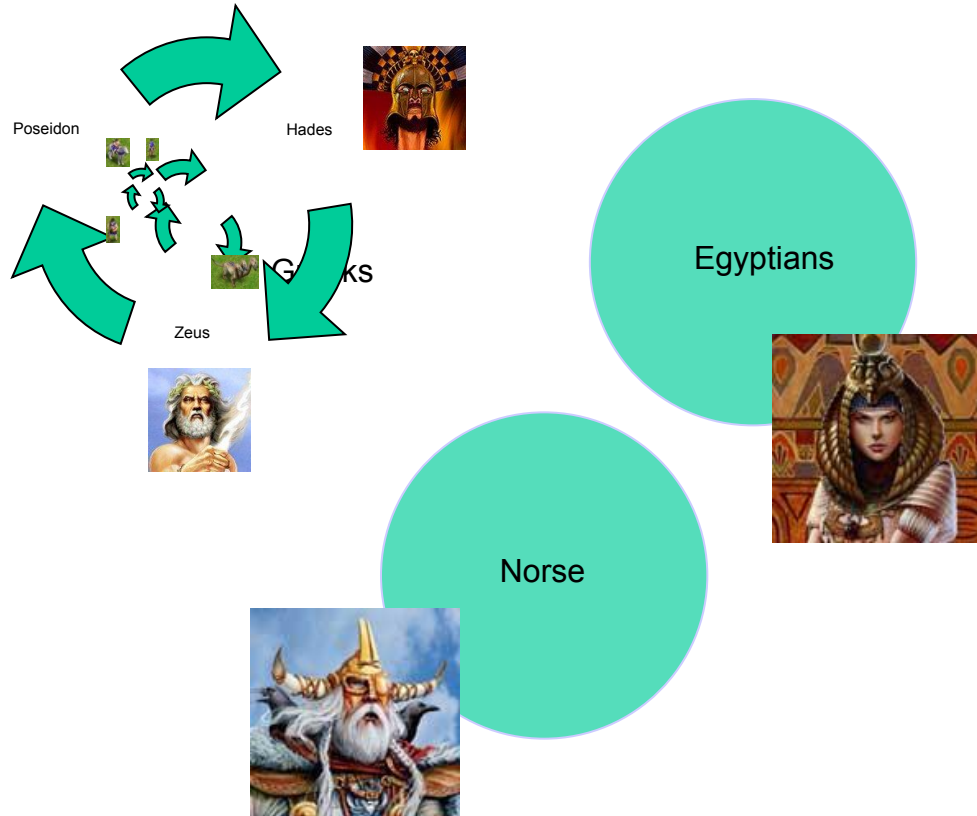
# Balance: Hierarchies of Relationships



# Balance: Hierarchies of Relationships



# Balance: Hierarchies of Relationships





# Balance: How-to

- Start with some kind of reasonable approximation
- Whip up a spreadsheet with unit stats
- Add formulas for emulating combat
  - effective attack, damage reduction, etc.
  - physical representation; archers can “hit” before melee units
- Compare results for unit count and cost
- Check:
  - unit good vs. intended targets
  - counter units strong on target
  - possible to win with enough of any unit



# Balancing: Playtesting

- Get to “first playable” *very* early in the cycle
  - like, seriously, a year’s worth of playtesting isn’t overkill
- Playtest, playtest, playtest
  - both casual and hardcore gamers
- Automated tools where possible
  - automated tools give broader coverage
  - can iron out the obvious bugs
  - detailed stuff still requires human play

# Combat Comparison

Mayans

Unit 1

<All>

<Infantry>

<Cavalry>

<Ranged>

<Siege>

<Towers>

<War Boats>

<Infantry & Cavalry>

<Infantry, Cavalry & F

<Inf, Cav, Ranged & Si

<All Land Units>

**Arbalest**

Archer

Battering Ram

Berserk

Bombard Cannon

Spanish

Unit 2

<Towers>

<War Boats>

<Infantry & Cavalry>

<Infantry, Cavalry & F

<Inf, Cav, Ranged & Si

<All Land Units>

Arbalest

Archer

Battering Ram

Berserk

Bombard Cannon

Bombard Tower

Camel

Cannon Galleon

Capped Ram

Catapult

Flip Sides



Fight in rows



Watch combat



Full speed



Post Imperial



Find Balance

Unit Counts



1 vs 1



10 vs 20

None



1 vs 5



15 vs 5

All



5 vs 1



15 vs 10



5 vs 5



15 vs 15



5 vs 10



15 vs 20



5 vs 15



20 vs 5



5 vs 20



20 vs 10



10 vs 5



20 vs 15



# Combat Comparison

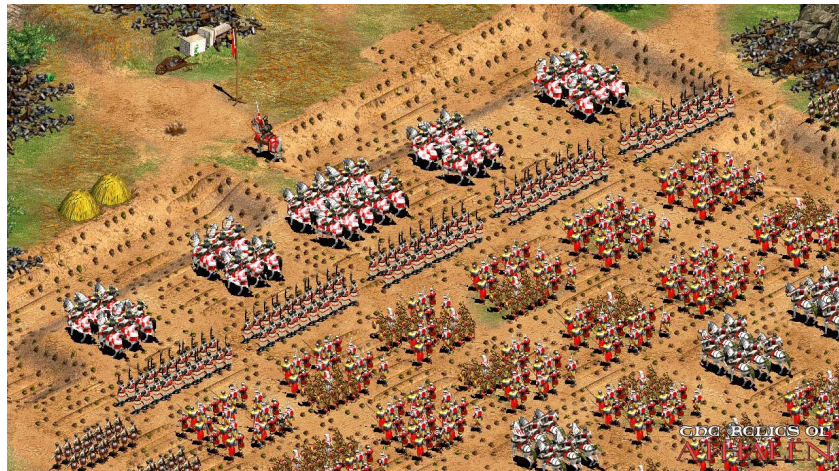
100%

## Arbalest vs Champion

1 vs 1, age 4+, Champion won, 1 left  
5 vs 5, age 4+, Champion won, 4 left  
10 vs 10, age 4+, Arbalest won, 4 left  
15 vs 15, age 4+, Arbalest won, 5 left  
20 vs 20, age 4+, Arbalest won, 8 left  
30 vs 30, age 4+, Arbalest won, 20 left

# Balance: Trade Offs

- More isn't always better
  - every unit needs a clear role
  - **avoid:** trivial differences
- Ranged units should be weaker
- Flying units should be weaker
  - fast/ranged flying units should be super weak
- Power curves for weak units
  - might lose 1v1, but win 30v30
  - overkill as a tie-break
  - AOE (area of effect, not Age of Empires) weapons as a tie-break



<http://aok.heavengames.com/blacksmith/showfile.php?fileid=12045&f=&st=20&ci=>

# Balance: Special Units

- Spell-casting units are tough to balance
  - be *super* careful with “nuke-level” powers
- Specific counter units:
  - deadly on-target, weak elsewhere
  - should be faster than their targets...
- General-purpose units:
  - shouldn't be good against any particular thing
  - jack-of-all-trades, master of none
- Playtesting: test masses of early/cheap units
  - do you want your players to see late-stages of your game?

# A History of Civilization

- Civilization I (1991)
  - classic “god” game
  - simple, turn-based mechanics
- Civilization II (1996)
  - more units, buildings, technology, etc.
  - isometric view
  - more complexity (hit points, trade system)
  - scenario editor





# A History of Civilization

- Civilization III (2001)
  - culture, resources
  - flexible diplomacy
  - rules editor
  - unit animations
- Civilization IV (2005)
  - religion
  - simplified mechanics
  - multiplayer
  - 3D world



# A History of Civilization

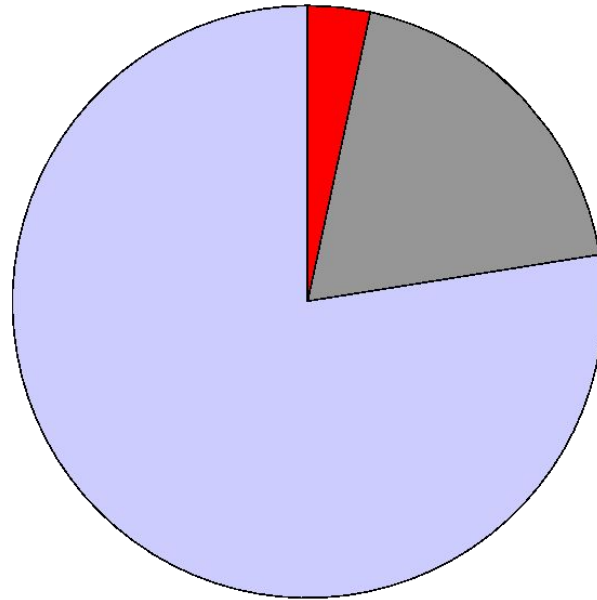
- Civilization V (2010)
  - hex tiles
  - better graphics
  - improved UI



# Civ IV AI

- Written by the designer
  - **Civ I**, Sid Meiers
  - **Civ II**, Brian Reynolds
  - **Civ III, IV**: Soren Johnson
- 10 files (Game, Team, Player, City, Unit)
- 25,000 lines of code
- Soft-coded decision making

# Civ IV AI: Codebase



# Civ IV AI: Testing the AI

- Traditional testing fails
- Automated testing helps a lot
- Needed a lot of hard-core fans to help out
  - 1.5 year closed beta
  - peaked at 100 users
  - bi-weekly patches

# Balance: Good vs. Fun AI

- Every player is different
  - challenge
  - sandbox
  - narrative
  - many more...
- Callback to player motivation types
- We want players to win
  - or at least to understand why they lost

# Balance: Difficulty Levels

- We can let Sandbox players off easy...
- ... and still give Challenge players something to do
- Greater depth to available tactics

*...but how?*

# Balance: AI Cheating

- Should we cheat?
- Is there a way to cheat “fairly?”
- Who notices?
  - who cares?
- What is fun?
  - like, which options are fun; not, like, broadly



# Civ IV: Difficulty Parameters

## AI Inflation Rate

- Settler (100%)
- Chieftan (90%)
- Warlord (80%)
- Noble (70%)
- Prince (60%)
- Monarch (50%)
- Emperor (40%)
- Immortal (30%)
- Deity (20%)



# Balance: Is “Even” Even?

- In Civ IV, “Noble” is supposed to be the “even” setting for difficulty
- But there are so many advantages given to the Noble AI
  - animal/barbarian combat probabilities
  - unit support
  - unit upgrades
  - production rates
  - war weariness
- AI needs more help in these areas
- Humans are more intelligent than AI (for now)
  - is this the same thing as saying that we can beat them?

# Balance: Cheating Should Never Feel Unfair

- **Civ I, II**
  - free wonders (?????)
  - ganging up on humans
- **Civ III, IV**
  - human-blind diplomacy
  - information cheats



guau so many bears

# Balance: Information Cheats

- **Civ III:** city ignored Fog of War to look at defenders
  - “Amphibious Assault Judo”
- **Civ IV:**
  - randomly update assault targets
  - ignore temporary data, such as nearby units



# Balance: Diplomacy Problems

- When can AI ally with AI?
- Does this feel fair to humans?
- Should the human be trusted/feared?
- How cutthroat is the AI?
- Can the player take advantage?



# Diplomacy

- **Civ I** (1991)
- **Colonization** (1994)
- **Civilization II** (1996)
- **Alpha Centauri** (1998)
- **Rise of Nations** (2003)

```
// try not to build in your ally's territory, it's rude  
if (world.get_who(wx, wy) != who) val /= 3;
```

# Diplomacy: Civilization and Colonization

- AI brings troops to your city even when you're at peace
- AI sits by while you bring troops to its city
- No concept of territory
- Little understanding of threats
- Unaware of your interactions with others

```
// In the following situations we should  
// definitely avoid aggression:  
if (weak[whom] || (LEADER2.attack > attack*3)) {  
    if (!courageous) aggression[whom] = false;  
}
```

# Diplomacy: Civ II

- Two-square exclusion zone around a city
- AI doesn't approach your city at peace
- Complains if you approach its cities
- Takes note of your interactions with others
- Still not great at threat-detection
- Helps itself freely to your turf

```
// Decide whether to demand tribute here (or just declare war)  
if ((LEADER2.betrayals < 4) && !rush) {  
    action_demand_tribute (whom, WEALTH, min (wealth, BUCKETS));  
}
```



# Diplomacy: Alpha Centauri

- National borders
  - simple algorithm: closest city
  - visual representation of territories
- AI pays attention to turf
- AI avoids hostile actions while at peace
- Pays attention to adjacent nations and threats
- Slightly better diplomacy: “hey, you’re in my turf!”

```
// tell the city it is near a border
```

```
CITY2.bordering |= (1 << who) ;
```

```
CITY2.bordering |= (1 << who2) ;
```

# Diplomacy: Rise of Nations

- National borders as centerpiece
- “Border Pushing” as a strategy
  - border algorithm to support political game
  - strategic AI must understand how to do this
- Borders inspire additional AI & design ideas
  - army AI++

```
// Stop pushing cities in a straight line, which AI was tending to do  
if (LEADER.city_num >= 3) temp = min (temp, 10);
```

# Anyone Played Civ VI?

- What are its strengths?
- Weaknesses?

Questions?