

# CS/INFO 4154:

## Analytics-driven Game Design

Class 18:

Internet Telemetry

Mon

Wed

Fri

10/4  
Logging

10/6  
Data Visualization

FALL BREAK!

10/11

10/13  
Beta Playtesting 1

10/16  
Beta Playtesting 2

10/18  
Beta Playtesting 3



10/19: Midterm Peer Evaluations Due

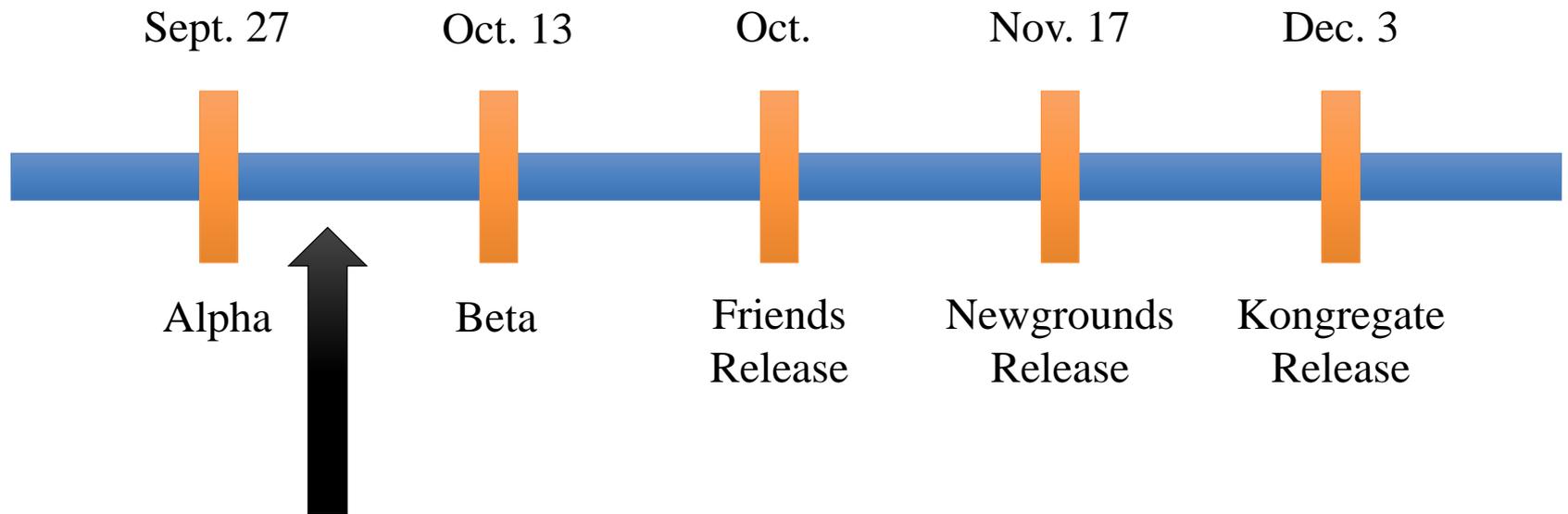
# Midterm Peer Evaluations

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- Three components:
  1. **Self-report:** what have you contributed so far?
  2. **High-level peer evaluation**
  3. **Work breakdown:** who did what % of the work?
- Scope: Throwaway, Alpha, Beta
- Privacy:
  - Information will kept private, but:
  - We may anonymously refer to comments to justify feedback
- Deadline:
  - Thursday, Oct. 19<sup>th</sup>, 11:59pm
  - Submit PDF through CMS

# Schedule

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# Beta Prototype

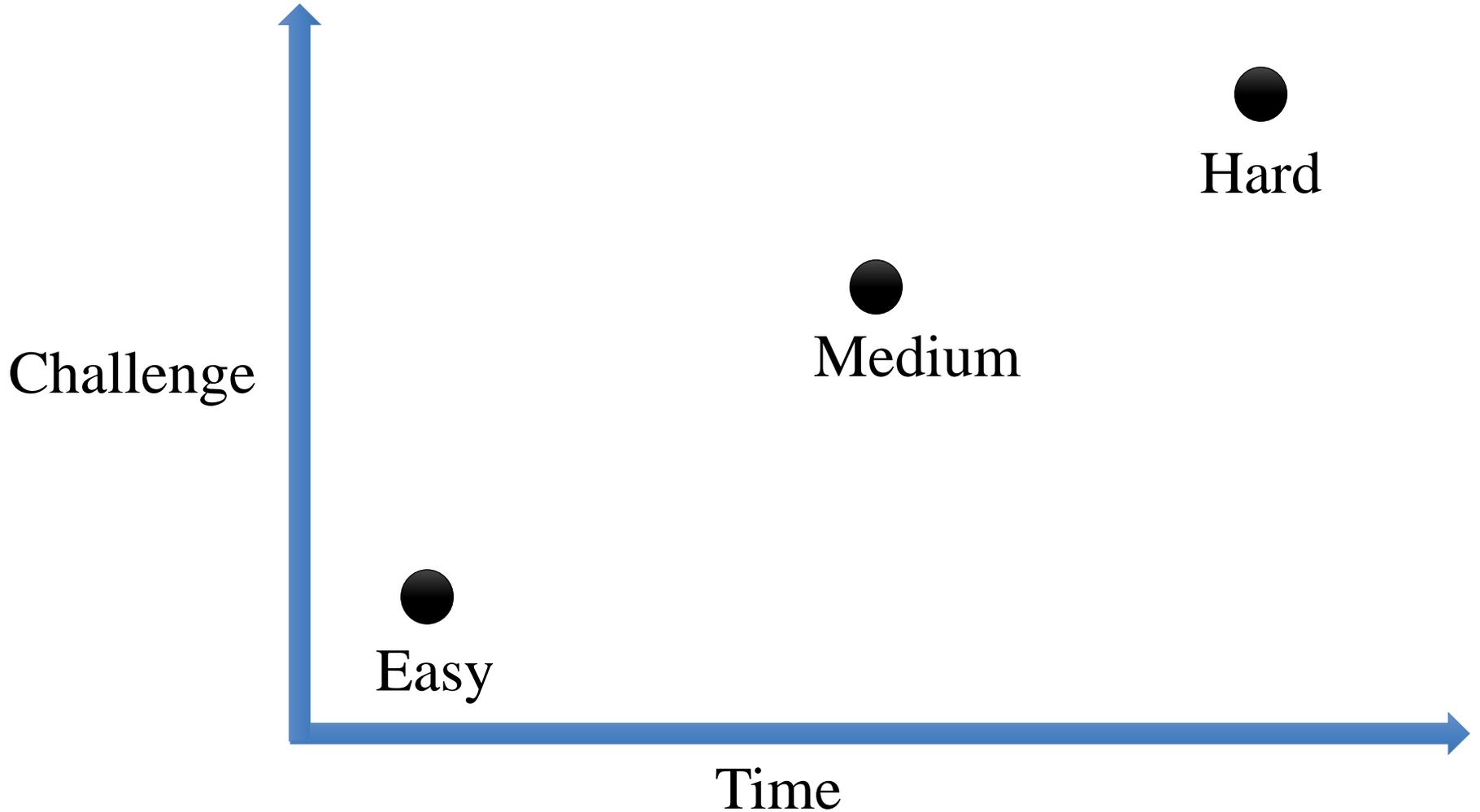
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- Requirements
  - Attempt to address feedback from Alpha
  - Smooth progression of *six*\* tasks
  - Tutorials
  - Basic logging: record *some actions*

\* Negotiable; “task” definition depends on your game

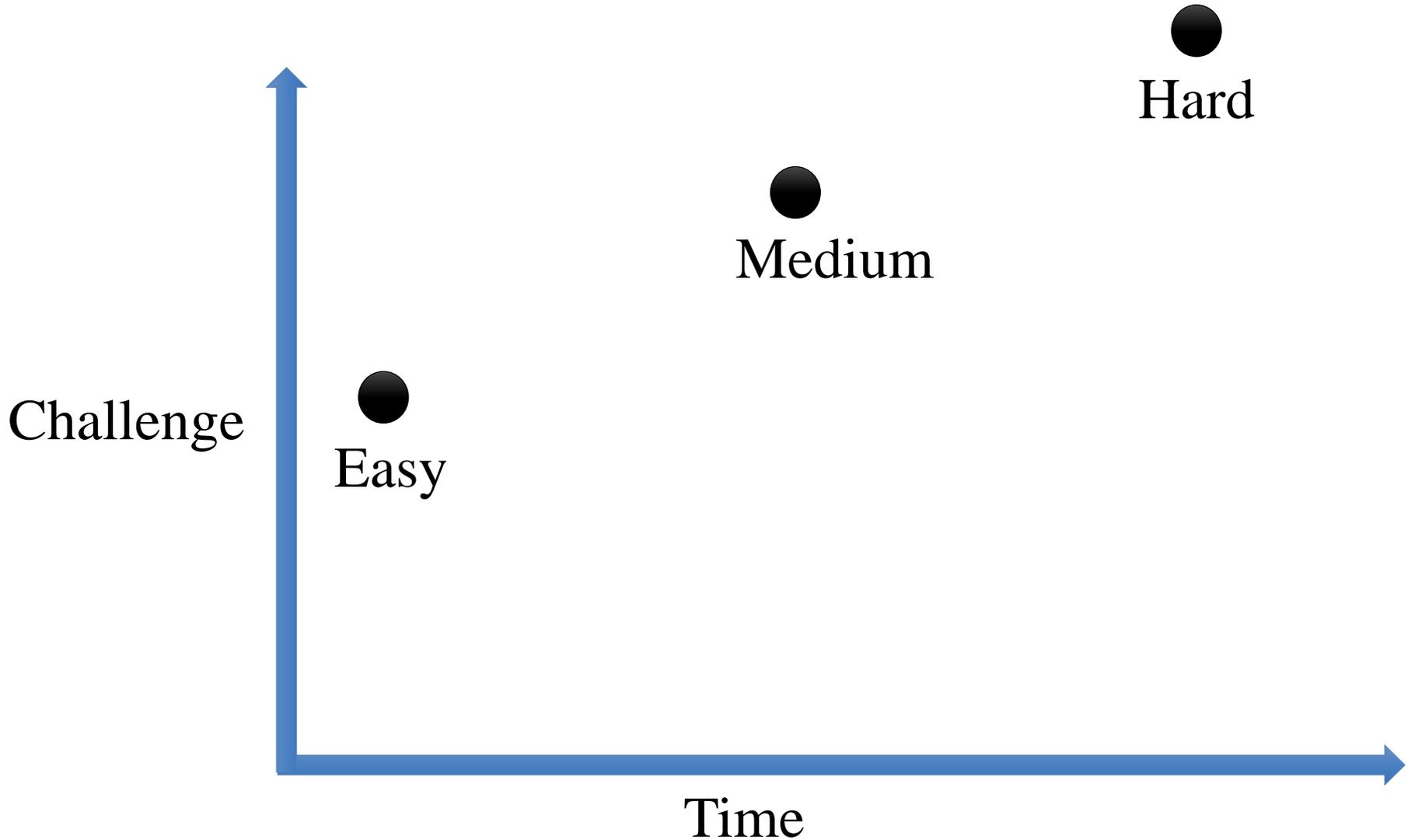
# Beta Level Progression

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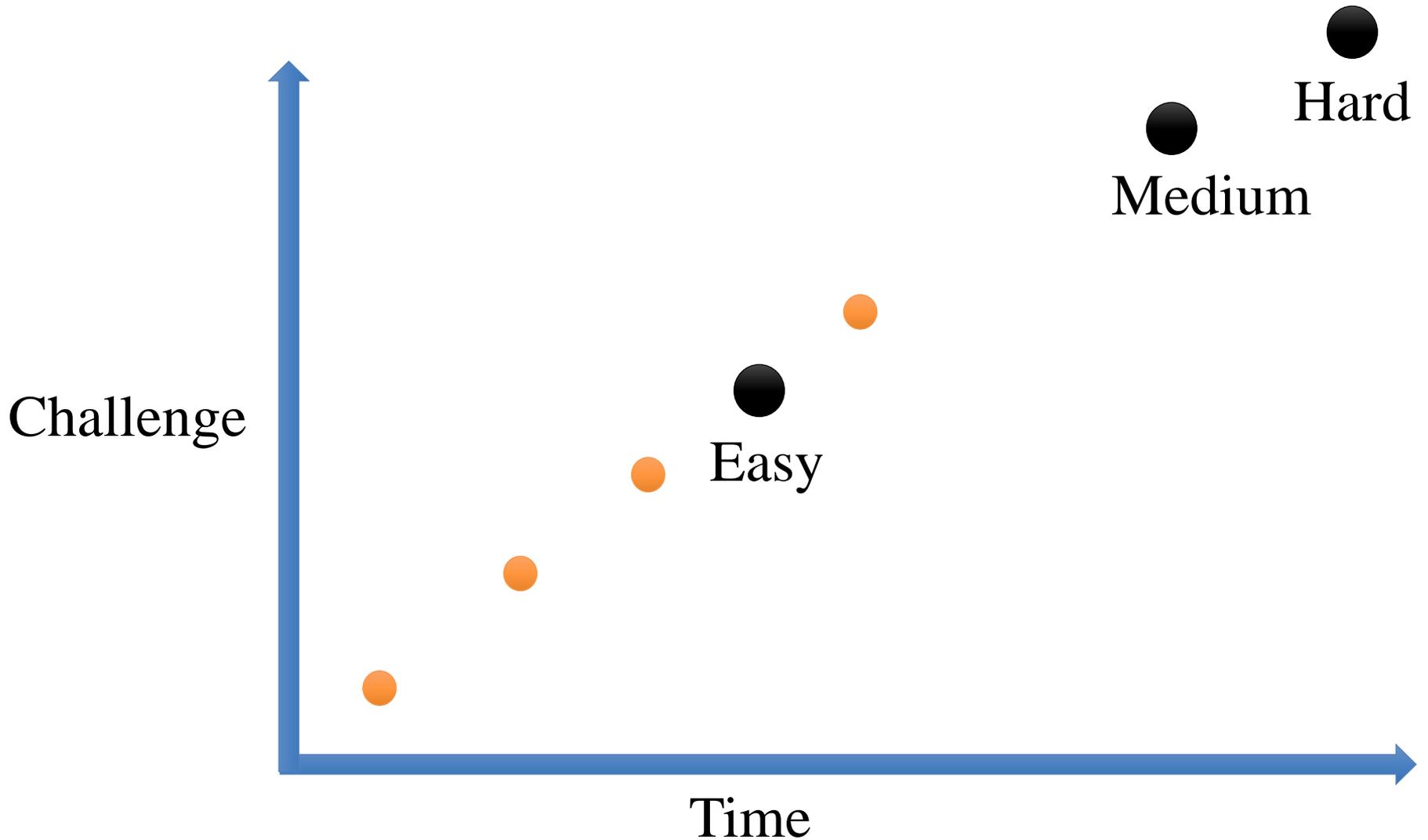
# Beta Level Progression

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# Beta Level Progression

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# Examples of Beta Prototypes

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# Outline

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1. Logging data
2. Retrieving data
3. Privacy considerations

# Outline

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1. Logging data
2. Retrieving data
3. Privacy considerations

# What are the challenges in logging?

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# Ideally

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Time	Event
9:00am	Starts game
9:01am	Starts level 1
9:01-9:10am	Completing level 2
9:11am	Starts level 2
9:11-9:17am	Completing level 2

# Reality

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Time	Event
9:00am	Starts game
<b>9:45am</b>	Starts level 1
9:45-9:55am	Random actions in level 1
9:55am	Restarts level 1
9:56am	Restarts level 1
9:57-10:04am	More actions in level 1
10:04am	Boss walks in. Minimizes game and acts like he is working.
<b>2:55pm</b>	Maximize game, resume level 1

# What are the challenges in logging?

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- Sporadic and unexpected player behavior
- Events can get dropped
- Limited space
- Spikes in demand

# Principle 1: Record what you need

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- Consider *decision-significant* information
- Consider your analysis questions

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## **The Ground Beneath Her Feet**

Move the platform across the pit and then go back in time so the goomba will land on the platform and walk across. He will get the key from the tiny space for you. Grab the first puzzle piece and move on.

---

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Move the platform across the pit and then go back in time so the goomba will land on the platform and walk across. He will get the key from the tiny space for you. Grab the first puzzle piece and move on.

# Recording Movement

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# Ways to do this

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- walk\_right walk\_right walk\_right walk\_right  
walk\_right walk\_right walk\_right walk\_right  
walk\_right walk\_right walk\_right walk\_right
- walk\_right (3 seconds)
- player\_at(1, 1) player\_at(1, 1) player\_at(1, 1)  
player\_at(1, 1) player\_at(2, 1) player\_at(3, 1)
- player\_at(1, 1) player\_at(2, 1) player\_at(3, 1)

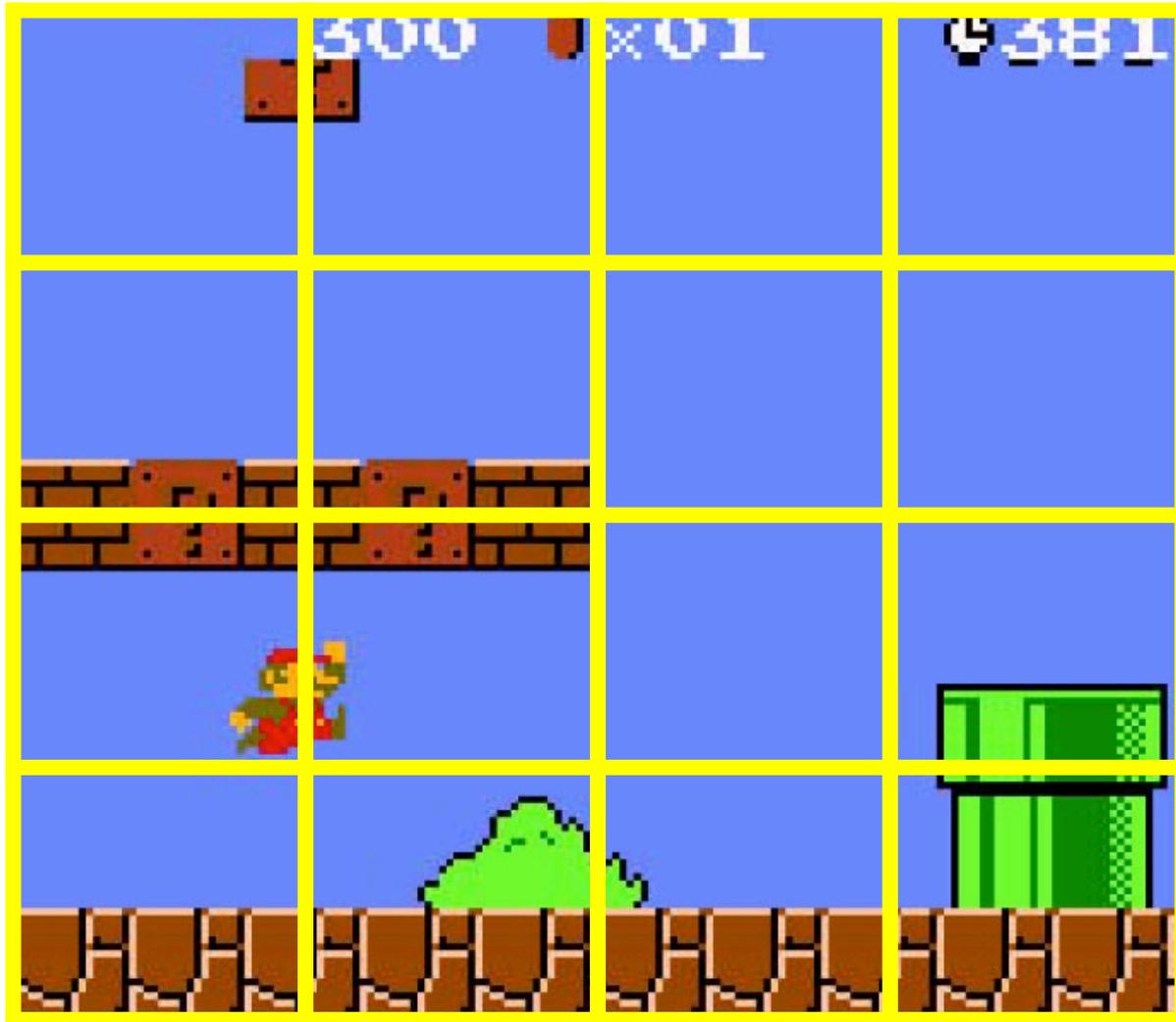
# Discretizing Space

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# Discretizing Space

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# Recording Health

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- Player health dropped to 99%
- Player health dropped to 98%
- Player health dropped to 97%
- Player health dropped to 96%
- Player health dropped to 80%
- Player health dropped to 60%
- Player health dropped to 40%
- Player health dropped to 20%

# Key events

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# Key events

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# Principle 2: Failsafes

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- Logs sometimes get corrupted
  - Events sometimes get lost
  - Mistakes get made
- Advice: add some *redundancy*
  - Report *global positions*, not *deltas*
  - Periodically report the entire game state

# Logging

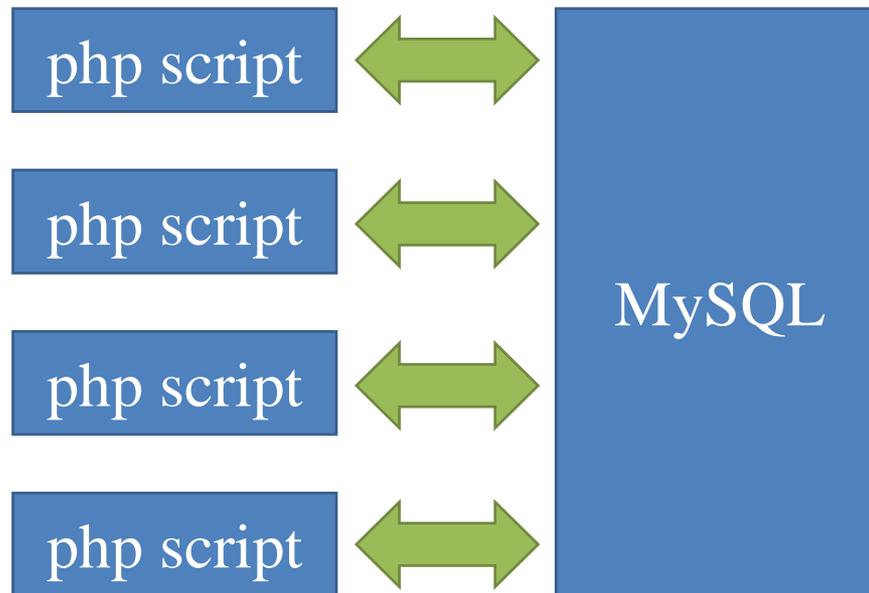
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- Painful bits are mostly taken care of for you
- Server communications managed through an Haxe/Javascript/Unity library

# GDIAC logging framework

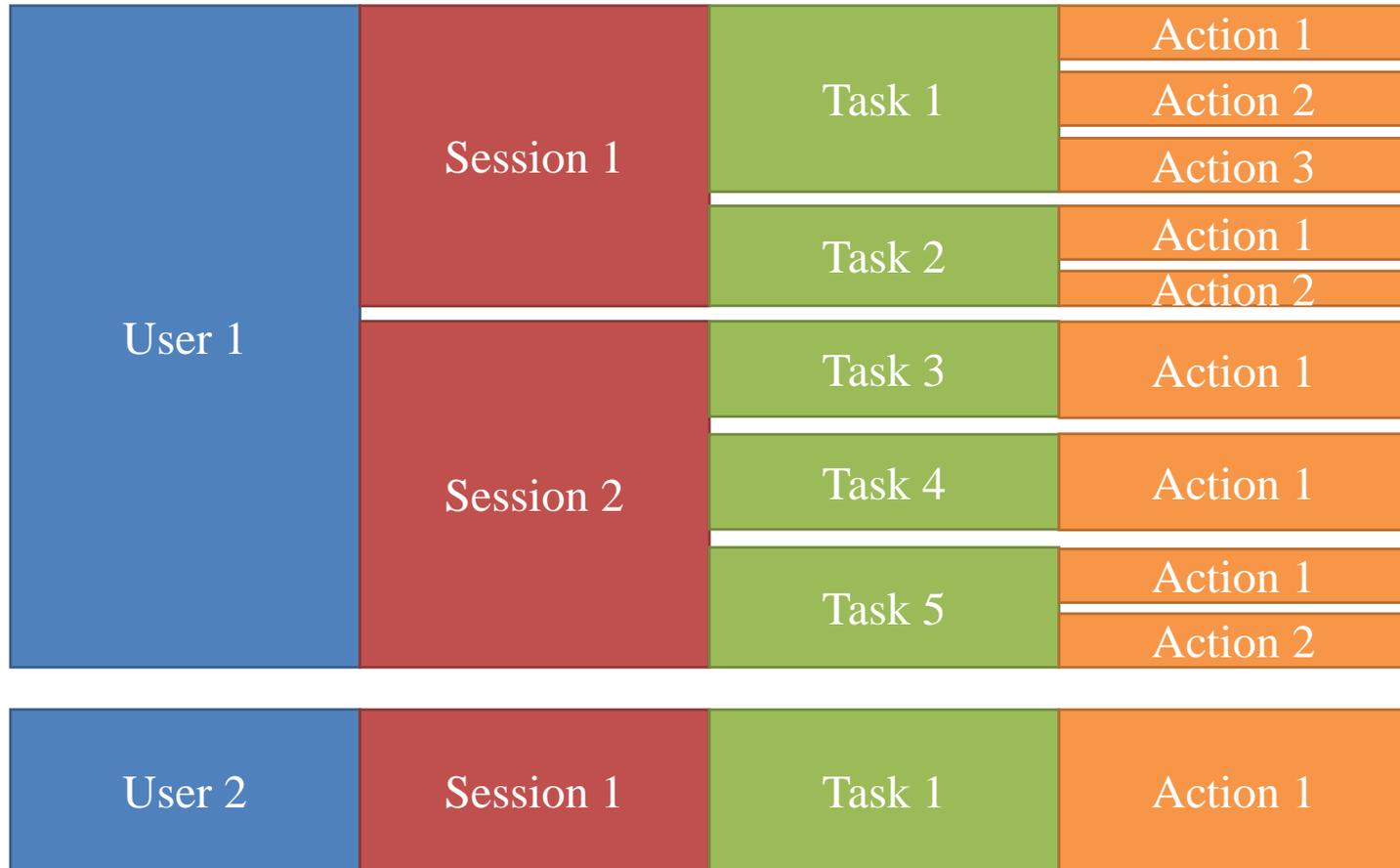
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- Located on `gdiac.cs.cornell.edu`
- Data communication through arguments to php
- Data shows up in MySQL database



# Data organization

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# How these entities are called:

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Users

“players”

Sessions

“pageloads”

Tasks

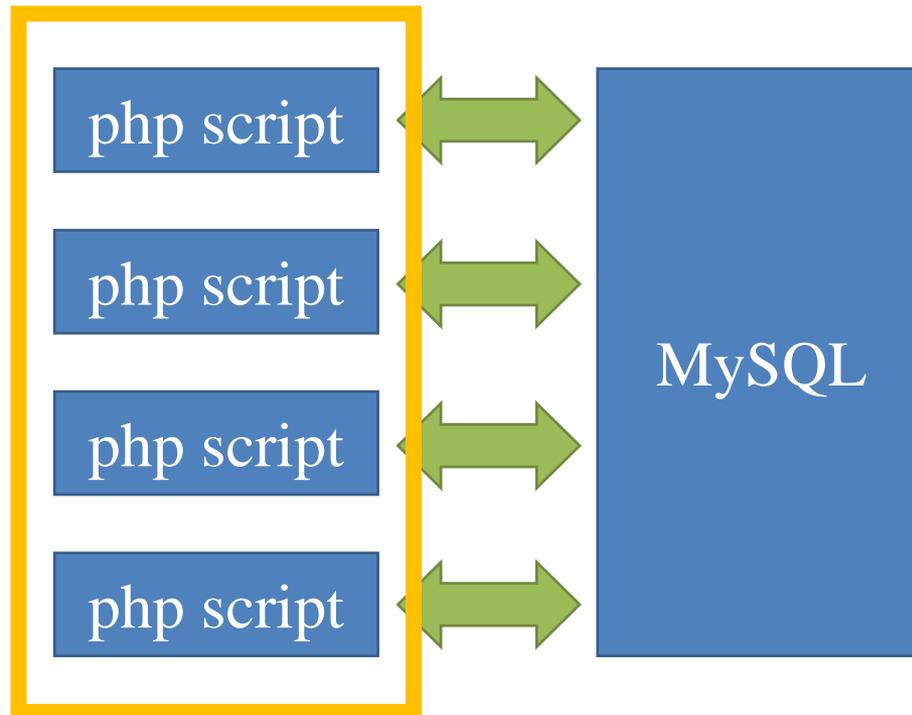
“quests”

Actions

“actions”

# Part 1: Logging data

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# Logging API

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Five commands:

- initialize
  - call before calling anything else
- recordPageLoad
  - use once when the player loads the game
- recordLevelStart
  - use when the player starts a level (or quest)
  - must follow *recordPageLoad*
- recordLevelEnd
  - use when the player ends a level (or quest)
  - must follow *recordPageLoad* and *recordLevelStart*
- recordAction
  - use when the player performs an action
  - must follow *recordPageLoad* and *recordLevelStart*

# Recording

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Users

Tasks

Actions

Sessions

initialize  
recordPageLoad

recordLevelStart  
recordLevelEnd

recordAction

# Setup: initialize

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High-level idea:

- Set a bunch of internal variables for bookkeeping

# Setup: initialize

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**initialize**(*gameId*, *versionId*, *debugMode*,  
[*suppressConsoleOutput*]):

- Initializes the logging module
- You *must* call this function when the game starts, or at least before the first event is logged

# Setup: initialize

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**initialize**(*gameId*, *versionId*, *debugMode*, [*suppressConsoleOutput*]):

- *gameId*: Your game's specific ID number (see Piazza post)
- *versionId*: Your game's current version number. You should change this number between releases, and after very large changes to your logging methods.
- *debugMode*: A convenience parameter that disables logging if TRUE. **Make sure you set this to FALSE before releasing.**

# Users and Sessions: recordPageLoad

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High level idea:

- register new player or existing player
- make a new user (if unknown)

# Users and Sessions: recordPageLoad

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## **recordPageLoad**(*userInfo*):

- Sends data to the server indicating that your game has been loaded.
- Should be called *once* in the game
- *userInfo*: Optional. Any additional information you would like to be recorded.

# Quests: recordLevelStart

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High level idea:

- signal start of a task
- associate task with a user and session

# Quests: recordLevelStart

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**recordLevelStart**(*questId*, *questDetail*)

- *questId*: An identifying number associated with the level that was just started.
  - If your levels are numbered, just use that number.
- *questDetail*: Optional. Any additional information about the level you would like to be recorded.

# Quests: recordLevelEnd

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High level idea:

- signal end of a task

# Quests: recordLevelEnd

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## **recordLevelEnd():**

- Sends data to the server indicating that a level has ended.
- Call this function each time a level ends.

# Actions: recordAction

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High level idea:

- record an action
- associate it with user, session, and quest

# Actions: recordAction

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**recordEvent**(*actionId*, *actionDetail*):

- Sends data to the server about some event that happened in a level.
- Must be called between **recordLevelStart** and **recordLevelEnd**.
- *actionId*: An identifying number associated with the event that just took place. It's your responsibility to assign numbers to events.
- *actionDetail*: Optional. Any additional information about the event you would like to be recorded.

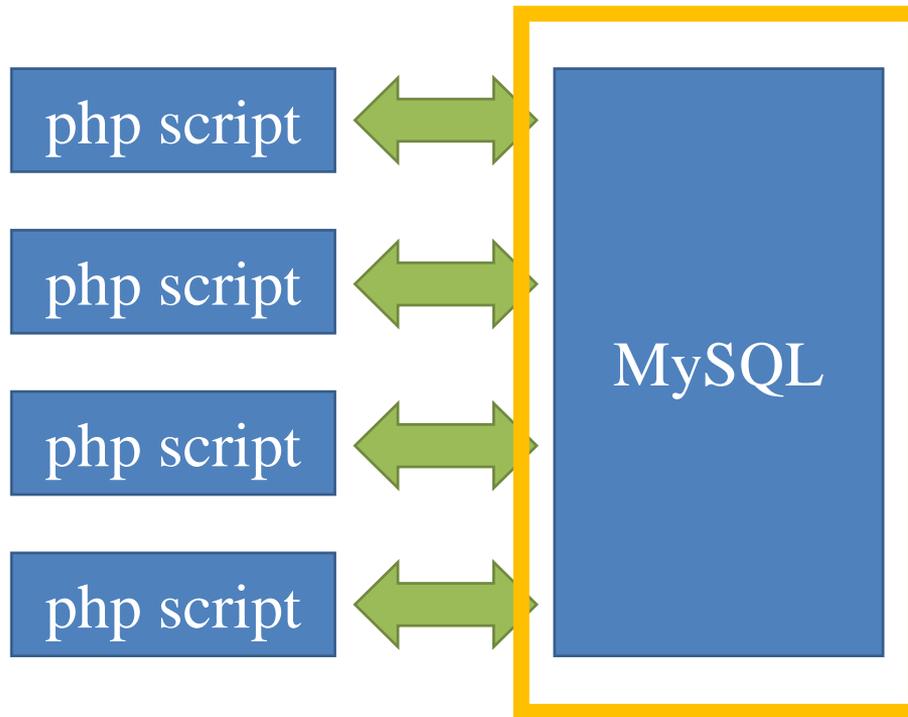
# Outline

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1. Logging data
2. Retrieving data
3. Privacy considerations

# Part 2: Retrieving your data

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# Pulling Data

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- Large JSON object of everything
- CSV file of key metrics
- Direct database access

# CSV data

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Player ID	Levels Completed	Time Played	Returns
1	2	60	0
2	5	120	1
3	2	30	1

# Test thoroughly!

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- Very easy to get something wrong
- Only one chance for each release!

# Outline

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1. Logging data
2. Retrieving data
3. Privacy considerations

# Data collection is everywhere...

The screenshot displays the Amazon.co.uk homepage with several key sections:

- Header:** "amazon.co.uk" logo, personalized greeting "Hello Sam Michel. We have recommendations for you. (Not Sam Michel?)", and navigation links for "Sam's Amazon.co.uk", "Deals of the Week", "Gift Certificates", and "Gifts & Wish L".
- Search Bar:** "Search Amazon.co.uk" with a dropdown menu and "igo everywhere" text.
- Shop All Departments:** A vertical list of categories including Books, Music, DVD & Games, Electronics & Computing, Home & Garden, Toys, Children & Baby, Jewellery & Watches, Shoes & Accessories, Sports & Leisure, and Health & Beauty.
- Recommended for You:** A section featuring three book covers: "Web Database Applications with PHP and MySQL" (price: £34.95 to £23.99), "The Dragon and the Elephant: China..." (price: £15.00 to £11.49), and "JavaScript: The Definitive Guide" (price: £35.50 to £22.99). Each item includes a link to "Why is this recommended for you?" and a "See more recommendations" link.
- Check This Out:** A sidebar section with four promotional items: "Authors in the Spotlight", "Health & Beauty", "Festival CDs Summer Festivals 2008", and "Blu-ray Store".
- What Do Customers Buy After Viewing This Item?:** A section showing cross-selling data for "Temptations 13520 Donut Maker". It indicates that 90% of customers buy the item viewed, 4% buy an alternative, and 3% buy another alternative. Images of the donut maker and alternative products are shown.

At the bottom left, there is a "Done" button with a mouse cursor icon.

# ...but so are ethical challenges

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*The Washington Post*

**Cornell ethics board** did not pre-approve  
**Facebook mood manipulation study**

**theguardian**

Facebook fiasco: was Cornell's study of  
'emotional contagion' an ethics breach?

**PCWorld**

Privacy group files FTC  
complaint over Facebook's  
'emotional contagion' study

# Milgram Experiment

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# Institutional Review Board

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Cornell University  
Office of Research Integrity and Assurance

# IRB Approval



**Cornell University**  
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Research Integrity and Assurance

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www.irb.cornell.edu

## Institutional Review Board for Human Participants

### Notice of Course Activity Approval

**To:** Erik Andersen  
**Date:** September 05, 2014  
**Protocol ID#:** 1408004901  
**Protocol Title:** CS-4154

The above referenced Course Activity Project was reviewed by Cornell's Human Research Protection Program (HRPP) and approved for the inclusion of human participants in class assignments. This approval does NOT cover students doing research for theses, dissertations, journal articles, public presentations, or other forms of dissemination of research findings. Students who wish to conduct research projects that require the individual student to complete his or her own Initial Approval Request form before beginning recruitment and data collection.

You or your students must ensure that the welfare of the research participants is protected and that methods used and information provided to gain subject consent are appropriate to the activity. You and your students should familiarize yourself with and conduct the research in accordance with the ethical standards of the Belmont Report: <http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html>

Please give a photocopy of this approval notice to each student in your class who will be conducting a human participant research project. Acceptance of these terms by students constitutes an understanding that data collection (and allusions to conclusions drawn from these data) from the project(s) covered solely by this approval may never be used for theses, dissertations, articles, or public presentations.

If you have any questions, please contact the IRB office at [irbhp@cornell.edu](mailto:irbhp@cornell.edu) or 254-5162.

# Don't publish data

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## An Unbalanced Study of Unbalanced Data versus *balanced*

An honors thesis study of the fulfillment of the  
requirements of

Director of Science

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# No identifiable data

---



# IRB Approval

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# Requirement: Privacy Policy

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# What this means for you

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- Do not
  - record identifiable information
  - give data to anyone outside the class
  - discuss your data or analysis in
    - public presentations
    - theses
    - journal articles
    - conference papers