COSC 419: Mobile Educational Game Development

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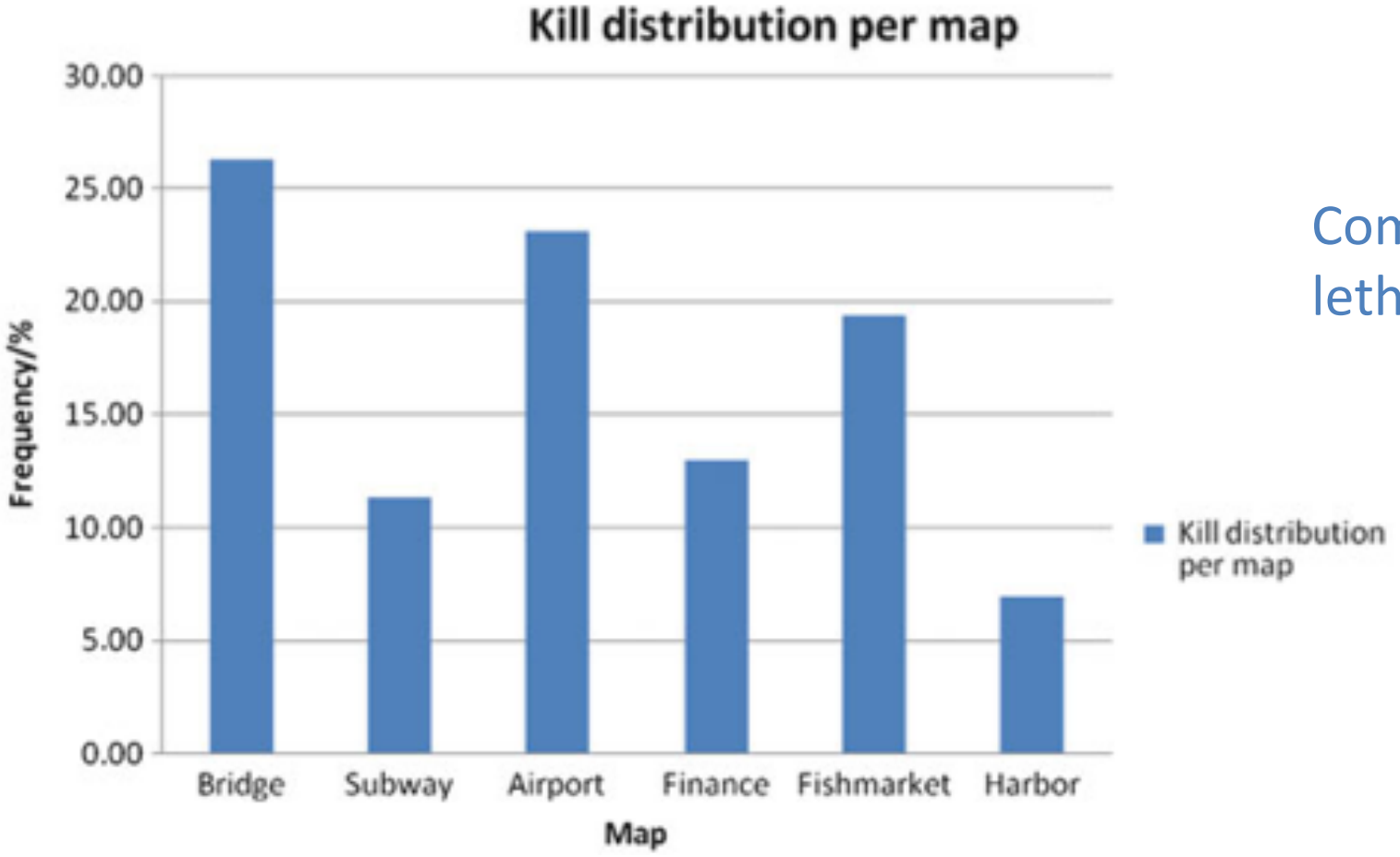
Game Metrics

- What can you learn from game metrics?

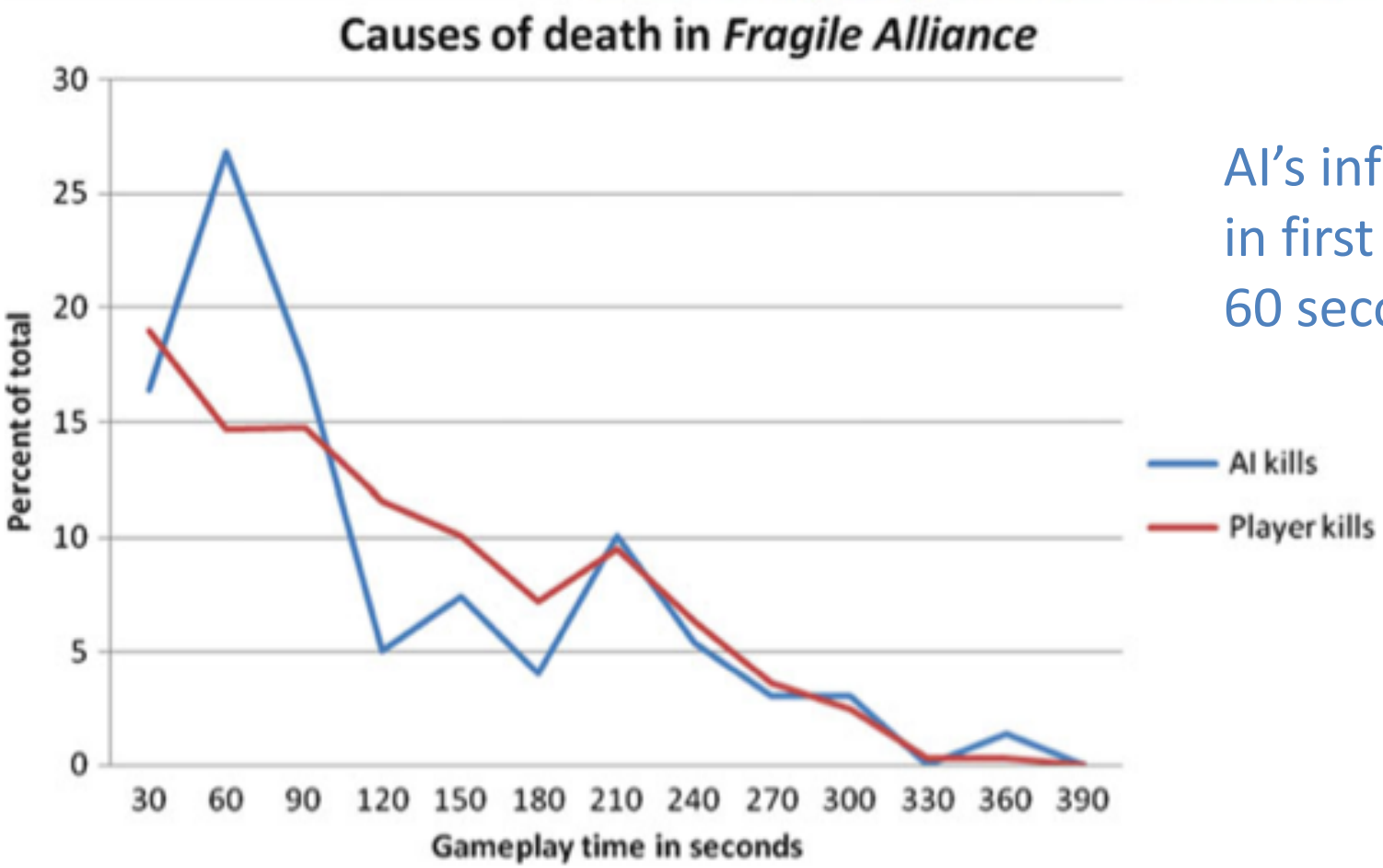
- Once you have the metrics in place …
  - What kind of data to collect?
  - How to analyze data?

Multiplayer Shooter Game: Fragile Alliance 2



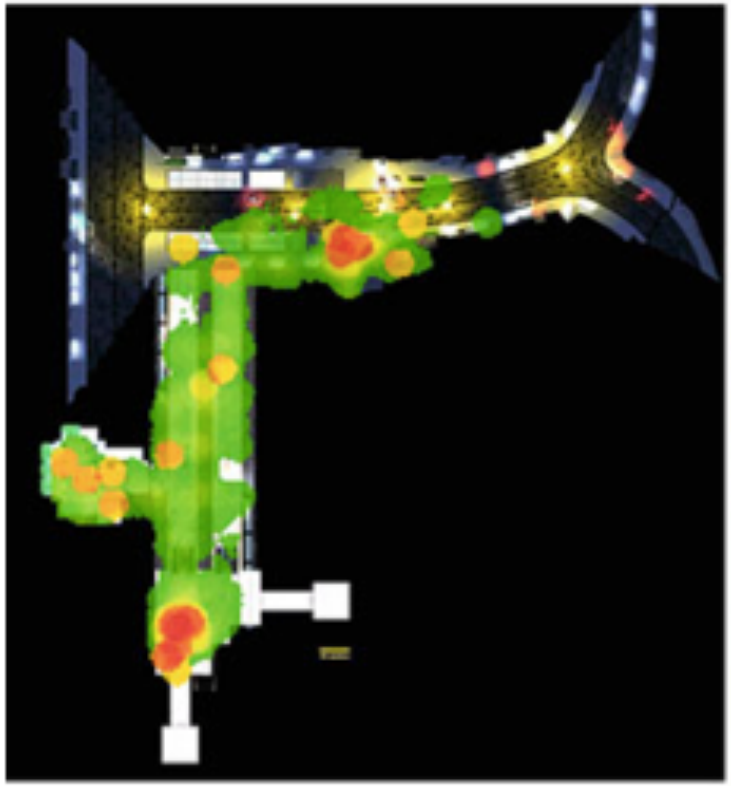
Compares lethality

Multiplayer Shooter Game: Fragile Alliance 2

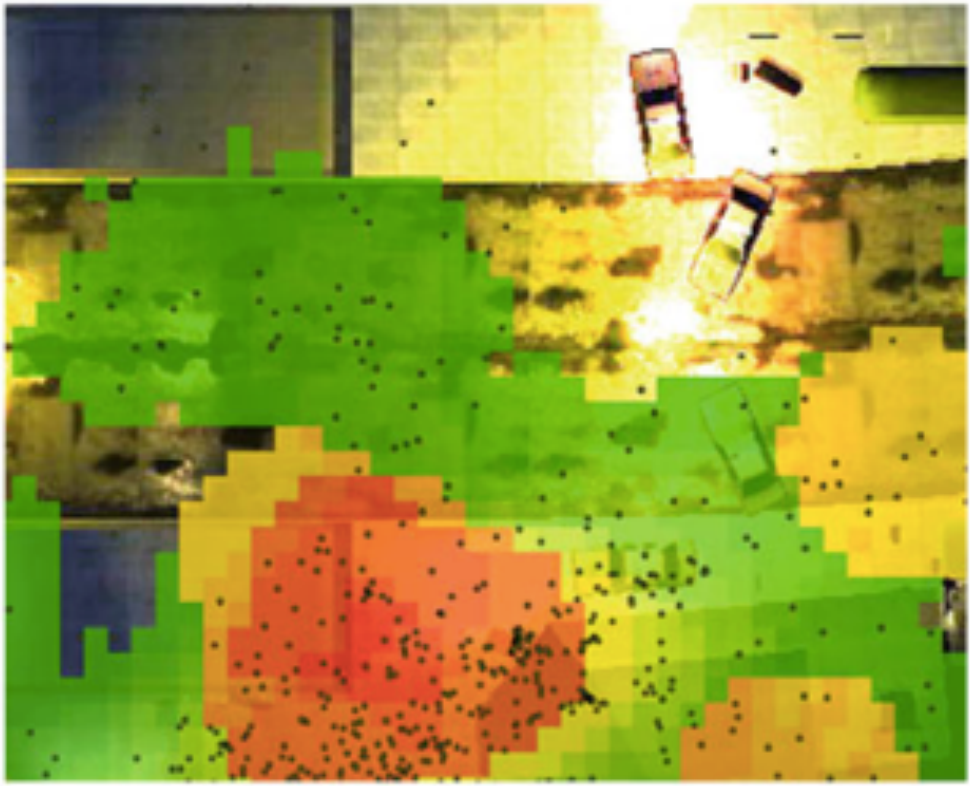


AI's influence in first 60 seconds

Multiplayer Shooter Game: Fragile Alliance 2

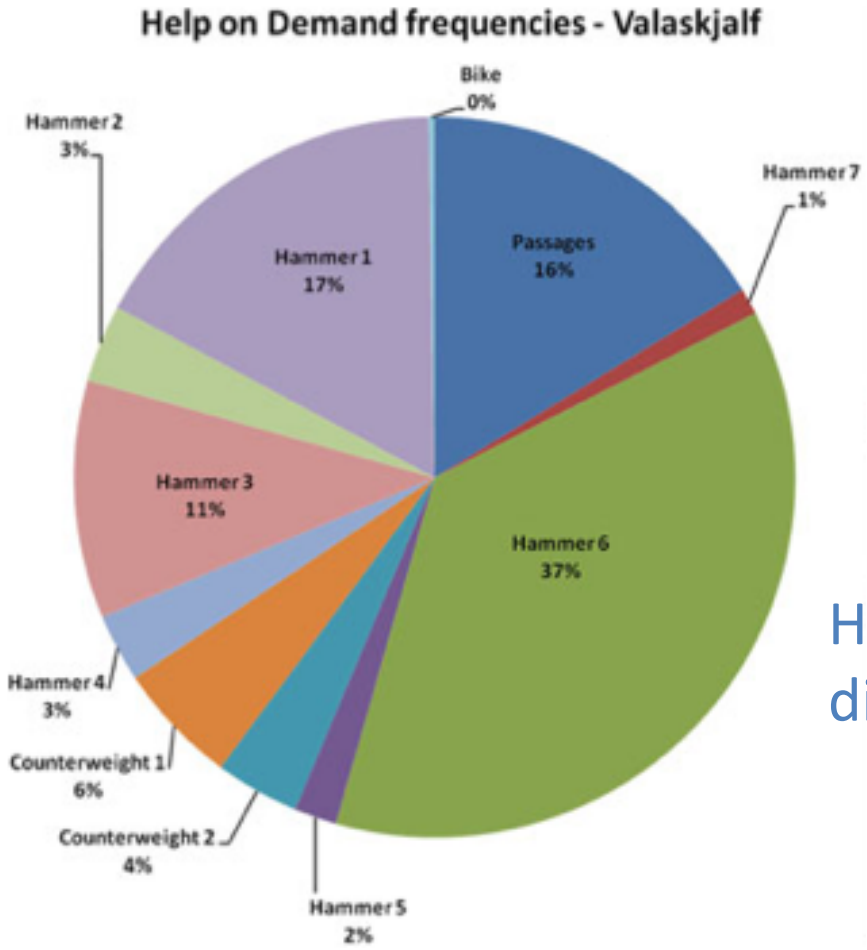


Subway map: overview



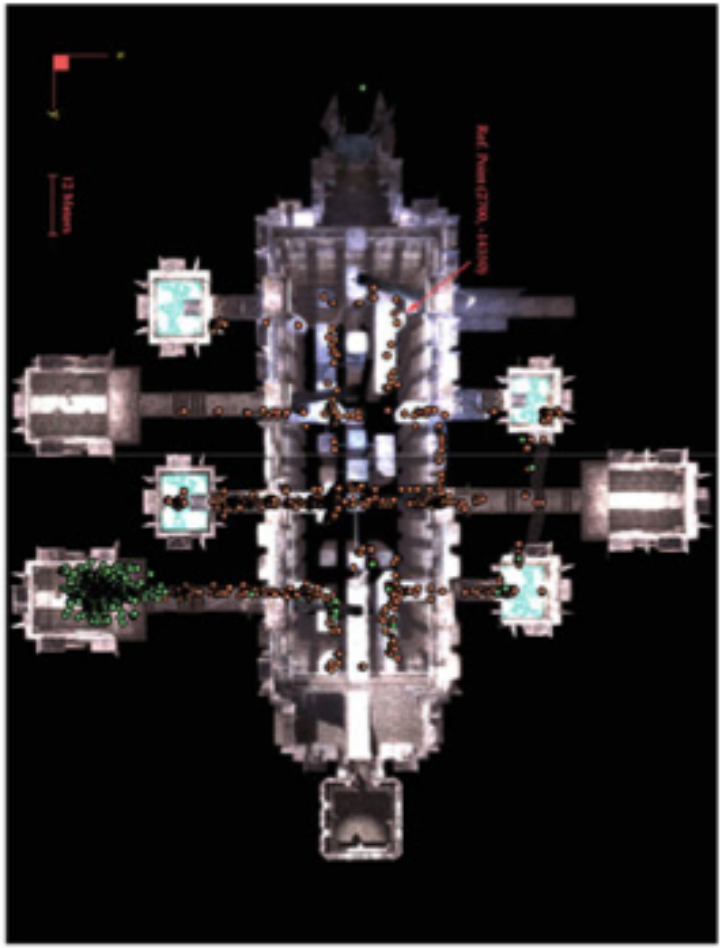
Subway map: close up

Tomb Raider: Underworld



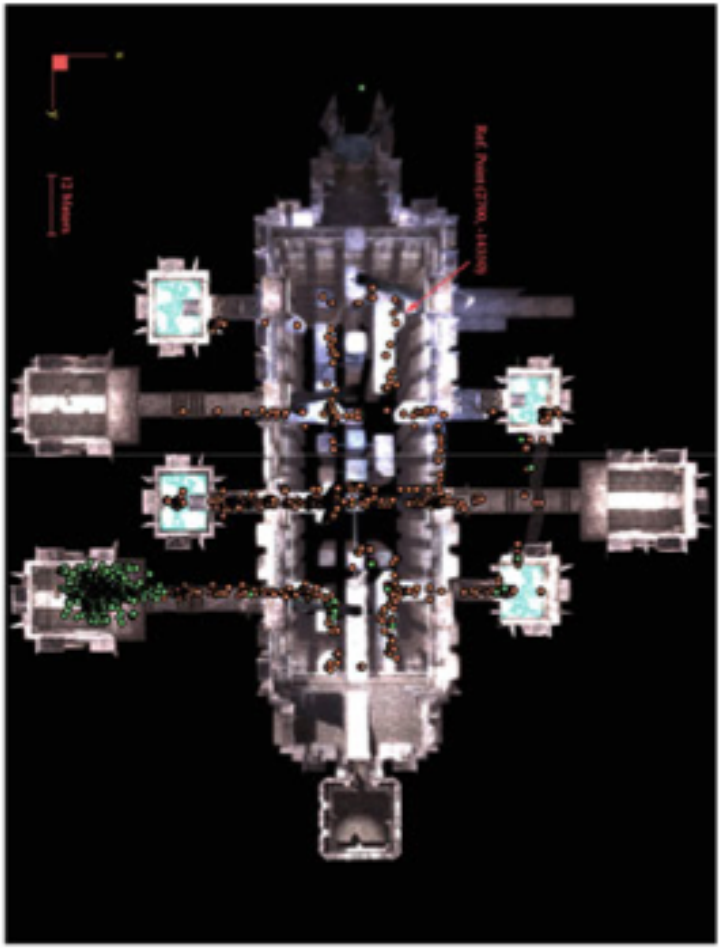
Help requests for different puzzles

Tomb Raider: Underworld

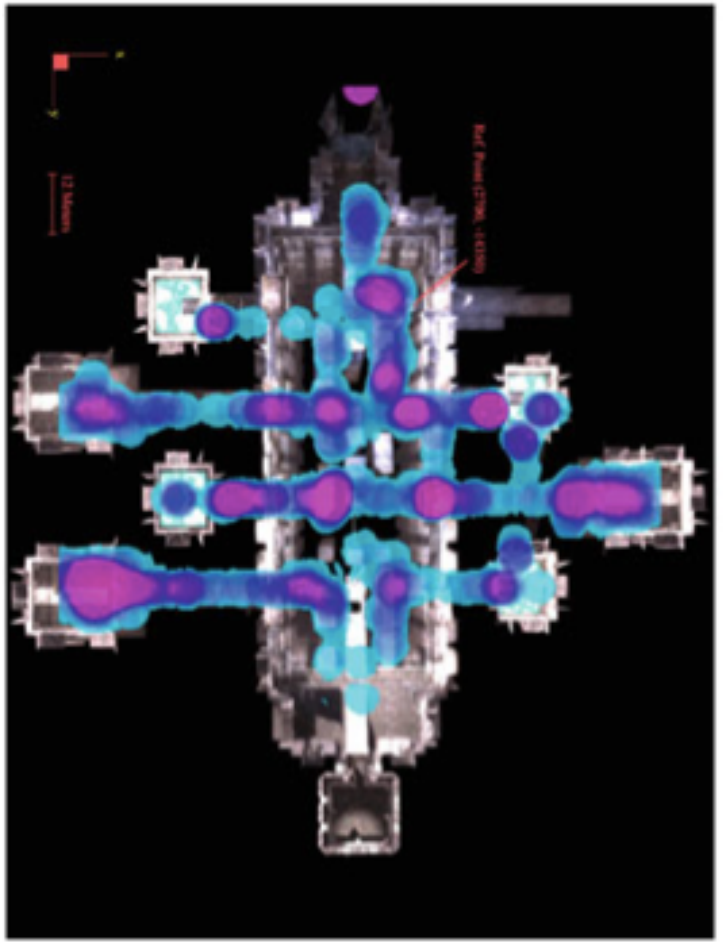


Positions when help was asked

Tomb Raider: Underworld



Correlate to death events?



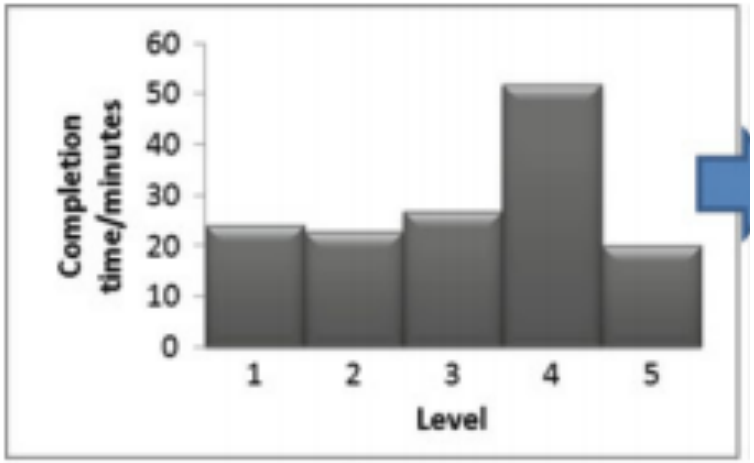
Explorative vs. Hypothesis-Driven

- Not to be confused with hypothesis testing

- Explorative:
  - See what the data can tell you

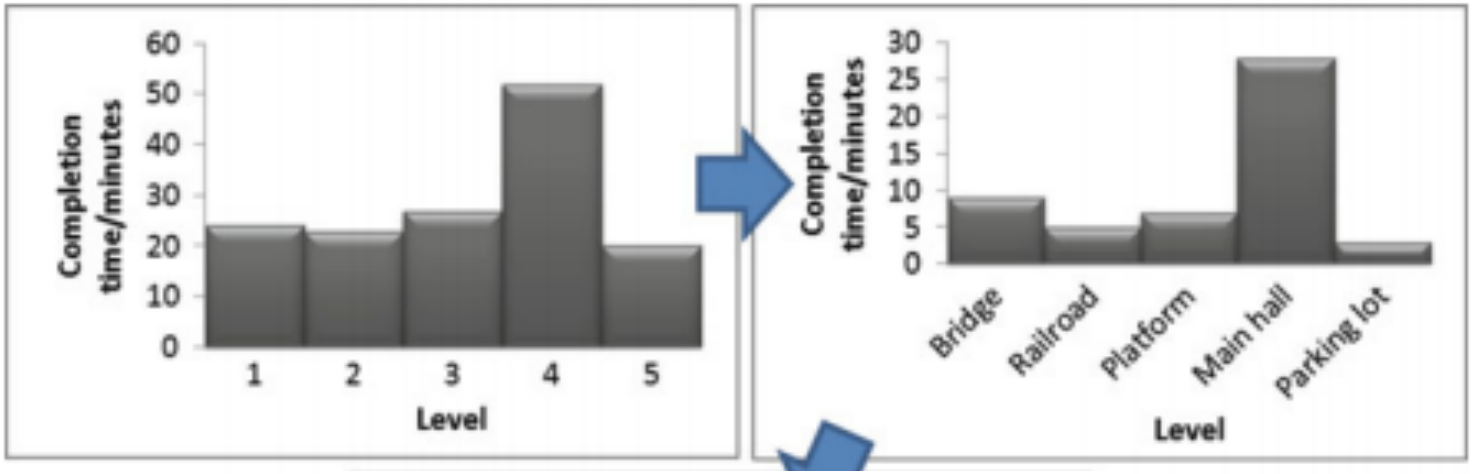
- Hypothesis-driven:
  - See how the data answers your question

Explorative Example



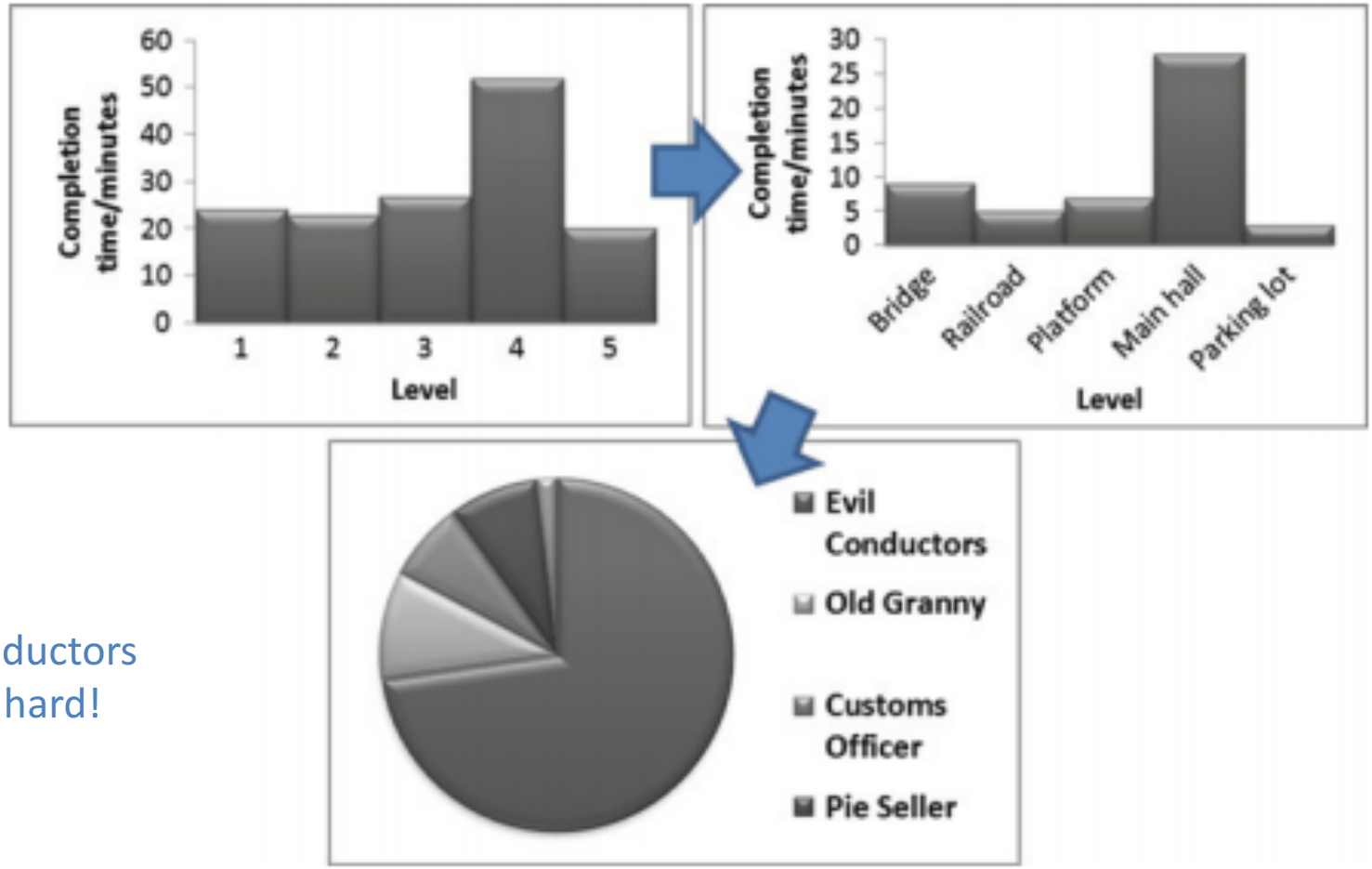
unintended design:
level 4 takes too long

Explorative Example



drill down into level 4:
problem in main hall

Explorative Example



evil conductors are too hard!

Case 1: Weapon usage metrics in Kane & Lynch: Dog Days

- Explorative approach: how weapon attributes affect player behaviour?

- Short range weapons
  - Drive players forward if enemies are far away
  - More intense experience

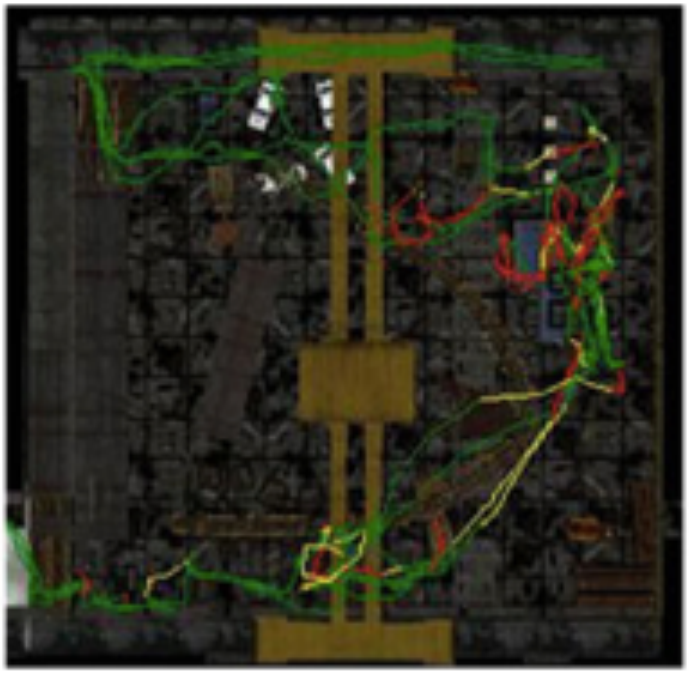
- Long range weapons
  - Sniper-like effect
  - Less roaming behaviour
  - Gives marksman-like experience

Fig. 14.3: Green dots are the player positions at the time killing shots were made; the *colored lines* represent the lines of fire (different colors are different weapons), and *red dots* are locations of enemies at the time of death

Sector 1

Fig. 14.4: (left) location vs. health
green is strong
red is close to death

Fig. 14.4: (right) locations of death



Sector 1:

- player under more pressure
- more deaths

Sector 1 (top)
vs.
Sector 2 (bottom)

Deriving Analysis Metrics

- Create kills/location ratio
  - If k/l is high, then experience is more like Sector 1
- Add kill distance metric
  - If long distances, then more sniper-like experiences
- Further analysis and data collection to confirm these relationships

Case 2: Gameplay analysis in Fragile Alliance 2

- Hypothesis-driven: did players die in the right locations with the right frequencies as intended by the design?

- Mercenaries try to steal $, cops (AI bots and players) try to catch them, mercenaries can kill each other (to steal $) and become traitors

- Focus data analysis on death events: where, when, why

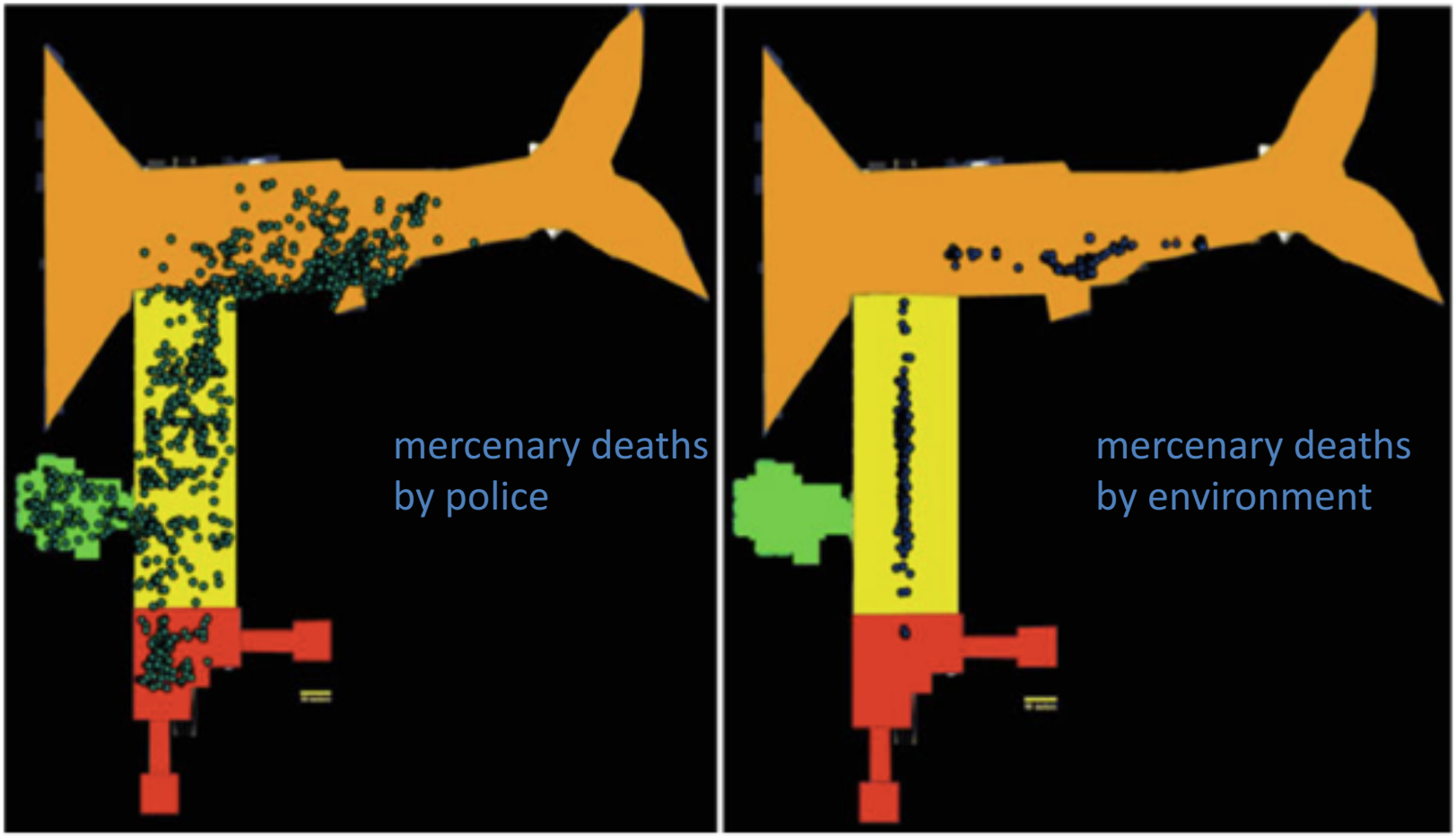


Fig. 14.8: The “Subway” map divided as: *Red* = spawning area for mercenary players; *Yellow* = subway; *Green* = vault area; *Orange* = road/exit area (+ spawning area for police. (*left*): The locations where police officers were the cause of death. A broad distribution is apparent indicating that AI police officers can reach the entire map.
(*right*): Locations of environment-caused death events. Y*ellow* sector events are caused by players being run over by a subway train while crossing a set of tracks, while the orange sector events are caused by exploding scenery (e.g. cars that explode).

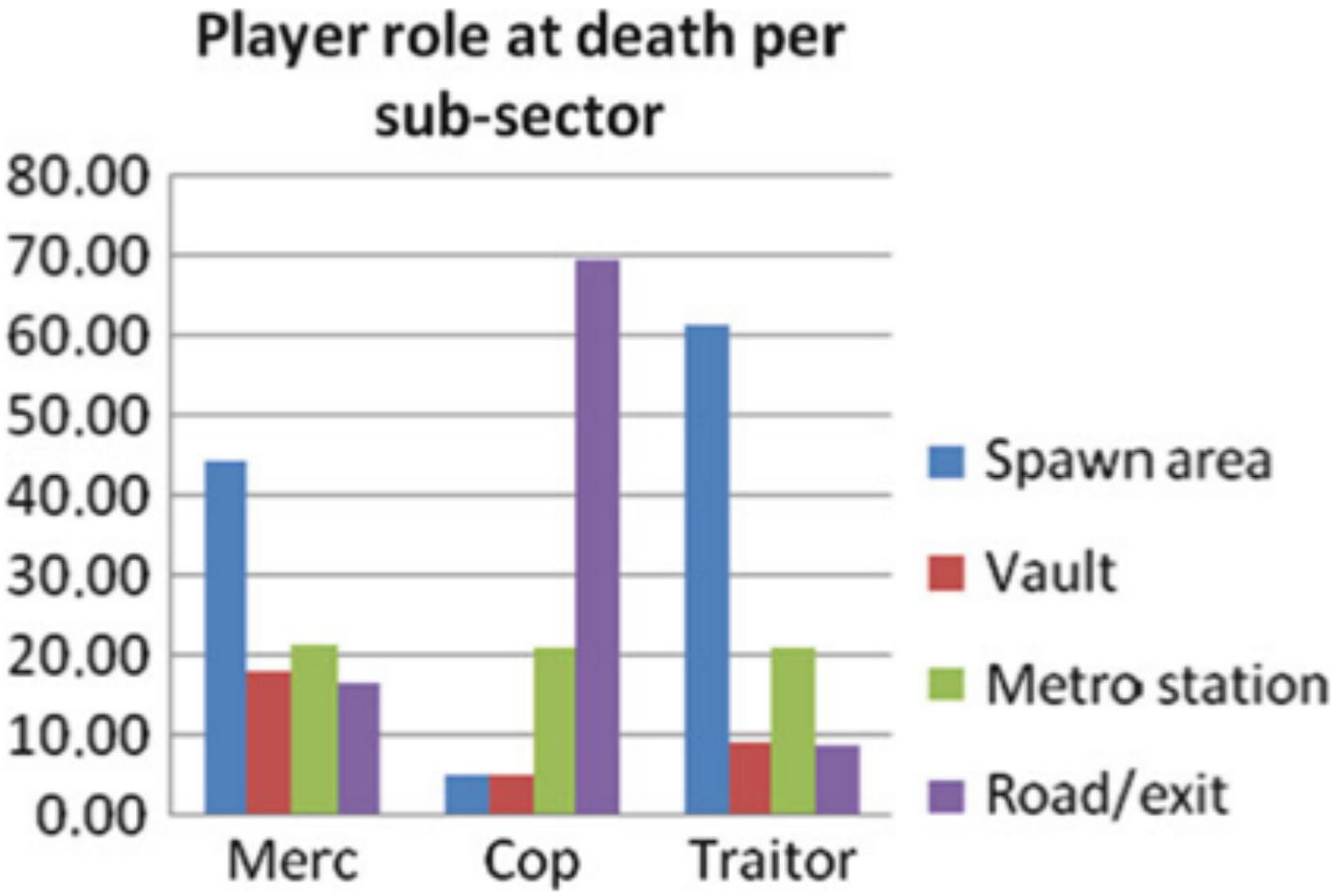


Fig. 14.10:

- Merc mostly killed at beginning but spread throughout the map
- Cop mostly killed at exit (where they enter), some cops penetrate to beginning
- Traitor mostly killed at beginning (unexpected)

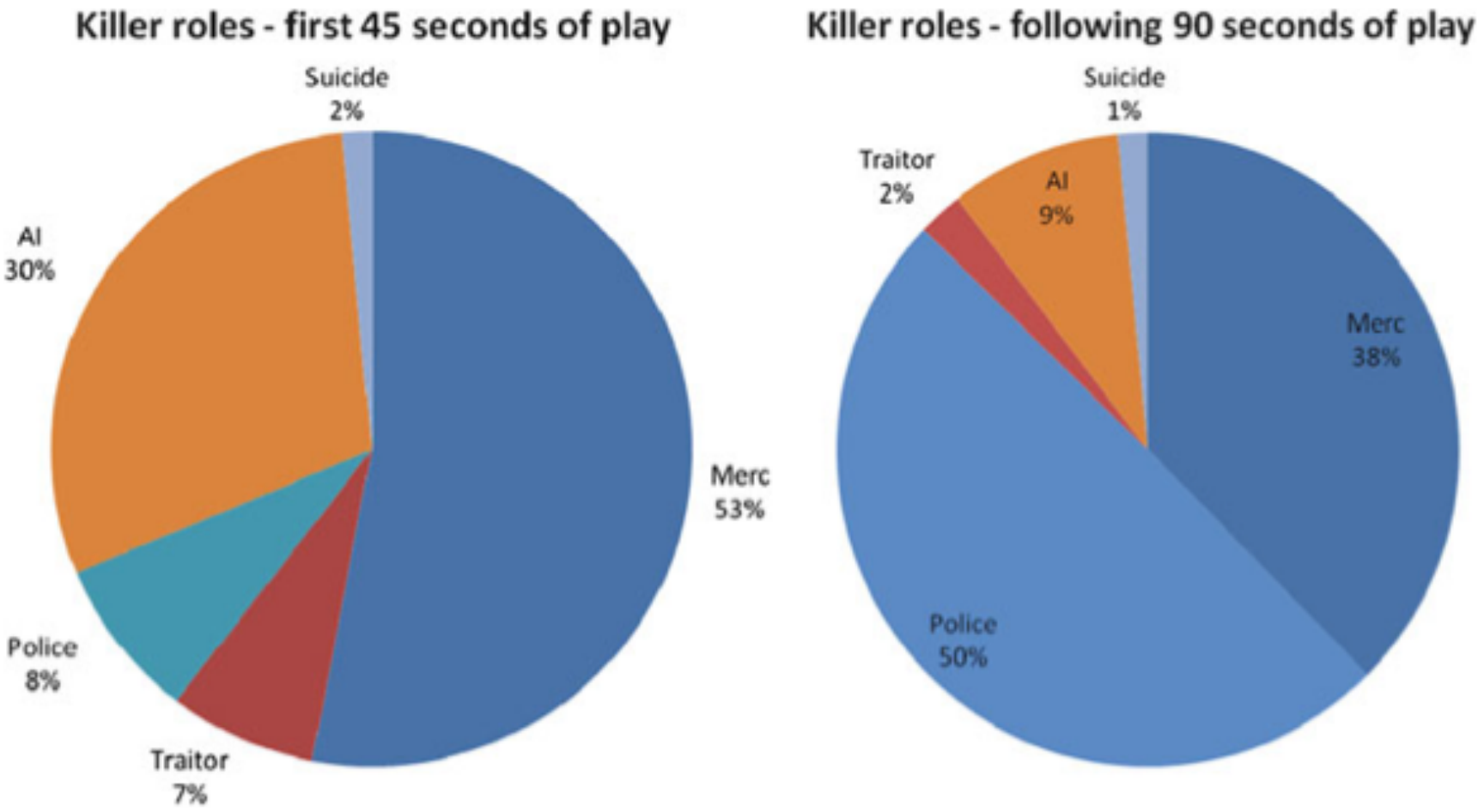


Fig. 14.11:

- how shift in power manifests
- mercenaries are initially powerful (when they die, they become police players)
- comparison of dominant kills across time

Alternative view: line graph of kills per role over time
can see when power “crosses over”

Case 3: Frustration analysis in Kane & Lynch: Dog Days

- Explorative approach
- Frustration:
  - Groaning, throwing the controller away, agitated, angry, etc.

- Tries to identify which behaviours led to exhibited frustration

- Problem:
  - Relationship between observable behaviours and hidden variables (causes)
  - Solution: Couple metrics analysis with user playtesting and questionnaires

Initial Analysis

- Use insights from one frustrated player
  - Video recording, game activity, in-person feedback
- Exhibited behaviour include:
  - Body movements, facial expressions, verbalizations
- Corresponding game behaviour:
  - Inability to advance (e.g., repeated deaths in same location)

Fig. 14.14 Visualization of the spatial behavior of a player through the environment of a *Kane & Lynch: Dog Days* level, between two death events. The location of the player is plotted at each second of playtime, and a color scale applied to show the dimension of time along the path. Various events are plotted as symbols: enemy kills (*blue dots*), weapon pickups (*red triangle*) and taking cover (*green squares*). Spatial metrics visualizations such as this one are highly useful for the

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Possible Indicators

- Player dies repeatedly in same location
- Decrease in progress in successive attempt
- Number of enemy kills decreases in successive attempt
- Pace of movement increases in each attempt
- Similar route taken each time
- Minimal use of special abilities or weapon pickups
- Camera angle coincides with character movement (less interest in exploring environment)

Confirming Frustration Indicators

- Sample of 22 players
  - 6 players exhibited similar behaviours
- Follow-up interviews with animated replays to confirm frustration behaviours

Model Creation

- Collectively generalize data to model:
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What about the other players?

Six Myths about Game Metrics

- 1. With game data mining, we can fire our designers and testers!

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- Wrong!
  - Mining is incredibly useful for evaluating design
  - But data cannot tell us what good design is, or how users feel, or what makes a good game experience

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- Wrong!
  - Results compliment each other, not replace
  - Each have different advantages

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- Wrong!
  - Analytics is a process
  - Need to identify goal, problems, relevant patterns, possible indicators, combined use of other info sources, etc.
  - Results require interpretation

Six Myths about Game Metrics

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- Maybe!
  - Depends on the problems identified
  - Investment to develop or purchase game analytic tools can be costly

Six Myths about Game Metrics

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- Wrong!
  - Game data can uncover patterns of behaviour: both game play and business oriented patterns
  - Patterns still require human interpretation
  - Still need to identify (and possibly fix) causes of patterns

Six Myths about Game Metrics

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- Wrong!
  - Need the *right* data
  - Don’t waste resources
  - Too much data = shooting in the dark