



GAM130 Assets, Rules & Story: Group Project

Game Analytics

What is analytics?



A rhetorical question

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- ▶ What **questions** could you answer about your game?

A rhetorical question

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- ▶ You can alter your game's code to **measure** things about how players play and **report** them back to you
- ▶ What **questions** could you answer about your game?
- ▶ How could these answers make your game more **enjoyable** and/or **profitable**?

Analytics

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- ▶ Related terms: data mining, data science, big data,

...

Why analytics?

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- ▶ Games can easily **collect data** and send it back to developers
- ▶ Bandwidth, storage, compute time are **cheap**
- ▶ Analytics can take the **guesswork** out of many game design and business decisions

Feedback loops

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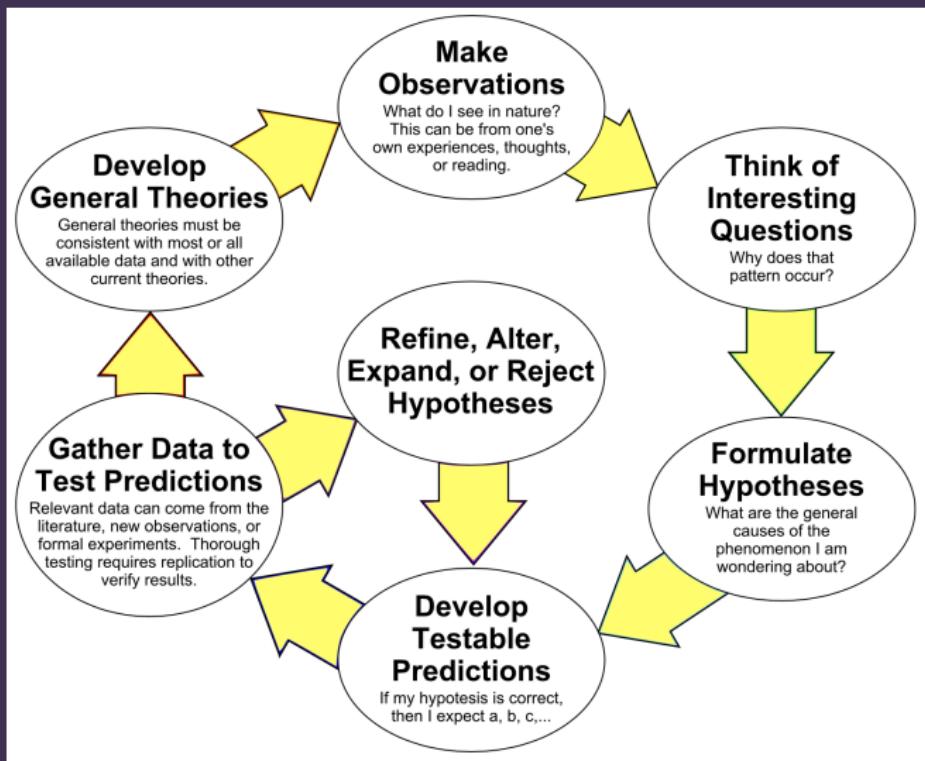
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- ▶ The **build-measure-learn** cycle

Analysing data



The scientific method



Statistical significance

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- ▶ You roll it 6,000,000 times and it comes up a six 1,100,000 times?

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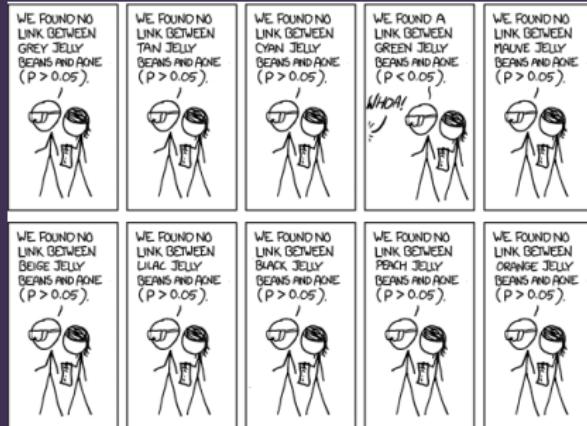
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- ▶ Know your **confidence intervals**
- ▶ Beware of ***p*-value fishing**



Statistical significance vs effect size

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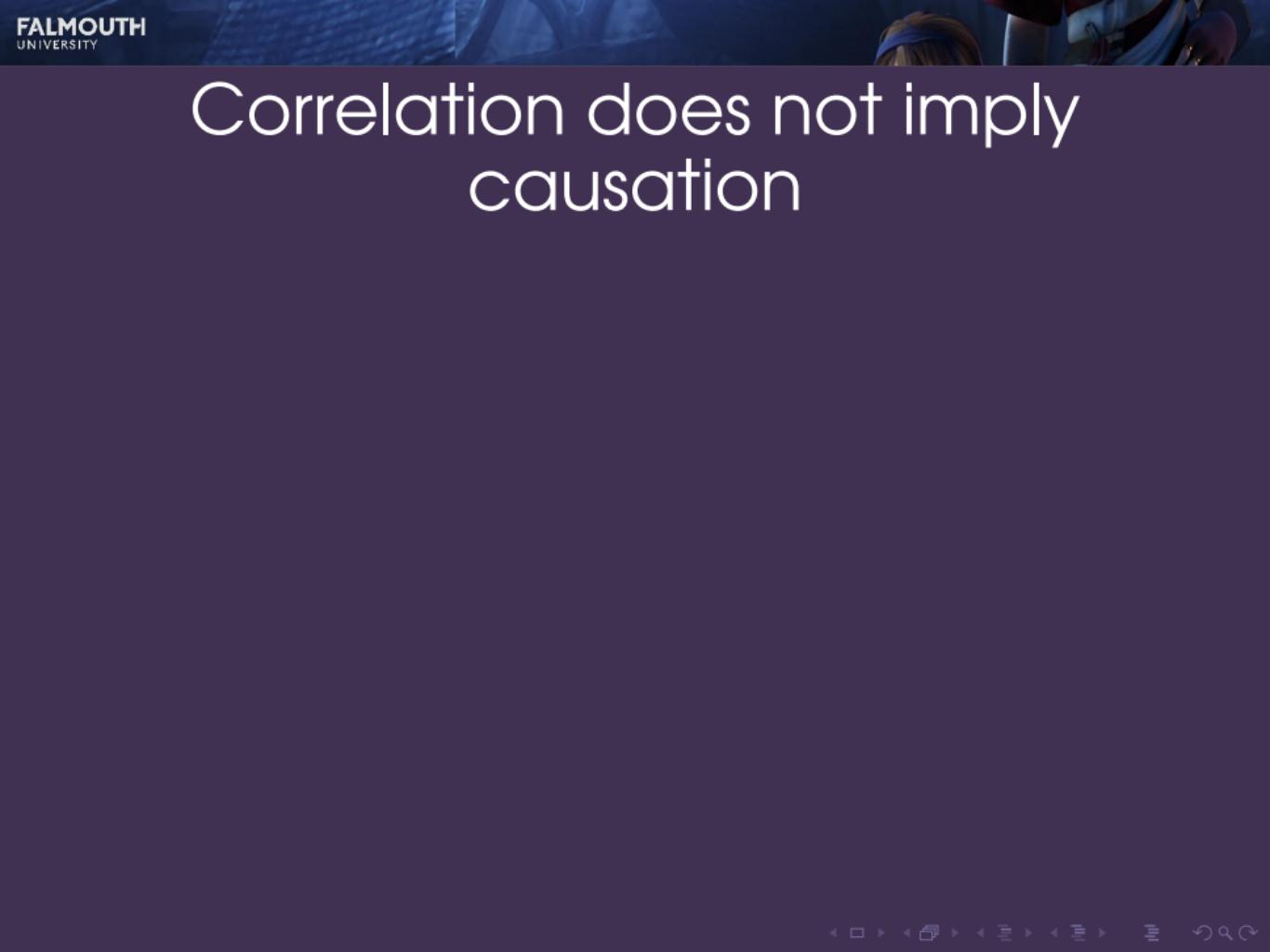
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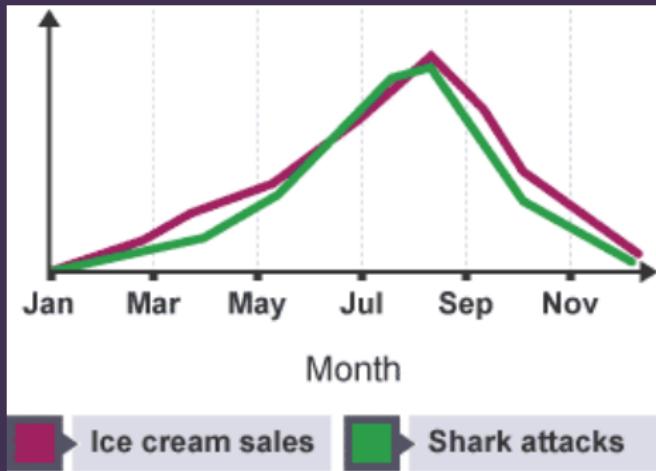
Statistical significance vs effect size

- ▶ High statistical significance does not always mean large **effect size**
- ▶ E.g. red team wins 5,010,000 matches out of 10,000,000
- ▶ This is statistically significant, but only a 0.1% effect size

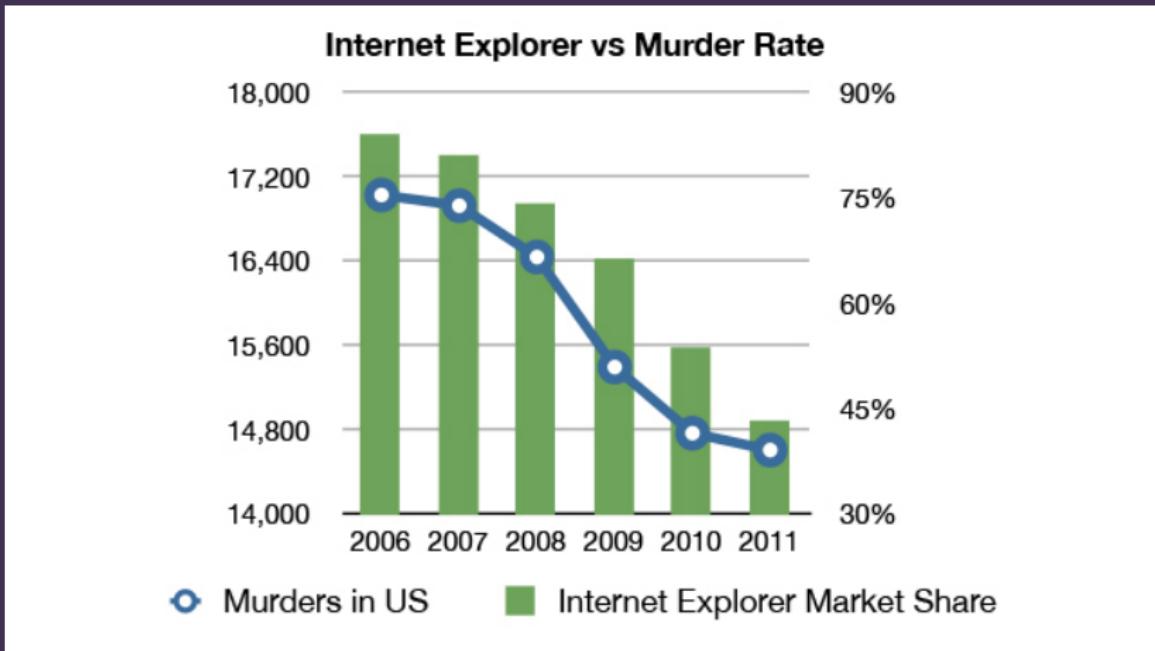


Correlation does not imply causation

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Data-driven decision making





<https://youtu.be/HQwL6zh7AgA>
[http://media.steampowered.com/apps/
steamdevdays/slides/data.pdf](http://media.steampowered.com/apps/steamdevdays/slides/data.pdf)

Decision making at Valve

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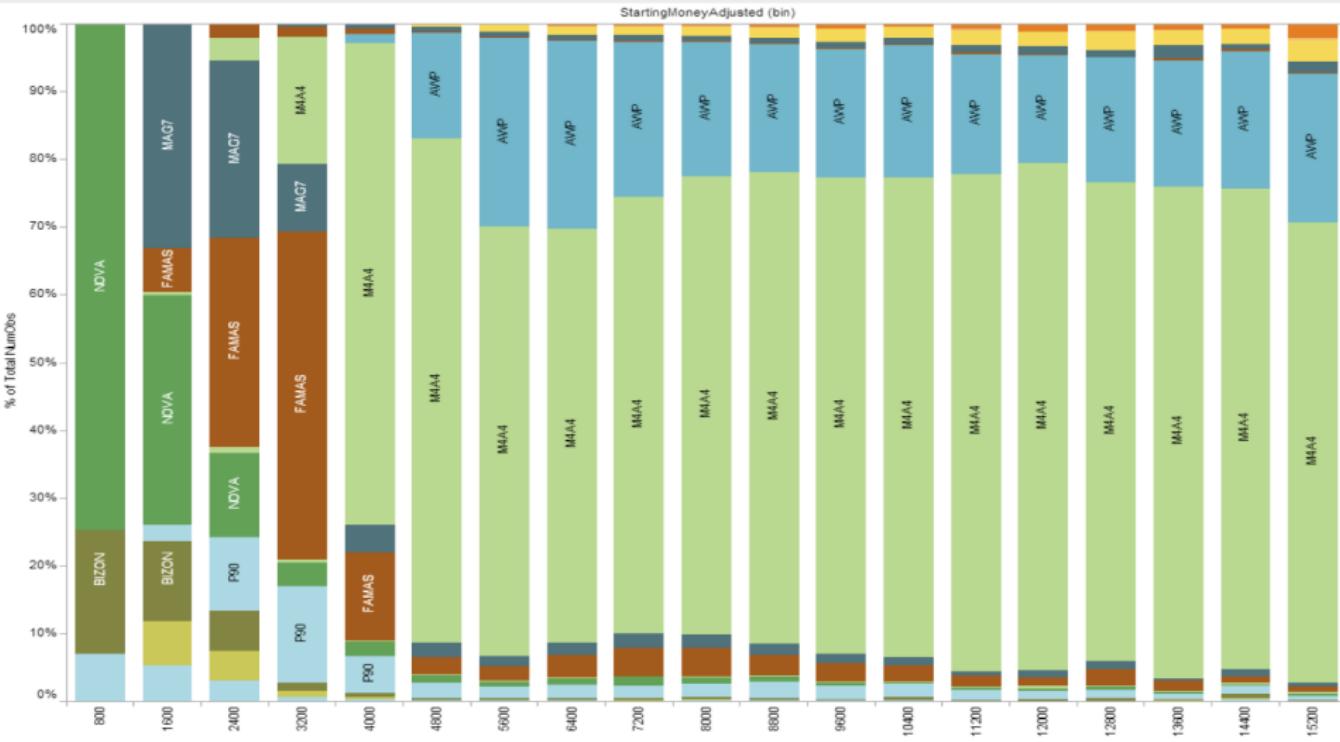
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 - ▶ Use the data to develop a **theory**
 - ▶ Define **measurable outcomes**
 - ▶ **Iterate**

Weapon Purchases by Budget

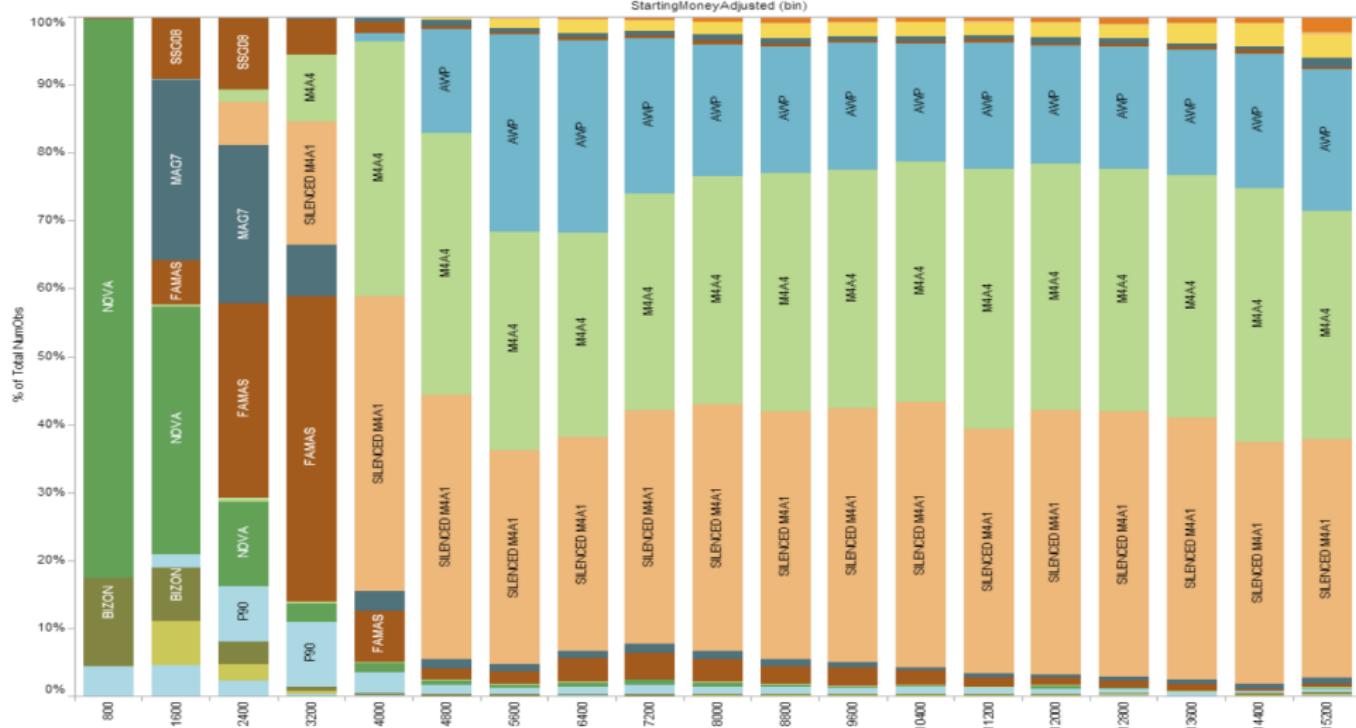


Weapon Balance

- Explicit: M4A4 usage is high; few choices in late-game
- Data-driven: Purchase rates
- Theory-driven: Greater tactical choice → Player retention
- Measurements: Purchase rates, playtime, efficacy
- Iterative: Inform future design choices

Hypothesis: Creating a balanced alternative weapon will increase player choice and playtime

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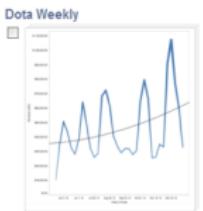
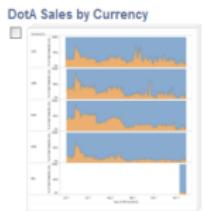
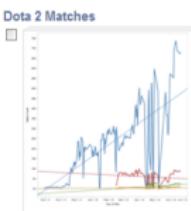
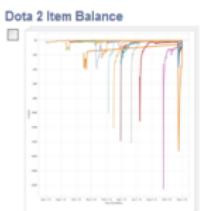
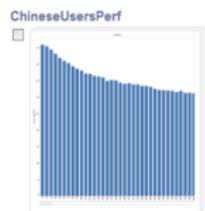
Results

- ~ 50/50 split between new and old favorites
- Increase in playtime
 - Conflated with other updates
 - Difficult to isolate
- Open question as to whether or not increased weapon variability increases player retention

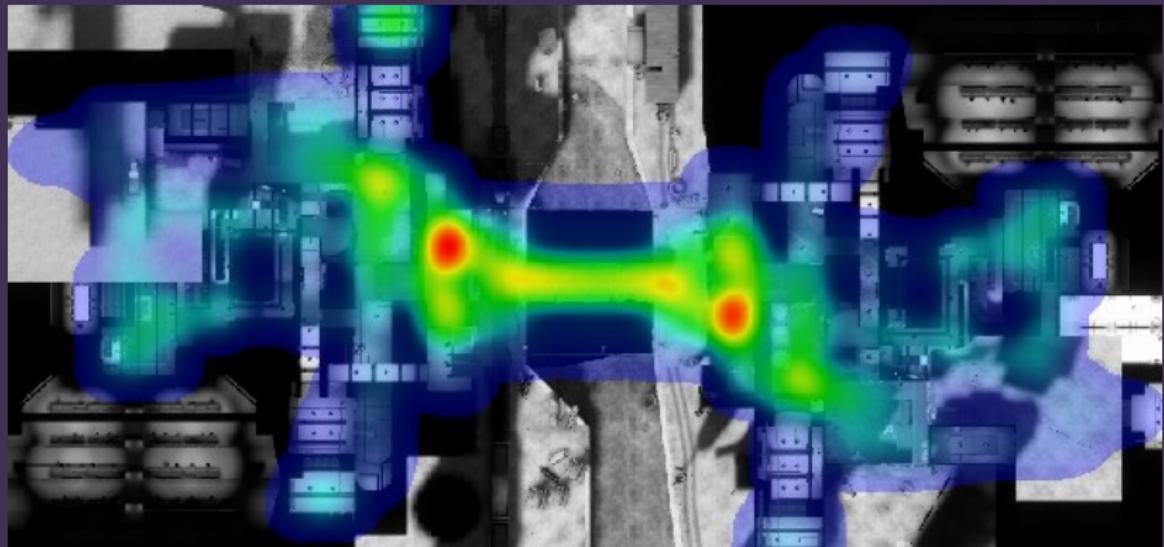
Data visualisation



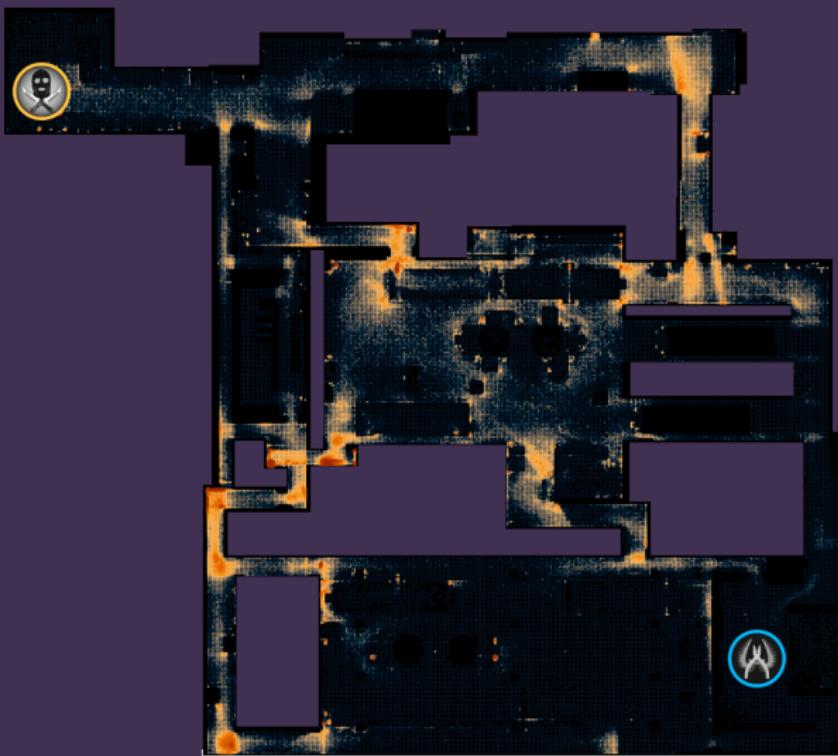
ValveStats



Player deaths in Team Fortress 2



Weapon fire locations in CS:GO



Data visualisation

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- ▶ Humans are good at seeing **patterns**
- ▶ Good data visualisation can help to spot patterns
- ▶ ... However this should be followed up by proper statistical analysis!

Psychology





<http://gdcvault.com/play/1017940/>

The-Science-Behind-Shaping-Player

<https://backchannel.com/>

inside-the-largest-virtual-psychology-lab-in-the-world
.e63is9hkl

Priming

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- ▶ How do you pronounce this word: S - H - O - P?

Priming

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- ▶ What do you do at a green traffic light?

A/B testing

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- ▶ Measure over different groups to compare effects of changes

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- ▶ Push **different versions** of your game to different groups of players
- ▶ Measure over different groups to compare effects of changes
- ▶ Not restricted to two versions

Priming in League of Legends

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Priming in League of Legends

- ▶ **Hint text** on loading screen and/or in-game
- ▶ “X% of players punished by the Tribunal improve their behaviour and are never punished again”
- ▶ Led to a **6% decrease** in verbal abuse and offensive language

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- ▶ “Teammates perform worse if you harass them after a mistake”

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- ▶ “Who will be the most sportsmanlike player in the game?”

Priming in League of Legends

- ▶ “Who will be the most sportsmanlike player in the game?”
- ▶ → **15% increase** in offensive language

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- ▶ ... and impossible at this scale (**millions** of participants)
- ▶ Results have a **measurable positive impact** on player experience

Monetisation



Metrics of monetisation

<http://www.nicholaslovell.com>

<https://www.appboy.com/blog/>

[essential-mobile-app-metrics-formulas/](#)

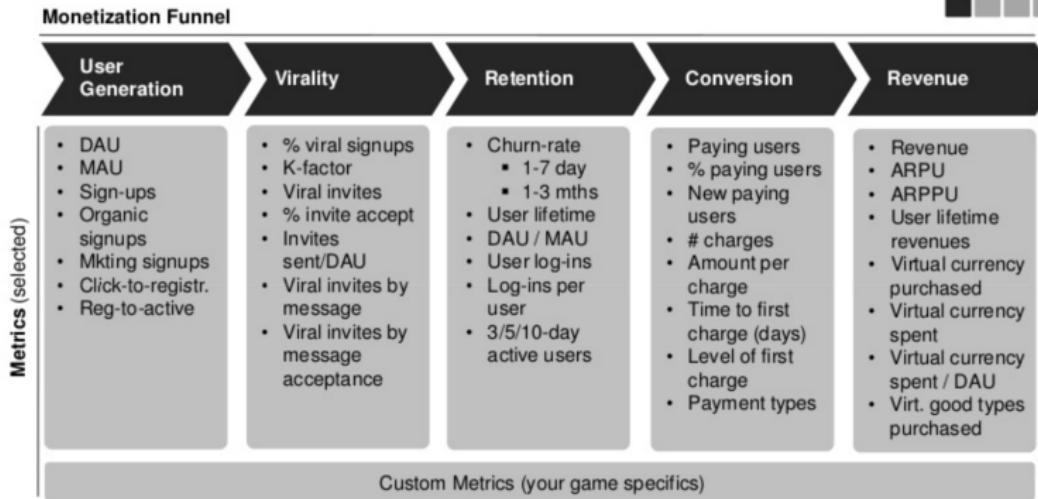
<https://www.slideshare.net/TomSente/>

[game-monetization-analytics-how-to-use-your-game-me](#)



Game Analytics

Metrics along the entire monetization funnel



-
- Track metrics along the entire monetization funnel
 - Both standard metrics and game-specific metrics matter

Metrics of monetisation

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- ▶ LTV = life-time value
 - ▶ How much each player spends over the entire time they continue playing the game
- ▶ CPA = cost per acquisition
 - ▶ How much it costs to get each person playing the game (e.g. advertising)

Stickiness

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- ▶ DAU = daily active users
- ▶ MAU = monthly active users

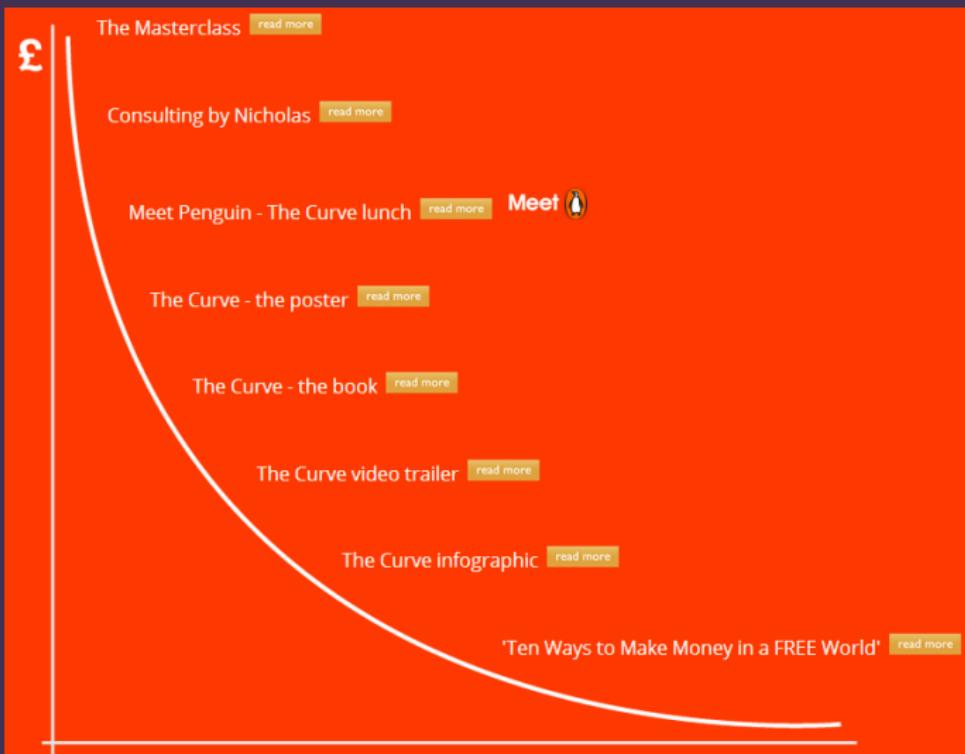
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- ▶ A “sticky” game is one that **keeps players coming back**

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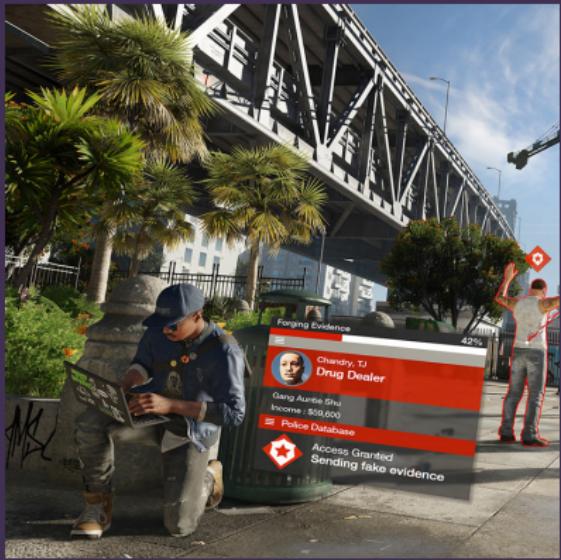
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 - ▶ ... but hopefully still generate word-of-mouth
- ▶ Not just for F2P — also applies to reward tiers in crowdfunding

Ethics of analytics







through our carriers or network service providers.

b. Collection of personal data: In order to provide You with a better game experience, adapted services and Product support, UBISOFT may collect and store data about You in relation to Your use of the Product, Your connection information and/or Your Compatible Mobile Terminal. Certain data is recorded, archived, analysed and used to create user statistics. Your privacy is very important to UBISOFT and UBISOFT will not reveal Your personal data to third parties except when expressly authorised by You to do so or in special circumstances. UBISOFT may be under a duty to disclose or share Your personal data in order to comply with a legal obligation, or in order to protect UBISOFT's rights and those of other users and third parties. This includes exchanging information with other companies and organisations for the purposes of fraud protection and credit risk reduction. In addition, UBISOFT reserves the right to collect, store and use anonymous data about You. For further information concerning UBISOFT's use of Your personal data, please refer to the Privacy Policy.

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4. CONSENT TO MONITOR.

When You are using the Product, the Product may monitor Your hardware random access memory (RAM) for unauthorized third party programs prohibited by Section 1 that interact with the Product. In the

Ethical considerations

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- ▶ What if it improves your **profits** instead / as well?

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- ▶ Not complying can be a **civil and/or criminal offence**

Conclusion

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- ▶ Allows a **scientific** approach to business decisions

