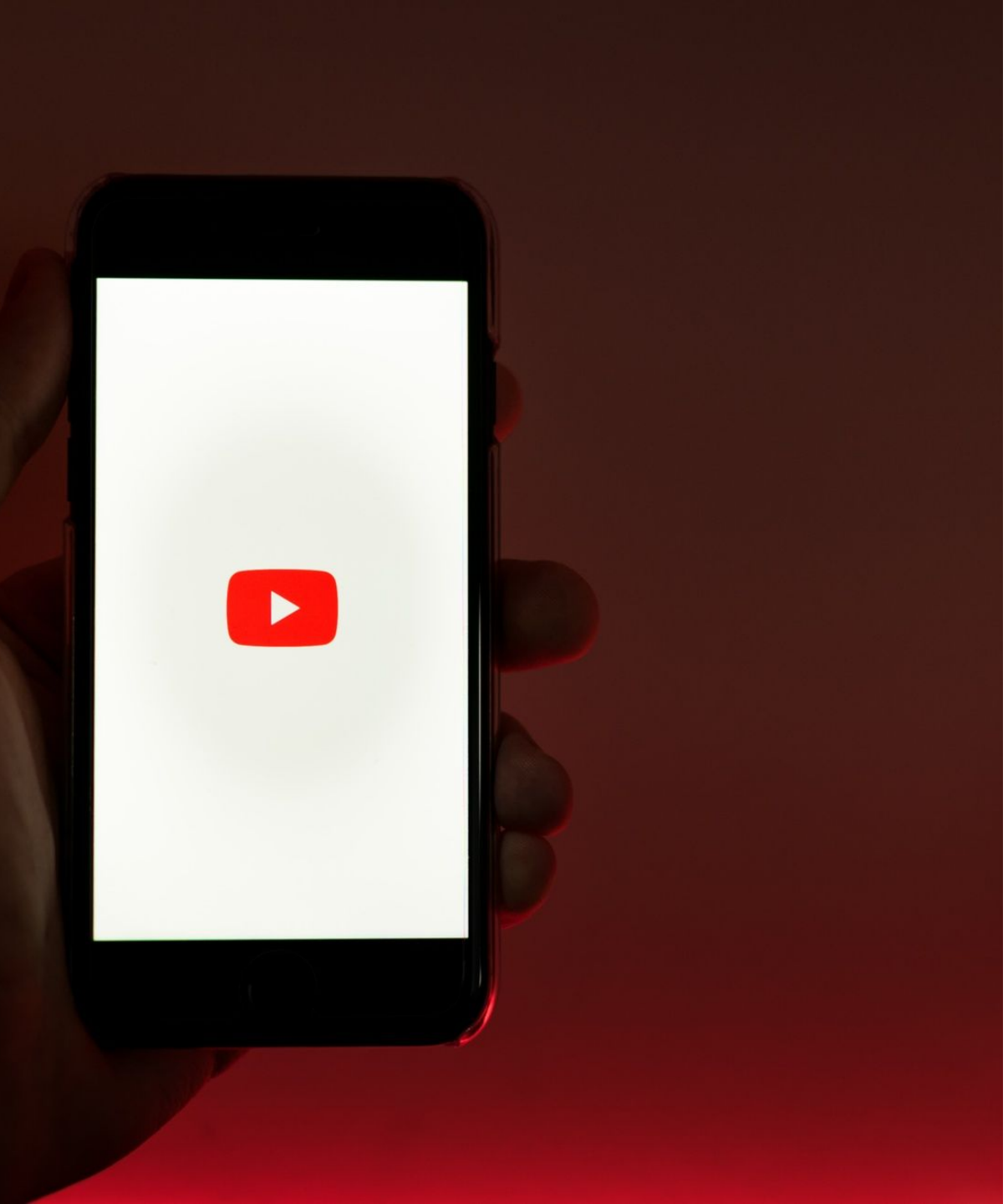


Investigating the Impact of Bitcoin Mentions on YouTube Engagement

Our project investigates viewer engagement in YouTube videos and the effect of comments on engagement and sentiment.

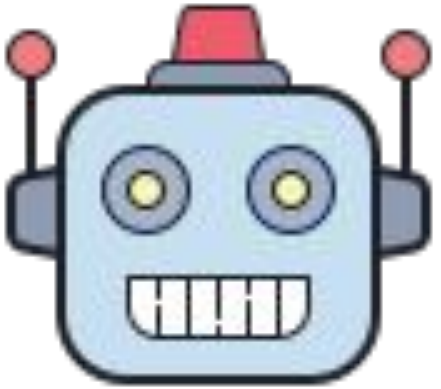
Research Question & Hypothesis

Research question: *Do Youtube videos get increased engagement when comments discuss hot-button topics such as bitcoin.*

A randomized experiment is required because videos on these topics may already have increased engagement and comments with keywords relevant to the controversial issue.

Hypothesis: Adding comments containing the word bitcoin to youtube videos will increase viewer engagement with the video over a short period of time. This effect could be caused by:

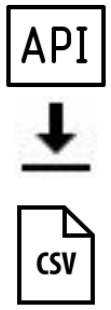
- Bot engagement
- Youtube algorithm
- “Shock” factor



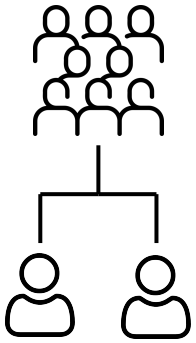
Project Overview

Experimental Methodology - from data collection to analysis

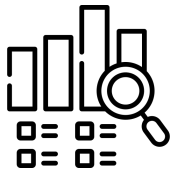
Data Collection → Simple Random Assignment → Pre Treatment → Treatment → Post Treatment → Analysis → Discussion



★ Access YouTube Data API to compile a list of videos

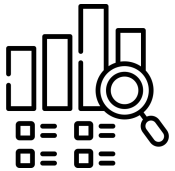


★ Assign to treatment and control groups

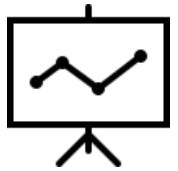


★ Pre-treatment analysis for baseline

★ Inject comments into YouTube videos



★ Post-treatment analysis for data quality

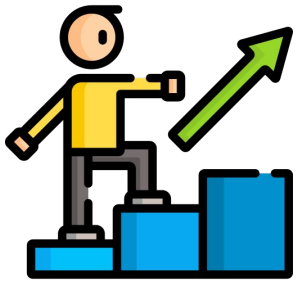


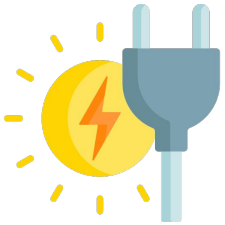
★ Statistical Modeling

★ Interpret results

Experimental Design

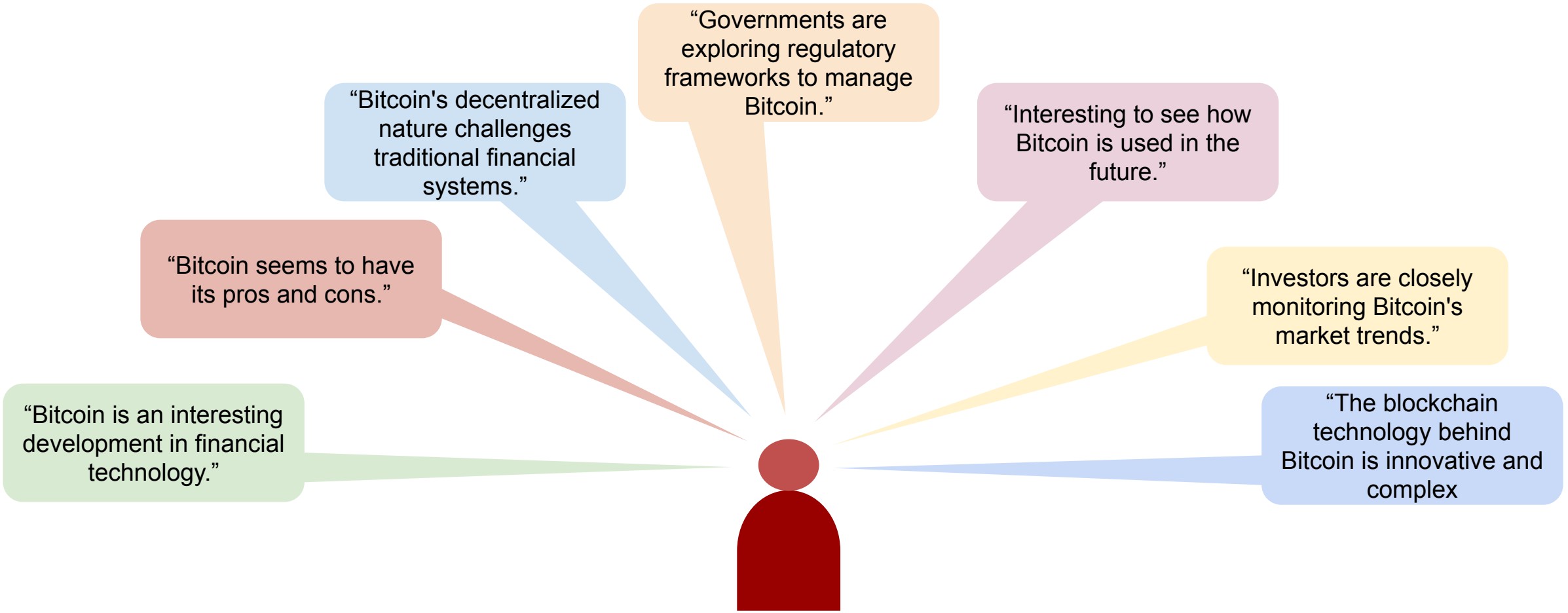
- Randomized Controlled Trial
  - simple random assignment to treatment or control group
- Multi-level Design
  - 7 different treatment conditions
  - 0 variation for control (control didn’t receive comments)





- Power analysis
  - Pilot study conducted to estimate required sample size
- Timeline
  - 1 month (July 2024 - August 2024)
  - 2 weeks treatment intervention (July 14th - July 28th)
  - Analysis (July 29th - Aug 5th)

Treatments



Control group received no comment

Three levels of Randomization

1. **Group Assignment:**

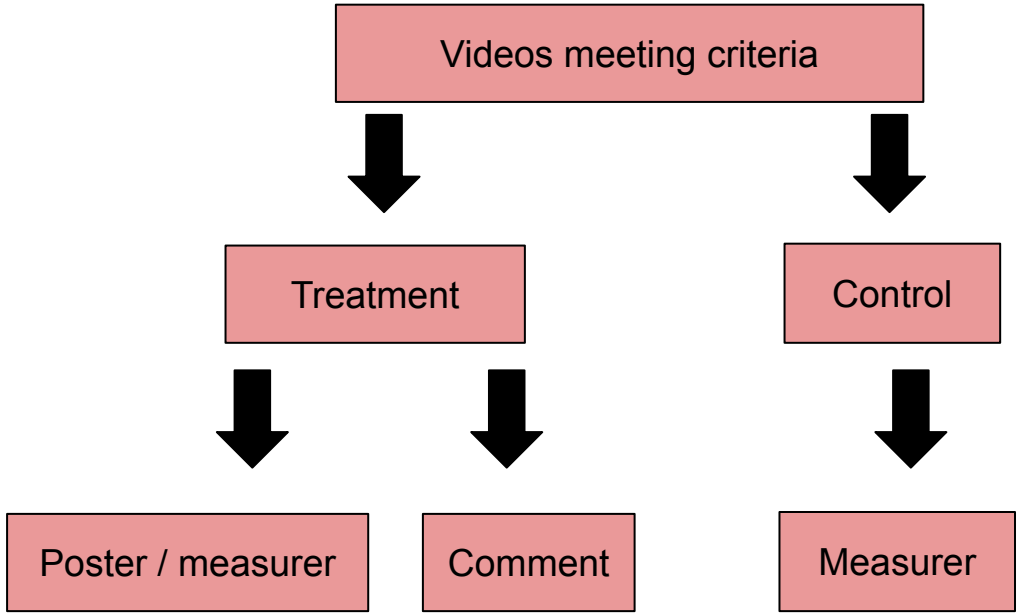
   Treatment / Control

2. **Experimenter:**

   Max / Sammy / Ted / Tony / Tracy

3. **Comment (treatment only):**

   1 of 7 neutral Bitcoin comments

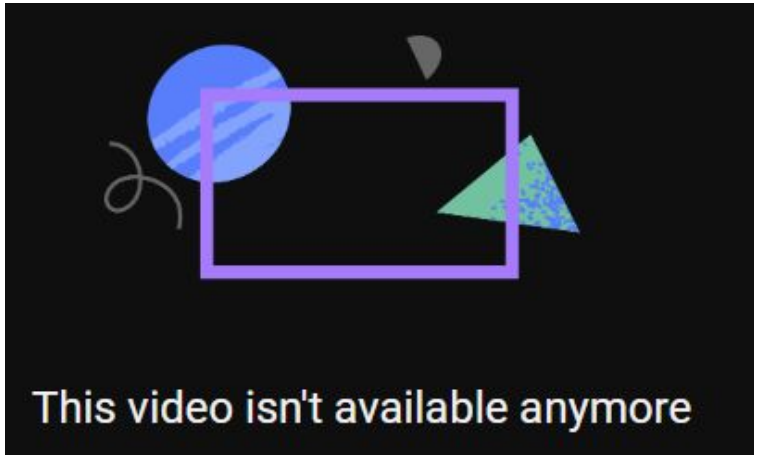


treatment		CONTROL			TREATMENT			
Variable	N	Mean	SD	N	Mean	SD	Test
genre	169			188			X2=6.928
... Blogs	13	8%		19	10%		
... Comedy	2	1%		0	0%		
... Education	17	10%		19	10%		
... Entertainment	14	8%		11	6%		
... Gaming	3	2%		5	3%		
... HowTo_Style	4	2%		5	3%		
... Music	2	1%		6	3%		
... News_Politics	89	53%		95	51%		
... Sci_Tech	23	14%		26	14%		
... Sports	2	1%		1	1%		
... Vehicles	0	0%		1	1%		
pre_treatment_views	169	99189	197389	188	115794	278307	F=0.414
pre_treatment_likes	169	2702	5212	188	3466	10939	F=0.684
pre_treatment_comments	169	663	1657	188	501	1075	F=1.222
video_length	169	312	155	188	303	155	F=0.352
comment	169			188			X2=357***
... 0	169	100%		0	0%		
... 1	0	0%		24	13%		
... 2	0	0%		28	15%		
... 3	0	0%		32	17%		
... 4	0	0%		25	13%		
... 5	0	0%		29	15%		
... 6	0	0%		26	14%		
... 7	0	0%		24	13%		
owner	169			188			X2=1.633
... Max	32	19%		42	22%		
... Sammy	39	23%		39	21%		
... Ted	41	24%		38	20%		
... Tony	28	17%		35	19%		
... Tracy	29	17%		34	18%		
post_views	166	130182	256691	184	187733	435570	F=2.206
post_likes	165	3298	6560	183	5944	27784	F=1.425
post_comment_count	166	730	1795	184	647	1326	F=0.245
pull_date	169			188			X2=0.002
... 07/27/24	137	81%		151	80%		
... 07/28/24	32	19%		37	20%		

Data Methodology

Two Datasets:

1. **Video engagement data for each Video ID (357 rows)**
    - Covariate imbalance – factors were less than 5% different, or pre-treatment values showed insignificant F-Stat
    - Attrition – Video wasn't available for analysis
    - Experimental Outcomes – Linear models

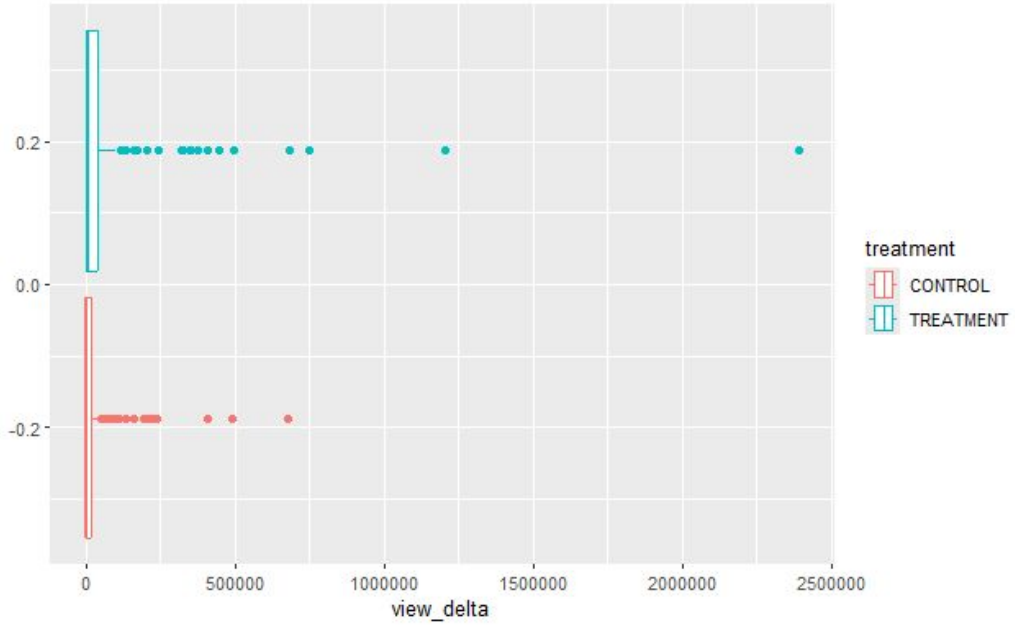


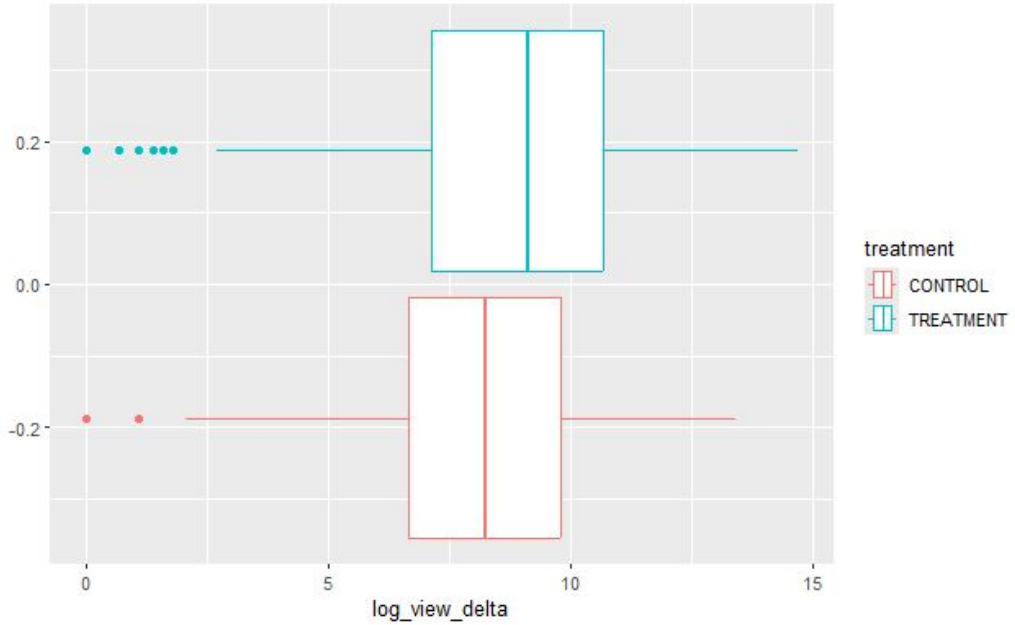
2. **Comment data for each Video ID (~157,000 rows)**
    - Compliance – treatment comment was deleted or shadow-banned

Data Methodology

Multiple Comparisons:

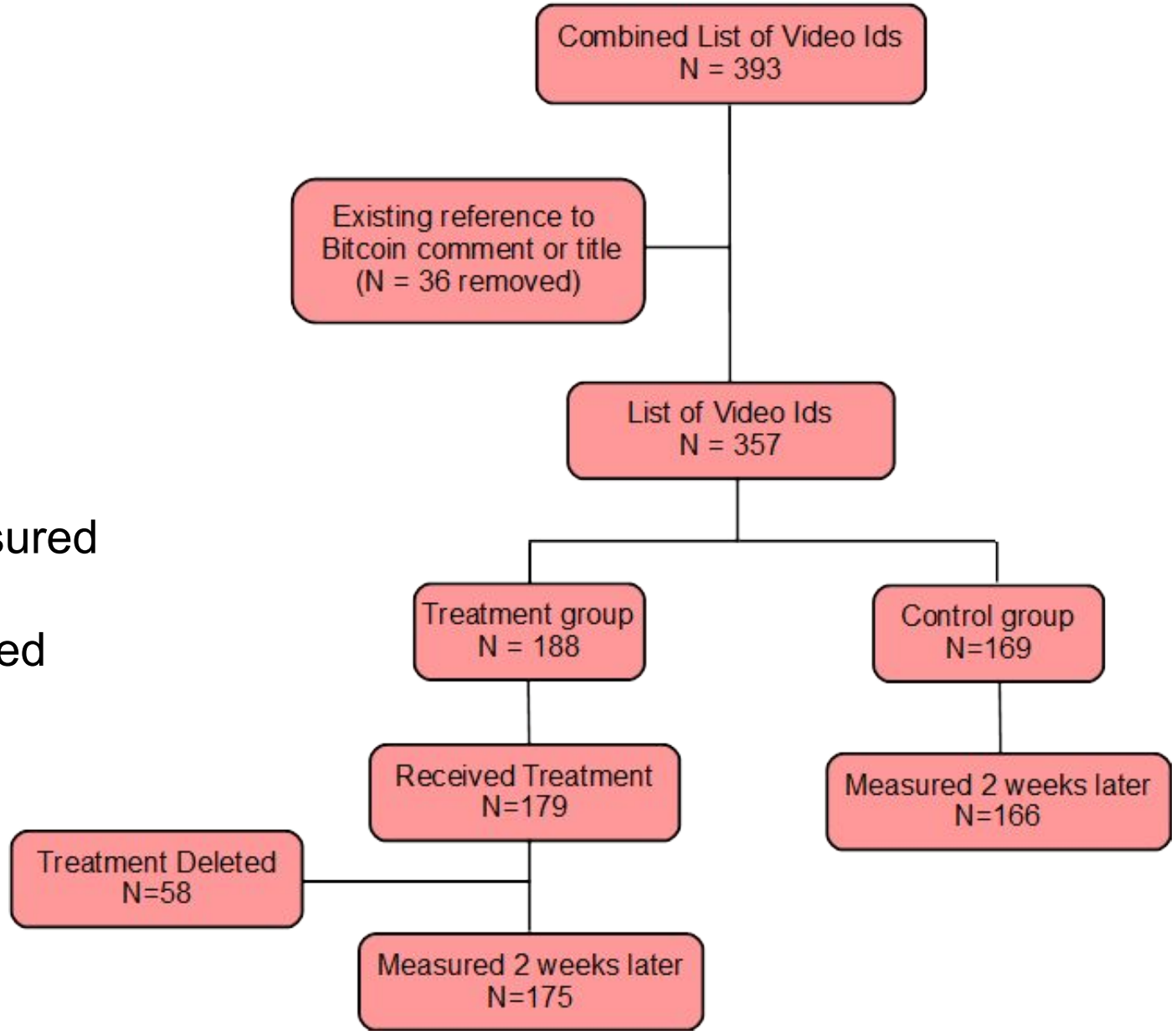
- **Linear models for treatment effect on Views, Likes and Comments**
  - Difference in differences
  - Raw values
  - Log Transformation
- **Covariates:** video “genre” and pre-treatment results
- **Selection criteria:** Low SE for Treatment with Large F-Stat
- **Bonferroni Correction:** 4 models per variable





CONSORT Diagram

- **Data cleansing** – 36 videos with “Bitcoin” in comments or title were removed prior to assignment
- **Attrition** – 7 videos were not measured
- **Compliance** – 58 treatments deleted



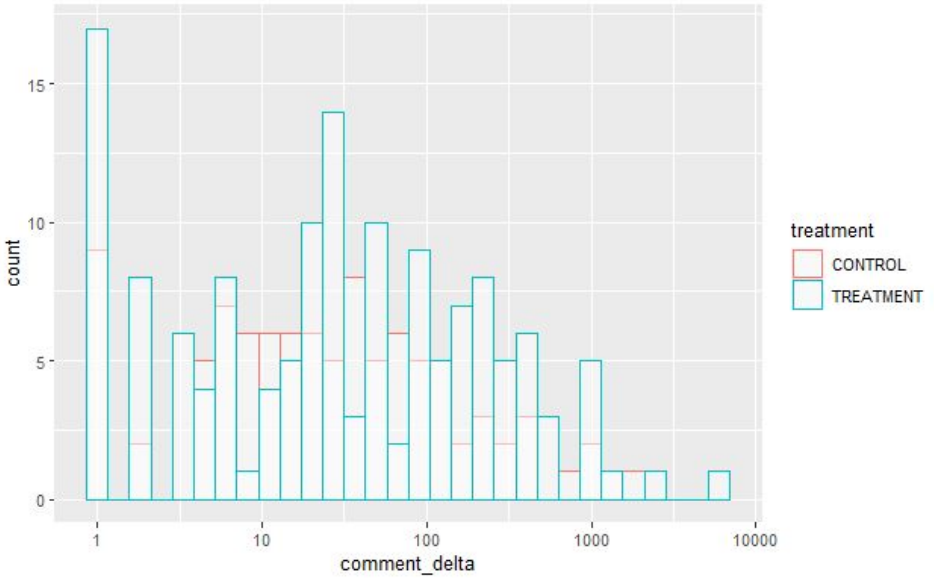
Analysis & Results

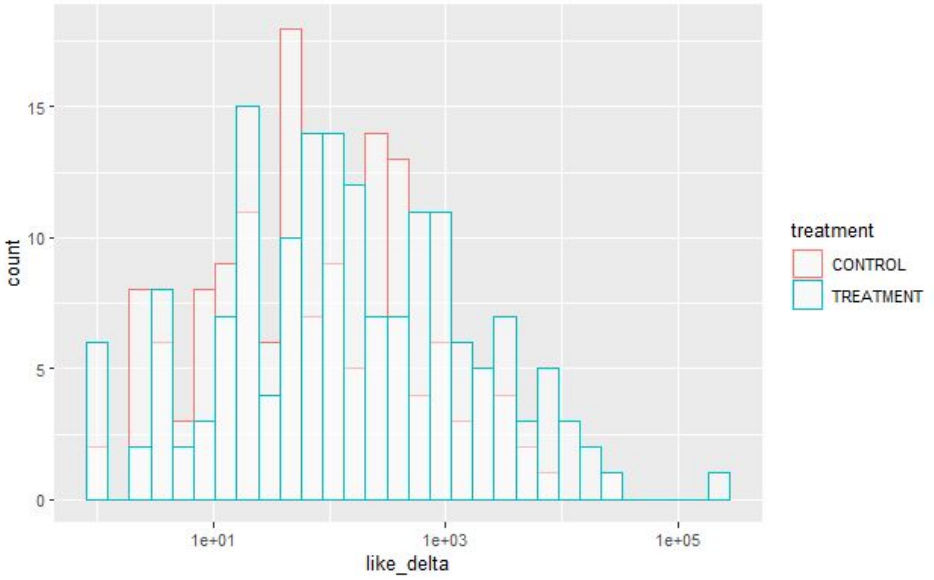
Model Outcomes

- Significant effects for D in D of views and comments!
  - But look closer…
- Distributions of outcomes have a heavy right skew
- Single videos being in control instead of treatment makes results statistically insignificant
- Regression p-values overrepresent statistical significance

CACE of Bitcoin Comments on Video Metrics

	Dependent variable:		
	Additional Views (1)	Additional Comments (2)	Additional Likes (3)
treatmentTREATMENT	46,955.400** (5,854.465, 88,056.350) p = 0.026	135.122** (9.121, 261.123) p = 0.036	1,428.280 (-307.507, 3,164.068) p = 0.107
pre_treatment_views	0.493** (0.092, 0.894) p = 0.016		
pre_treatment_comments		0.124** (0.001, 0.247) p = 0.048	
pre_treatment_likes			1.791*** (0.895, 2.687) p = 0.0001
Constant	-661,073,414.000 (-3,225,391,468.000, 1,903,244,639.000) p = 0.614	370,894.400 (-6,282,447.000, 7,024,236.000) p = 0.913	-77,183,765.000* (-168,895,520.000, 14,527,989.000) p = 0.100
Observations	350	350	348
Residual Std. Error	146,012.700 (df = 332)	390.741 (df = 332)	6,278.521 (df = 330)
Note:			*p<0.1; **p<0.05; ***p<0.01





Challenges

A potential violation of our Acceptable Use Policy has been detected for multiple projects you own. Read more

Google Cloud | My Project 6642 | Search (/) for resources, docs, products, and mor

Request an appeal

Summary

We recently detected that your Google Cloud Project My Project 6642 (id: enhanced-pen-426804-v7) has been circumventing our quota restrictions via multiple projects that act as one. My Project 6642 (id: enhanced-pen-426804-v7) appears to be violating applicable YouTube API Services Terms of Service and Developer Policies. As a result, we have restricted your use of the corresponding YouTube API Services.

Details

Project impacted: My Project 6642 (id: enhanced-pen-426804-v7)

Description: Circumventing our quota restrictions via multiple projects that act as one, which appear to be violating applicable YouTube API Services Terms of Service and Developer Policies.

Next Steps

You can fix this violation by using **exactly one (1) project ID per API Client**.

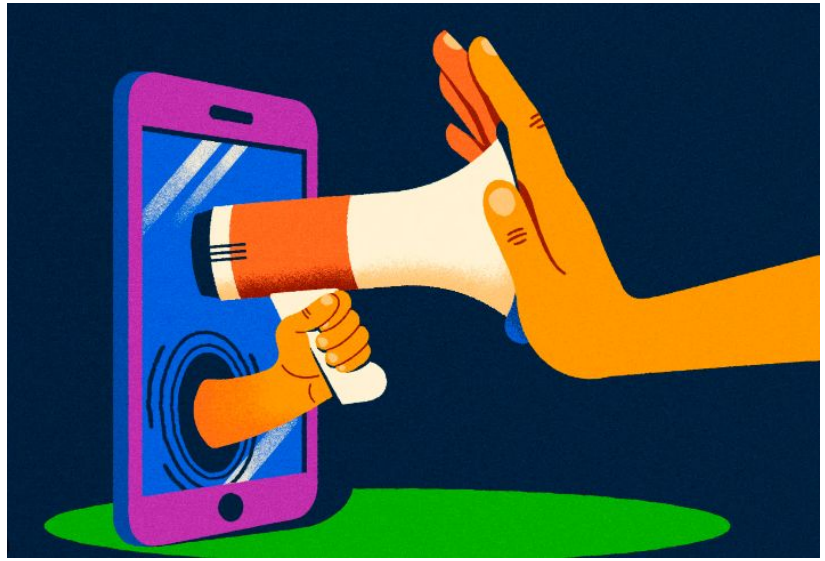
Your project may be **suspended** unless you take action and submit an appeal.

Request an appeal *

Additional email for notifications

SUBMIT REQUEST

Name	ID	Last accessed	Status	Charges
No organization		July 22, 2024		
My Project 6642	enhance...	July 22, 2024	Warned...	
My Project 70113	solid-pac...	July 9, 2024		$0.00
My Project 15024	composit...	July 7, 2024		
My Project 83580	famous-t...	July 7, 2024		$0.00
My Project 87178	summer-...	July 7, 2024		$0.00
My Project 52304	charged-l...	July 7, 2024		$0.00
My Project 29405	gothic-ag...	July 7, 2024	Suspen...	
My Project 9757	beaming-...	July 7, 2024	Suspen...	
My Project 93930	apt-them...	July 7, 2024	Suspen...	



Conclusion

Key Findings:

- Initial analysis indicated significant increases in views and comments for videos receiving Bitcoin-related comments.
- After applying Bonferroni correction and addressing outliers, statistical significance of effects diminished.
- Outliers had a substantial impact on results, highlighting the importance of data distribution considerations.
- No statistically significant effect detected on engagement metrics.

Future Directions:

- Ensure larger sample sizes for increased power..
- Explore additional variables affecting engagement metrics.

Appendix