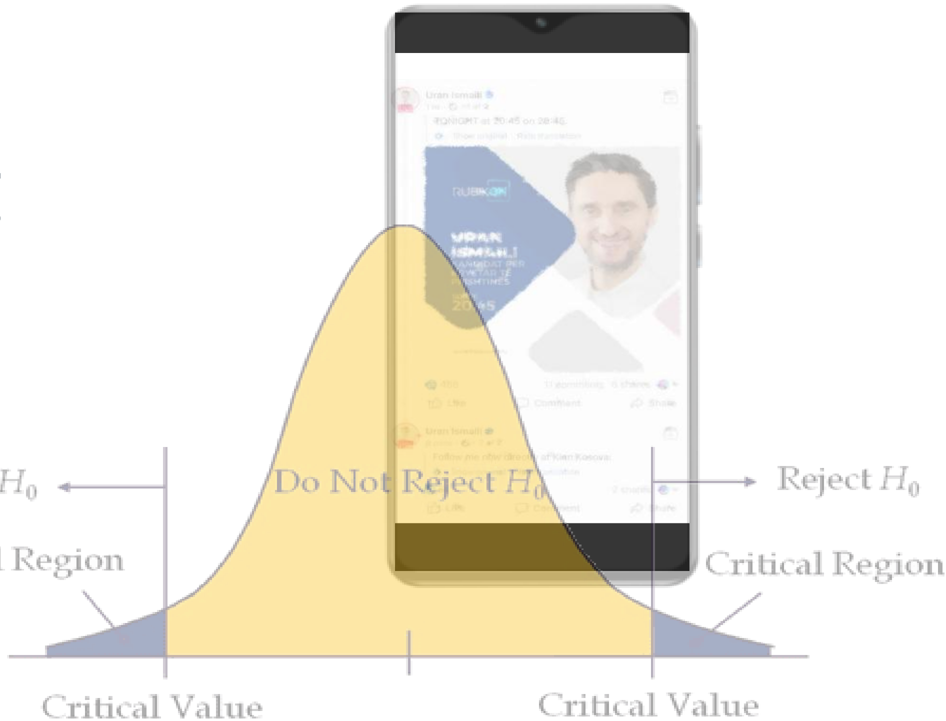
Analyzing the Impact of Facebook Group Treading Structure on Engagement: Was It Significant?

- Data Simulation
- Hypothesis testing
- Interpretation



Data Analytics Case:

Let's say we work on Facebook Groups, and the Project Manager decided to add threading structures to comments, similar to other social media platforms like X or Reddit.

Observations:

↑ 16%
Comments per Posts

↓ 5%
Posts per User

After the change we observed that comments per posts increased by +16% but posts per user went down by -5%.
Why would that be?

*Threading Structure on Facebook Groups

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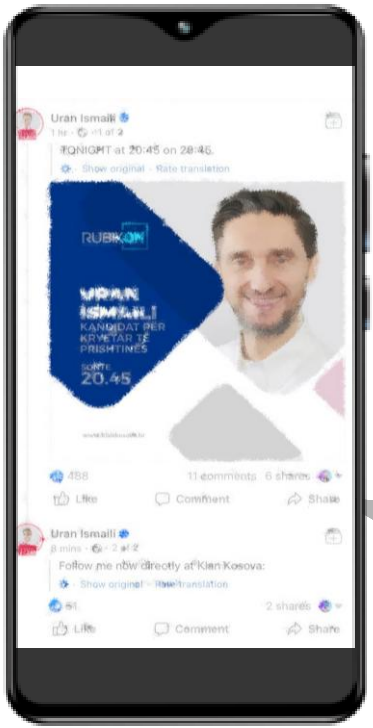

We observe that comments per posts increased by 16% but posts per user went down by 5%. **Why would that be?**

a) Threading increases the loading time for the page, discouraging users from making new posts.

b) Threading disrupts the user interface, making it less appealing for users to create posts.

c) Threading structures discussions and encourages more comments within the same post, thereby reducing the need for new posts.

d) Threading makes it harder for users to post comments, leading to a decrease in posts.

Case inspired by the material found on interviewquery.com – Case: Threaded Comments

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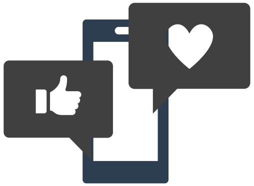
c) Threading structures discussions and encourages more comments within the same post, thereby reducing the need for new posts.

Logically, it makes sense that structures like those in X or Reddit encourage users to comment on posts.

Let's say our main goal is to improve the engagement rate in Facebook Groups



Did we achieve significant improvement towards the goal?

Case inspired by the material found on interviewquery.com – Case: Threaded Comments

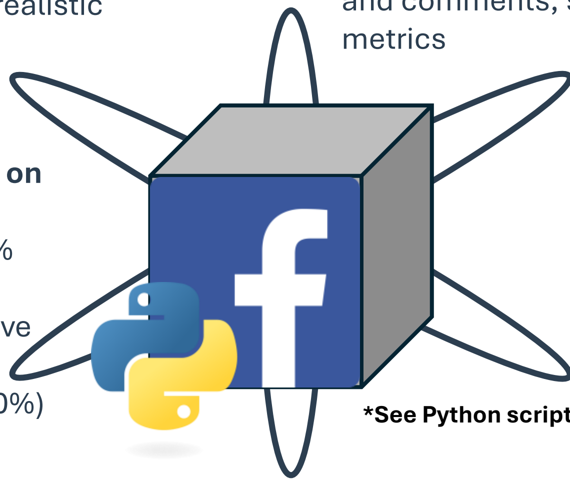
Simulating actions in an interdependent system on Facebook Groups

Since there is no data available for this specific business question, we can simulate a set of Facebook Group variables, establish interdependencies between them to generate realistic data, and conduct hypothesis testing

This model simulates engagement (**posts, comments, and reactions**) for 1,000 fictitious Facebook groups. It incorporates group type classification, probabilistic user behavior, and statistical distributions to estimate realistic engagement patterns

We establish an interdependent ecosystem where the group type (A, B, or C) and member count influence posts. More posts increase the likelihood of comments, and reactions depend on members, posts, and comments, simulating realistic engagement metrics

Each group is assigned a type based on empirical probabilities:
Type A (Hot Groups): Highly active (5% population)
Type B (Mild Groups): Moderately active (15%)
Type C (Cold Groups): Low activity (80%)



***See Python script here**

Finally, we adjust the model by **reducing post probability by 5%** and **increasing comment probability by 10%.** We then rerun the script to generate a new dataset for hypothesis testing.

Now that we have two datasets (before and after), the next step is to establish a hypothesis to test whether the changes in post and comment probabilities significantly impacted engagement metrics.

For the simplicity of this simulator, we just limited Facebook Action to Posts, Likes and Comments as inputs to calculate engagement

Hypothesis Testing:

Let's say our main goal is to improve the engagement rate in Facebook Groups

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Comments per Posts

-5%
Posts per User

Before threading layout in Facebook Groups:
Total Engagement: **2.09%**

After introducing the new layout:
Total Engagement: **2.35%**↑

Yes, we can see an improvement in the total engagement but...
Did we achieve <u>significant</u> improvement towards the goal?

Null Hypothesis (H_0):

No significant difference in engagement between Model 1 and Model 2

Alternative Hypothesis (H_a):

There is a significant difference in engagement between Model 1 and Model 2

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We used an independent two-sample t-test because:
We are comparing the means of two independent samples: engagement percentages for Model 1 and Model 2

RULE:

- **If |t| > t critical, reject the null hypothesis**
- If |t|≤ t critical, fail to reject null hypothesis

For our case, the t-critical value for a two-tailed test with α=0.05 and df=1998, based on the t-table, **t-critical is 1.960**.

Python |t| test:

```
t_stat =
scipy.stats.ttest_ind(engagement_1,
engagement_2, equal_var=False)
return
t_stat
```

T-statistic: -2.1115 or ABS =2.1115

RESULTS
2.1115 (|t|) > 1.960 (t critical)
We reject the null hypothesis

Conclusion:

After conducting the test, we **reject the null hypothesis**, indicating a **statistically significant difference** in the **engagement percentage** between **Model 1 and Model 2**.

Business Perspective:

We now know for fact that the engagement was improved by our actions and not by just random fluctuation.

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But from a business perspective, a small improvement of **only 0.26% may not seem significant at first glance.** However, we must remember that **Facebook is a massive digital platform**, where even small percentage changes can lead to **huge impacts**.

Based on the simulator numbers we achieved:

Group A: +219,347 comments, +171,352 reactions
Group B: +203,349 comments, +78,155 reactions
Group C: +356,485 comments, +140,685 reactions

Not bad! 🚀