

AMENDED Exhibit 412

PLAINTIFFS' OMNIBUS OPPOSITION TO DEFENDANTS' MOTIONS FOR SUMMARY JUDGMENT

Case No.: 4:22-md-03047-YGR

MDL No. 3047

In Re: Social Media Adolescent Addiction/Personal Injury Products Liability Litigation

TikTok History 101 - US

Here is a past recording of the presentation: [HYPERLINK]

Agenda

1. Significant Events
 - a. Musically - A brief Intro - 10min
 - b. Cringe - 5min
 - c. Memes - 15min
2. The beginning of Taste Clusters - 20min
3. How TikTok became Mainstream for High Schoolers - 5min
4. TikTok and the Quarantine Period - 10min
5. Where we're at Now - 15min
 - a. L45 Growth and Diversification

I. Significant Events up to Summer 2020



1. Stage 1: Musical.ly

The first stage was Musical.ly, a lipsync dance app founded out of China. The original goal was to create a global education platform where users could easily teach and learn through a network of educators. This proved difficult as there was a high barrier to creation of education-related content. Educative content could not take off.

Commented [1]: [REDACTED] you happen to have an updated version of this from the website?

Commented [2]: link : [REDACTED]
[REDACTED] 2017: TikTok was launched We believe companies are meant to be global, and that the opportunities brought by mobile internet would be universal. In August 2015, the company launched TopBuzz, its first product for the global market. By late 2016, Douyin had grown in popularity in China. As visuals and music proved easier to connect across cultures, the short video form carried universal appeal. The company decided this was an ideal format to reach a global audience. In May 2017, TikTok was launched for the global market. With the distinctive combination of videos and music and a personalized feed, TikTok quickly took off in markets like Southeast Asia, signaling a new opportunity for the company. In the same year, ByteDance acquired Musical.ly, and subsequently merged it with TikTok. As TikTok continued to make it easy and fun for people to connect with, create and consume content, it started to grow at an accelerating pace and became the app that users know and love. Today, TikTok has become the leading destination for short-form mobile videos worldwide. Globally, more than 1 billion people come to TikTok every month to be entertained as they learn, laugh, or discover something new as TikTok continues to live the mission of inspiring creativity and bringing joy.

Commented [3]: [REDACTED] hope it could be useful!

[REDACTED] : [THANKS] 2023-09-29 03:17:35

Commented [4]: Cc [REDACTED] - please see the above!

[REDACTED] n : [THUMBSUP] 2023-10-20 17:10:54

Musical.ly found its audience in middle school and high school females, interested in lipsync dance.

One interesting element is the use of Challenges, which provide a fun, trending content template that make it easy to latch onto an existing trend. It could be anything from a simple dance move to a goofy prank.

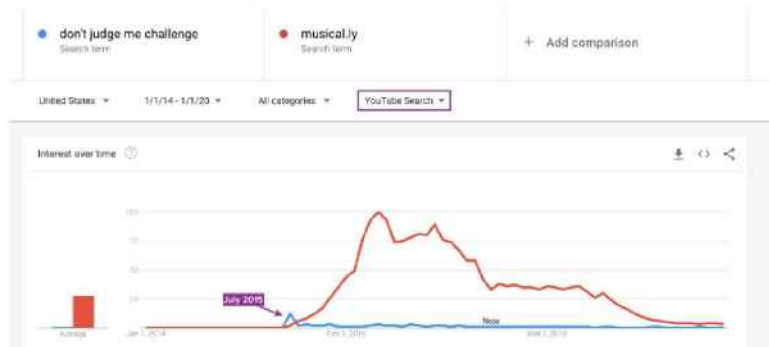
Users were encouraged to join a trending challenge and make their own versions. Challenges were a way of educating users and showcasing new ways to create videos. It also allowed the Musical.ly team to have greater control over the direction of content creation. The challenges gave users a purpose to participate and create videos rather than just passively watch others.

"The key difference between Musical.ly and Vine is on Musical.ly we lowered the barrier to content creation so all the consumers are creators at the same time," explained Alex. As he saw it, lowering the barrier to content creation was critical to Musical.ly's success as a platform, where all content was produced by the users themselves.

The biggest barrier to people creating videos wasn't a technical one. All of the new breed of short video mobile apps had easy-to-use built in mini-editing studios. Young users especially had no trouble working out how to add music, text and use the recording function. Vine's recording feature in particular was about as simple as one could imagine, just point the camera and hold down on a button to record for six seconds. Here's an example of top musical.ly compilations from 2015:

[youtube]([HYPERLINK "https://www.youtube.com/embed/sgJR4MR7h0g" \h])

Musical.ly's breakout challenge, Don't Judge Me sent the app viral in the summer of 2015:



Baby Ariel (One of the most famous influencers on Musical.ly)

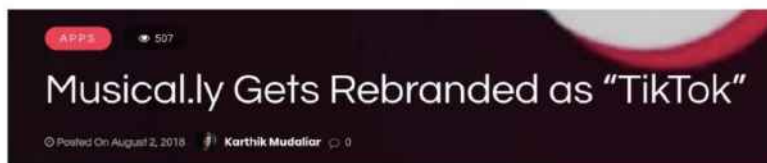
[youtube]([HYPERLINK "https://www.youtube.com/embed/vKsLFstbsCo" \h])

What Musical.ly looked like:



ByteDance acquires Musical.ly in 2017, and rebrands to TikTok by August 2018.

2. Stage 2: Musical.ly & TikTok Rebranding



With the re-branding, there was a period of TikTok ads that popular internet culture at the time interpreted as cringe, heralding the period of TikTok cringe:

experience revolves around the For You page, users can also **search** and **discover** new content. The interplay between For You and search/Discover provides the needed signals to update the recommendation model to provide more relevant videos, ultimately guiding users into their own self-selected interest feeds. Relevant feeds determine a user's **lifetime (retention)**, while diverse content types ensures a diverse content ecosystem, leading to a healthy, **diversified** user base.

The success of the platform depends upon the total number of recommendable videos, making the **content creation** process essential to the platform's survival. Therefore, a low-barrier to creation is required. *The lowest barrier to creation is to imitate an already existing template.* A user watches a video they find particularly **#relatable**, causing an "ah-ha" moment, thus **inspiring** the user to create a similar video, giving rise to a high volume of **meme**-related content (meme, simply put, means "something that's imitated"). Since users must re-create videos from scratch, the imitation of a video is not exact (giving rise to mutations or new versions). Users try to one-up the concept of the video they are imitating by making a small change or subverting the expectation entirely, leading to incrementally better videos.

Commented [12]: I feel like I'm reading a research paper

Therefore, the TikTok core user experience is **evolutionary** in nature, where different videos, like genes, compete for survival. The better the meme, the better the chance it will be **selected** by the algorithm, propagated on the For You page, and **replicated** by other users. Through evolution and **variation** in the video pool, recommendable content categories naturally become **wider**, and individual content types become **deeper**. High quality, diverse videos are recycled as paid ad assets, attracting ever wider types of audiences, who, in turn, create more videos, intensifying the content creation cycle.

Commented [13]: (Not urgent) For my own learning@Drew Kirchhoff, how does this happen in practice? Is this referring to the videos in the ads we show on other platforms (say, Facebook or Instagram)?

As recommendable content becomes increasingly relevant for ever wider audiences, word of mouth inevitably spreads, driving organic downloads and forging TikTok's **brand image**. As the **perception** of the brand image increases, the **value** of creating on the platform provides incentive for Creators as a means to **social capital**, and brands are incentivized to advertise, further validating the ROI for creating high-quality videos.

Commented [14]: Yes thats correct, we can use the favorited videos from each cluster as ad assets on Facebook and other ad channels to attract similar users as those in the cluster. Utilizing this methodology, we are able to decrease CPI by 8%-39%. [HYPERLINK]

II. The Beginning of Taste Clusters

With the rise in meme gaming content, we needed to figure out the total sizing of meme gamers on the platform. We used an interesting **method to automate user segmentation** to identify meme gamers by clustering together users who watch similar types of content. The goal of Taste Clusters is to better understand our user and content ecosystem. Leveraging the signals from recommendation

automates this process.

Simple User Understanding

- Who are our users?
- How big is each user group?
- Which groups have the highest performance and why?
- How does content vary by age and gender?
- User evolution over time
- etc...

Simple Content Understanding

- What content types are consumed and created by each "taste cluster"?
- What does our content ecosystem look like?
- etc...

Taste Clusters 1.0 [\[HYPERLINK \]](#)

TikTok is home to hundreds of millions of users, we need a scalable way to understand our user composition. User clustering is an efficient, highly scalable way to understand our user <> content ecosystem. Some of the basic things we care most about:

- **Sizing** (the size of a given user segment in relation to other segments and the whole)
- **Penetration Rates** (where have we hit a ceiling, where do we have room to grow?)
- **Performance** (augment high performing, improve low performing)
- **Trends & Evolution** (how is and what is driving the content <> user ecosystem evolution over time)
- Evaluate Risky Audiences w/ high violations

How do we cluster users?

We utilize the direct output of the recommendation system to group together users with similar interests.

The recommendation system outputs a special embedding (user embedding) for each user, representing, at a high level, the embedded features of a given user's interests and the videos they are predicted to like. By clustering these user

embeddings, we can automatically generate segments of similar users.

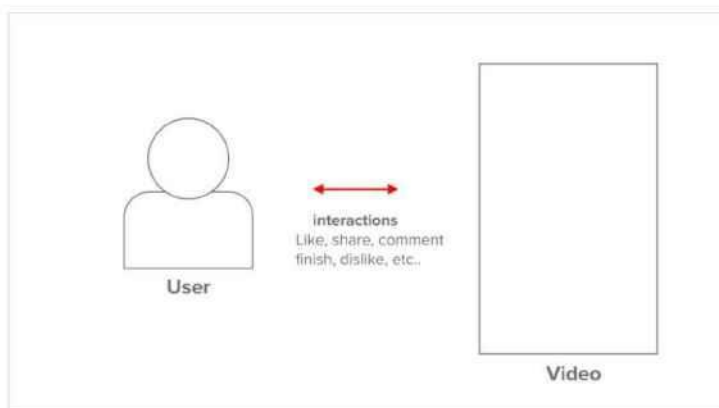
There are hundreds of embedded features that contribute to the user embedding, for example:

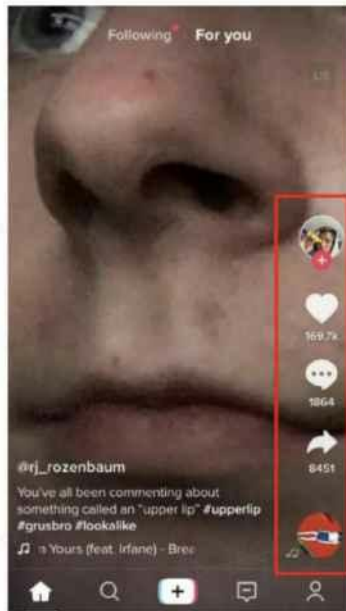
- Actions on videos: Like, follow, share, comment, video play finish, video skip, etc...
- Device: device model, OS, language
- Geographic location
- etc...

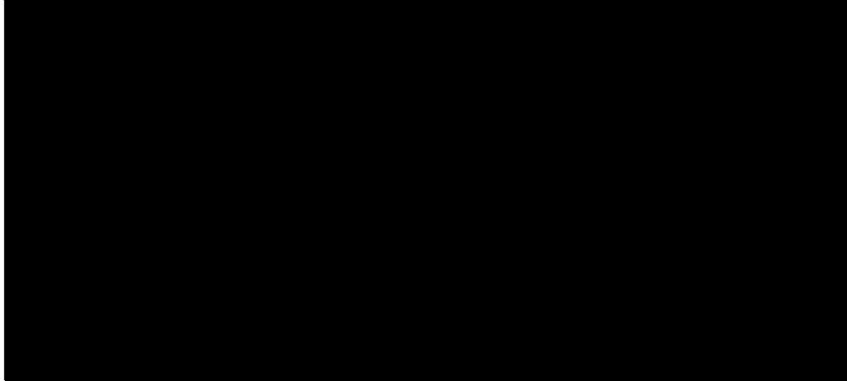
Simple Intro into how Recommendation Works [\[HYPERLINK](#)

The goal of TikTok's recommender system is to find, for every user, a limited set of videos that have the highest chance to be liked by the user.

TikTok, in essence, simply consists of the interactions between (1) users and (2) videos:

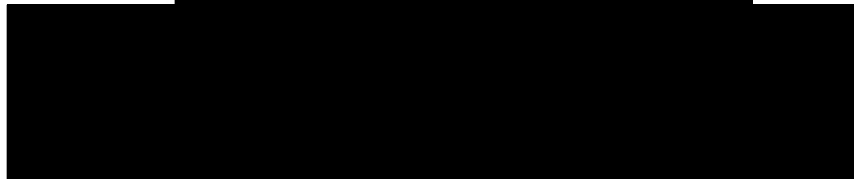
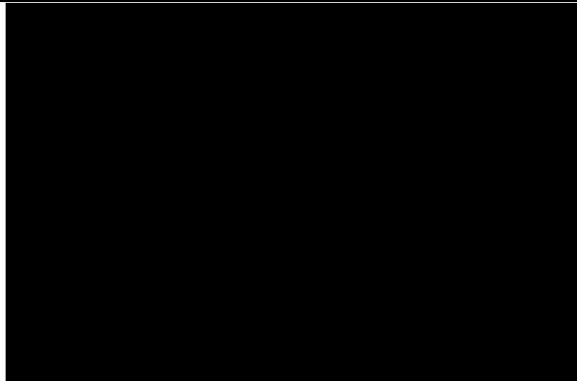
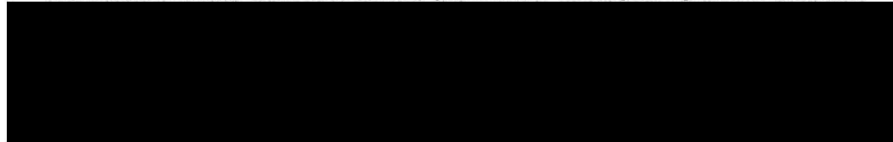


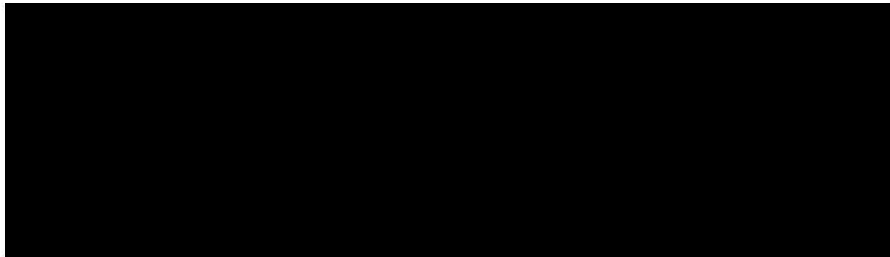




The User-Video Interaction Matrix

The user-video interaction matrix encapsulates the historical interaction data between users and videos, with each entry representing the type and intensity of interaction between a specific user and a particular video. It forms the ground truth for training recommendation systems. The goal of the recommendation system is to learn a model that can approximate the interaction matrix, such that it can help you find new videos you might like in the future.

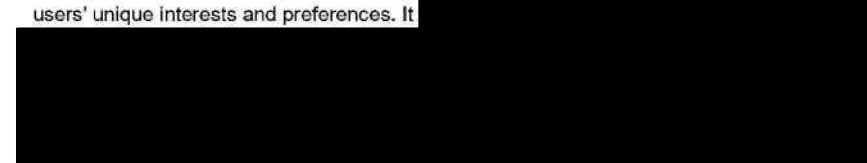




We'll explore how this works in the next section by introducing a simple overview of TikTok's recommendation system.

A General Introduction to TikTok's Recommendation System

TikTok's recommendation system is designed to deliver personalized content that matches users' unique interests and preferences. It



In the diagram below, we illustrate a simplified recommendation architecture, broken into three core parts. While the TikTok recommendation system is much more complex in reality, the classic architecture detailed below serves as a standard model to learn the elementary concepts of what's happening under the hood. Note that in this architecture, you start from the bottom of the diagram and move upwards to the top.

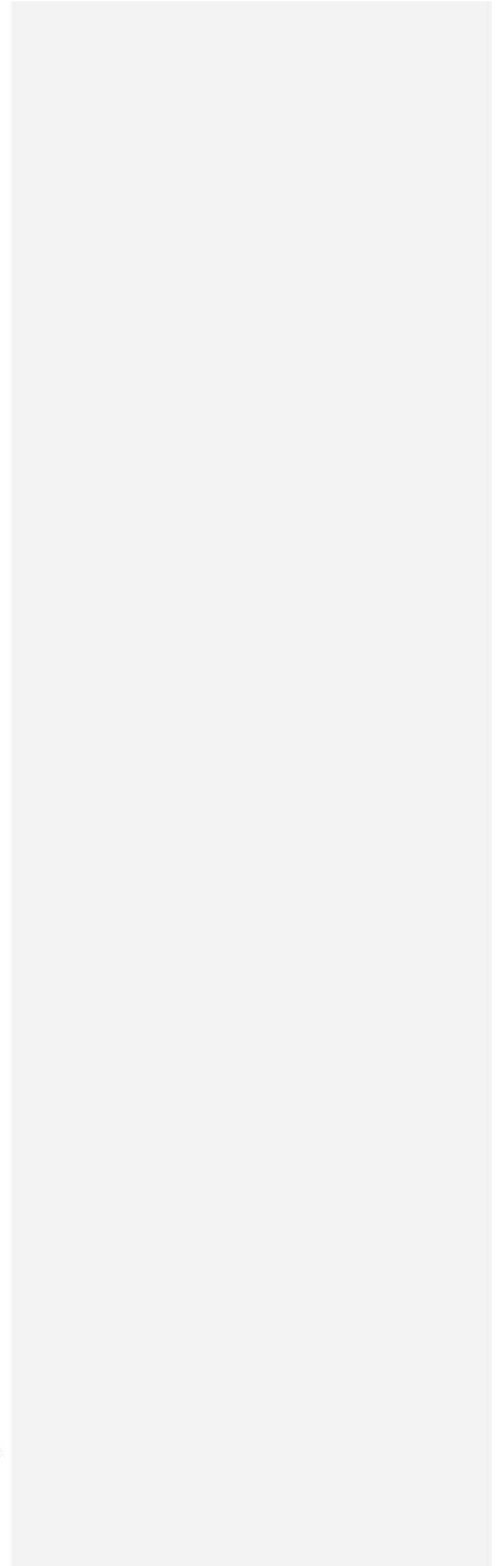
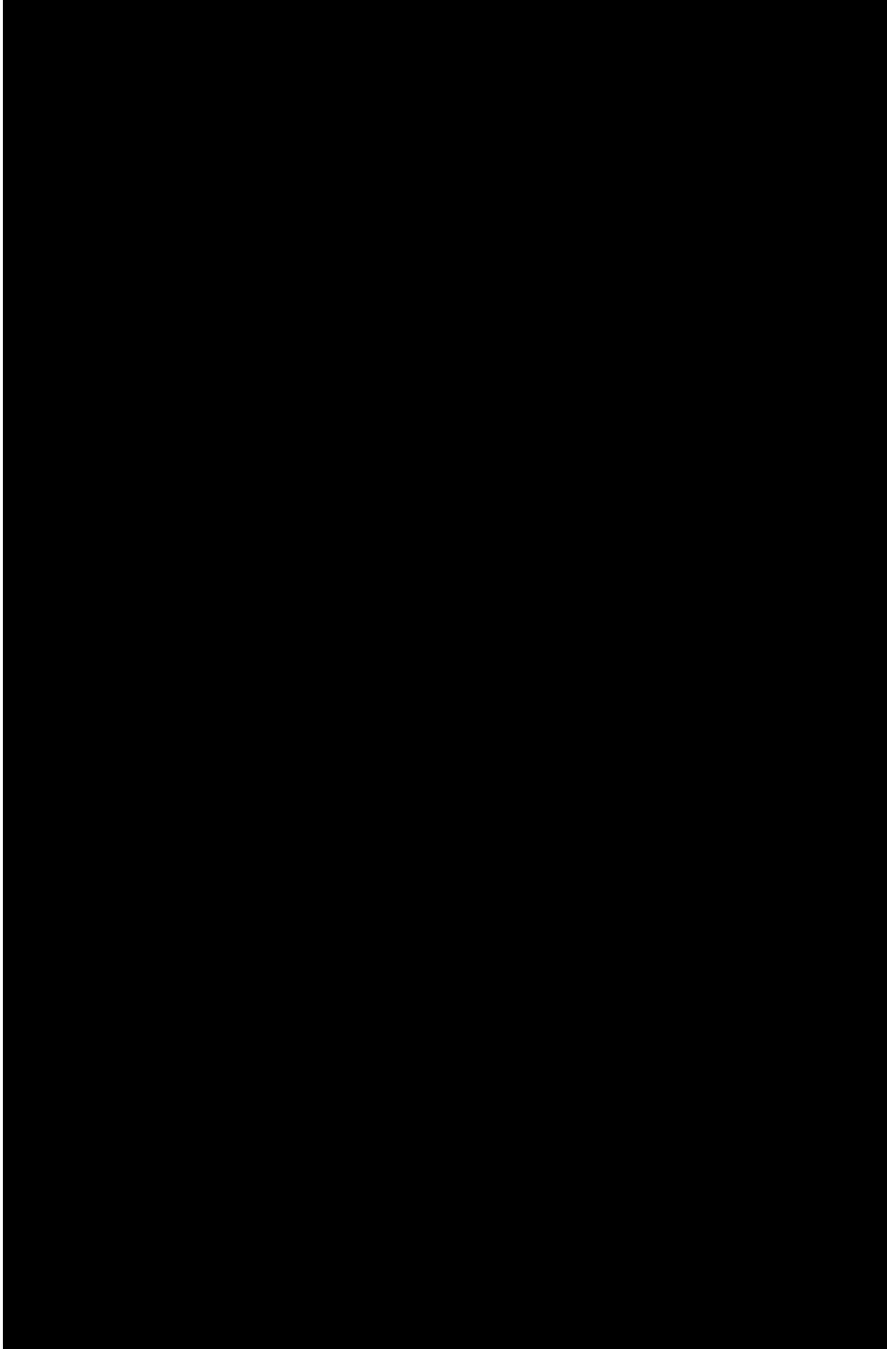


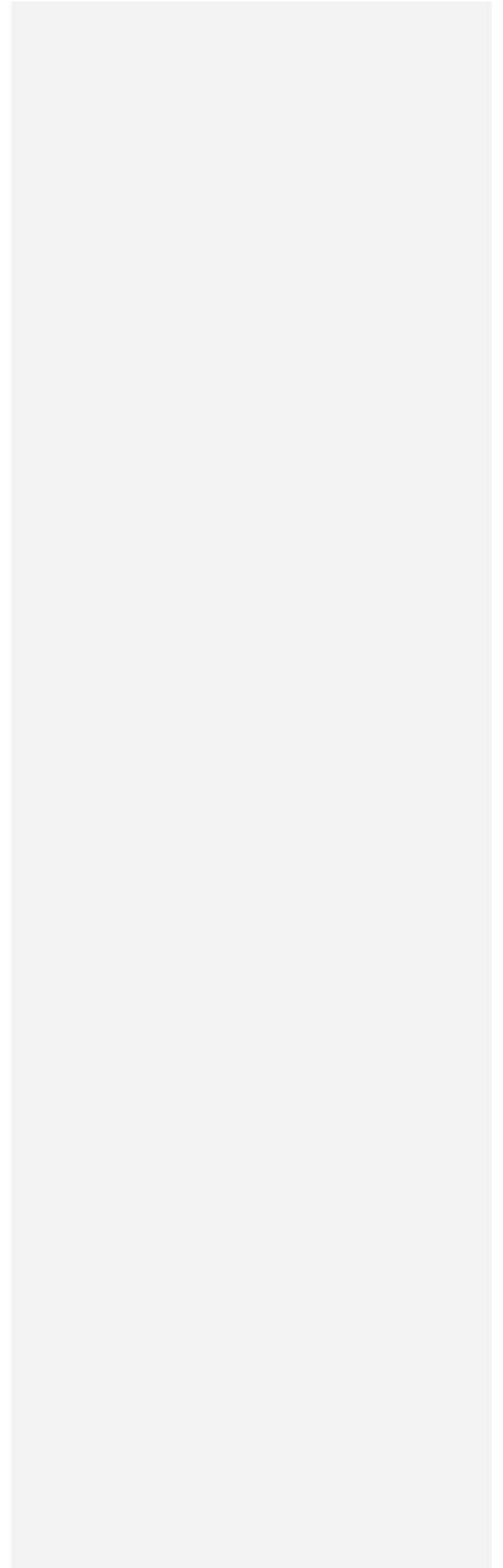
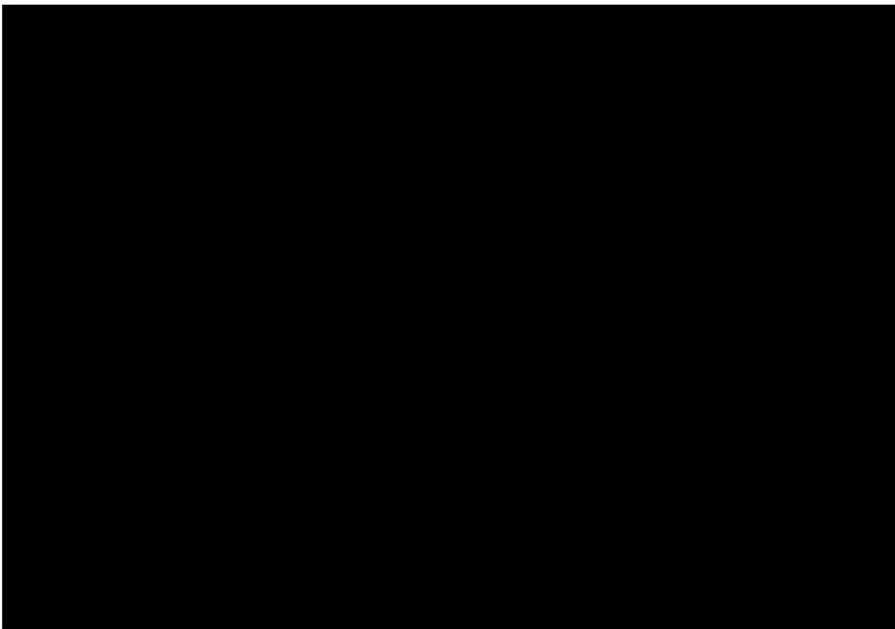
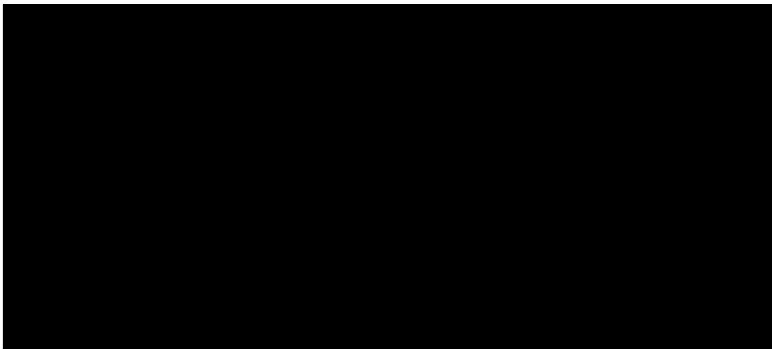
Let's look at each part individually.

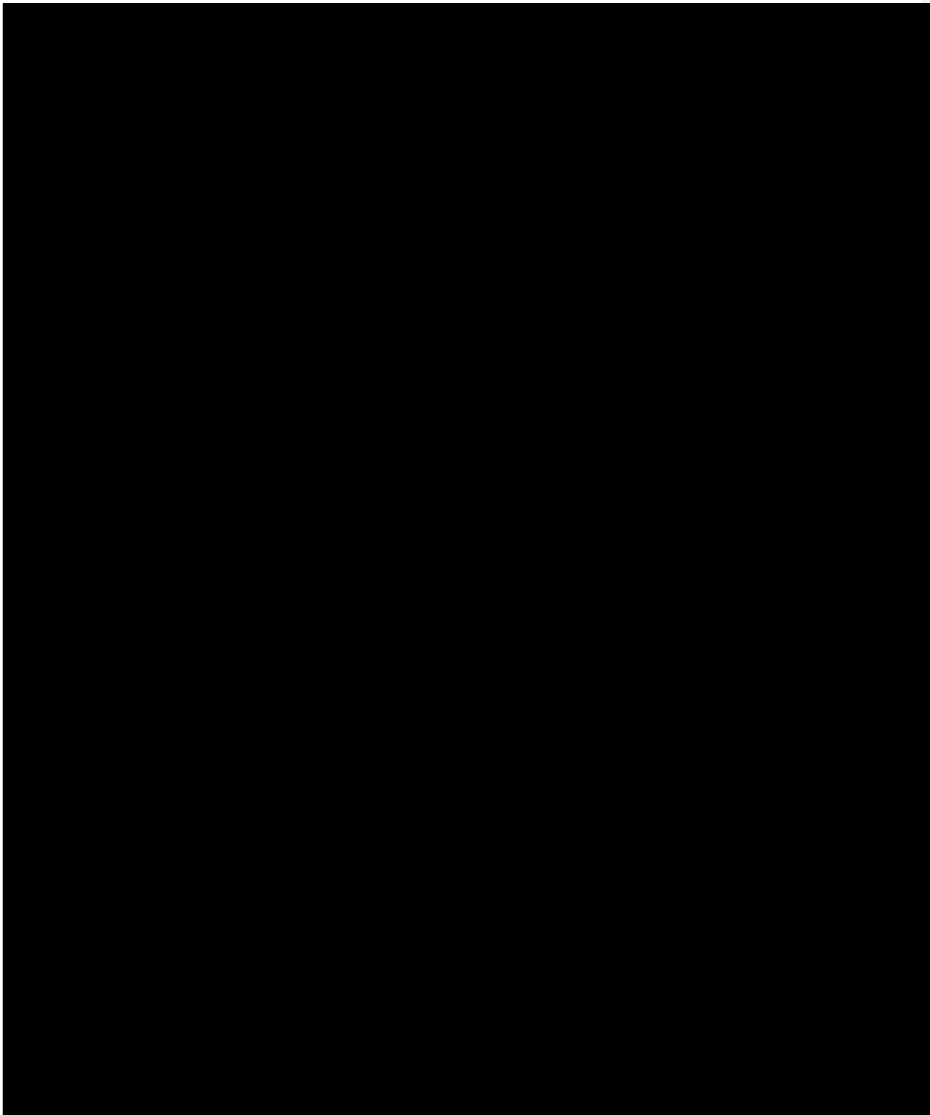
1. The Two-Tower Model

[REDACTED]

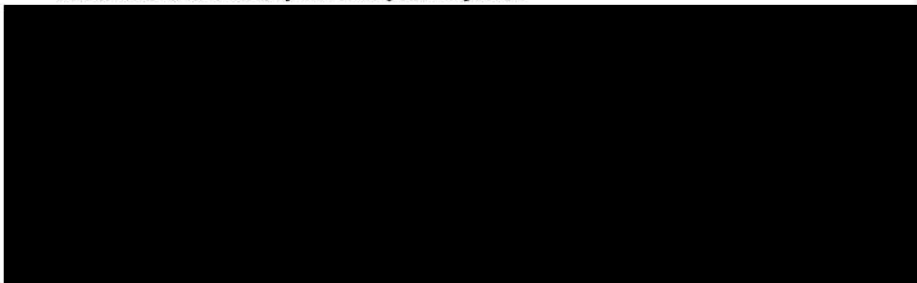
[REDACTED]







Recommendation briefly over the past 10 years:

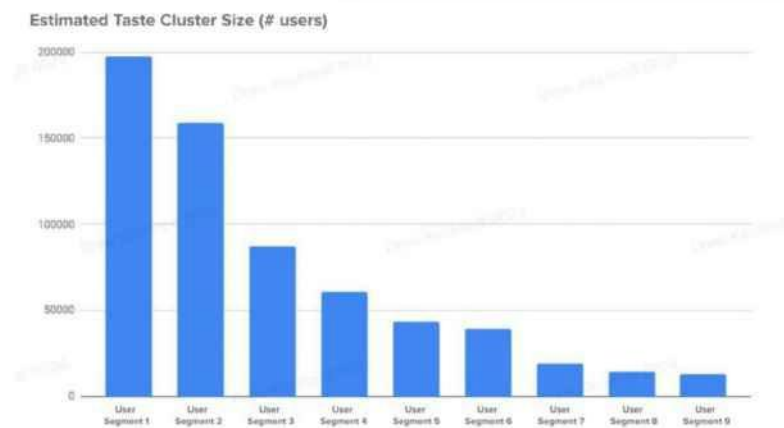




[HYPERLINK

Our First US Taste Cluster Analysis - Q1 2019 - L34 Users

The goal of our first taste cluster analysis was to size the meme gamer taste cluster and get an idea of our main L34 user segments:



Commented [15]: (Not urgent) For my own learning@Drew Kirchhoff, what does "L34" refer to? I see this leveling (?) across different places.

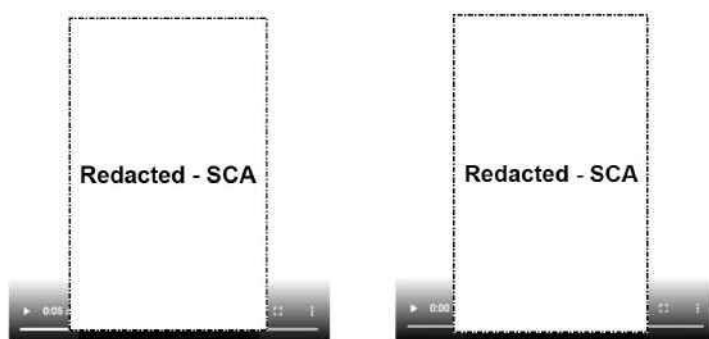
Commented [16]: L12345 refers to age of users. We usually focus on L345 (18+): - L3: 18-24 yrs - L4: 24-34 yrs - L5: 35+ yrs

[THUMBSUP] 2023-11-30 10:10:53

Commented [17]: "L" refers to age level

3.1 Meme Gamer - User Segment 1

We found that Meme Gamer accounted for 31% of users in Q1 2019, the largest user group on the platform.



(older)

Creating word clouds of the signatures of the user profiles of users in each Meme Gamer cluster, we see obvious words like "meme", "gamer", "youtube", "pewdiepie", etc... Interestingly, we see the same exact words across Canada, Australia, US, and UK:

1. We found that our older users were mainly located in what appear to be more rural areas, and watched videos containing hashtags like "hunting", "fishing", "blue collar", "mechanics", "oil rig", "construction", etc...).
2. The older, "country" users were from Facebook, so we switched our acquisition strategy to Snapchat from in 2Q 2019 to focus on acquiring L2M users (help grow meme and comedy)

Commented [22]: We switched away from Instagram or Facebook?

Commented [23]: We switched away from FB and began focusing on acquiring users from snapchat

3.2 "Country" - User Segment 2



III. How TikTok Became Mainstream in High School, 2H 2019

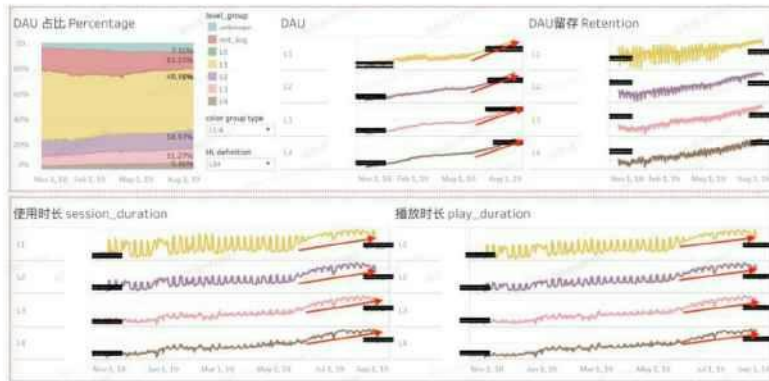
In 1H 2019, we began spending more on Snapchat as an acquisition channel, with the aim to grow L2 male users. L2 male users were important for memes and to balance out the huge gender imbalance of females (>80% female) in the app coming from Musical.ly. L2 male became one of our diverse user groups, with a focus on growing L2M + L345 users, (age up strategy to acquire and retain adult users).

We can see the breakout growth in DAU, retention, session duration, and play duration below across all users, beginning summer 2019:

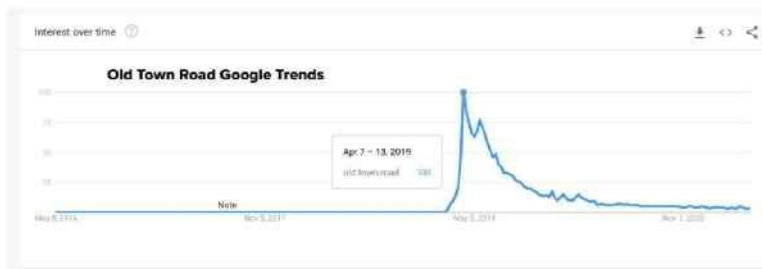
Commented [24]: "Acquiring users from other channels, like Facebook, Insta, Snapchat" means we distribute Ads on these platform? Or we talk to the creator in those platform then ask them to join TT?

Commented [25]: Yes, UG team focuses on acquiring users from Snapchat with our ads
[Redacted] : [Get] 2021-07-26 16:52:38

Commented [26]: See this doc for details:[HYPERLINK]
[Redacted]



An important lead up to this summer growth was Old Town Road, one of TikTok's most famous trends:



Rise of L2 Male Retention

In the below graph, we can see that L2 Male was originally the lowest performing user group among our diverse user groups, with DNU retention at 70%. However, L2 Male grew significantly in 2H 2019, reaching 86% and surpassing all other user groups except for L2 Female:



Commented [27]: Have we analyzed the reasons for the L2M retention increase, is it just because we changed the acquisition channel and thus built a better ecosystem?

Commented [28]: Yes we built a better content ecosystem for L2M, which is documented here: [HYPERLINK](#)

[REDACTED]
: [THUMBSUP] 2021-07-06 11:56:50

Commented [29]: Very interesting that we grew L2M as a diverse user group to further push the memes trend, but they ended up becoming the mainstream

Commented [30]: Yes the meme template was the growth kernel for TikTok! [HYPERLINK](#)

Some of the most important evolutions during this time period include:

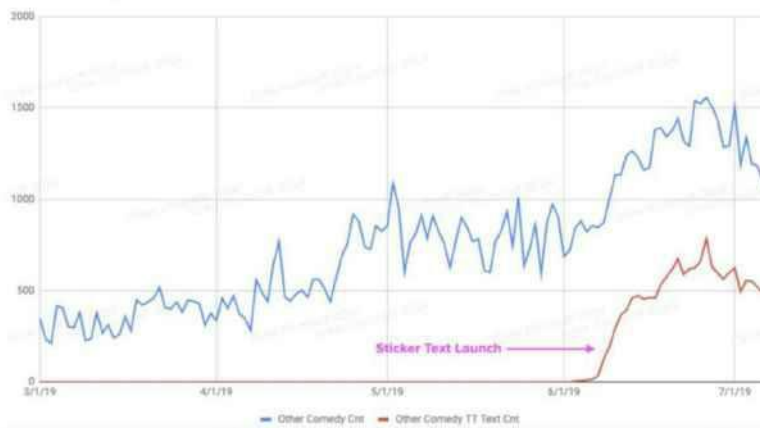
1. Content Diversification

- a. **Sticker Text:** The introduction of "sticker text" (the text captions you can add on top of videos) in June 2019. Sticker Text became the primary method to communicate memes for L2M users, introducing the meme template, and growing comedy on the platform:

Commented [31]: [image]

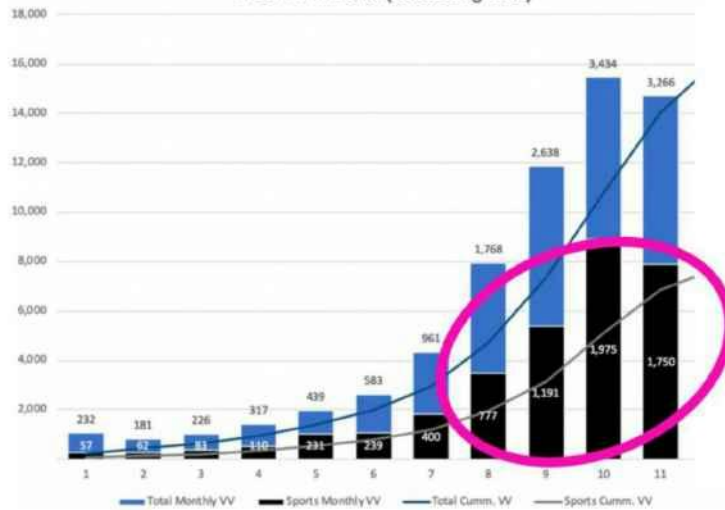
[THUMBSUP] 2022-01-30 14:29:55

Other Comedy vs Other Comedy TikTok Text



2. Introduction of Sports PGC content at increasing speed throughout 2019:

PGC VV in 2019 (excluding Dec)



3. New user feed strategies aimed at improving the content quality of videos showing in the new user feed, primarily removing lipsync dance videos.
4. A variety of algo strategies aimed at growing L2M specifically.

How L2M content evolved in 2019: [HYPERLINK

and [HYPERLINK

How to Determine the leading Content Types in TikTok

We adopted a simple methodology to understand the overarching content types prevalent in TikTok by each country. We can look at the ratio of each user segment's vved supply and vv demand. We believe high supply and high demand are indicators of high quality mainstream in-app content types. We can call this cluster(s) the "north star cluster". It's important to point out that the north star cluster points to what is "mainstream" in TikTok, which may not necessarily be mainstream in a given country's culture. **The goal is to match the content of the mainstream cluster, with what is mainstream in a given country's culture.** The US was the earliest country to match mainstream TikTok content (memes/sports/gaming) with mainstream US culture. However, it's important to note that at this period, we only had mainstream alignment for L2M, **not L345** users.

By looking at the north star cluster, we can get an idea of types of videos our top user group is consuming and posting to better understand what's "mainstream" in the app at that time. One way to measure the north star cluster is by looking at "Video View" - or "vv" - number of videos consumed by users under a cluster vs "Video Viewed" - or "vv-ed" - number of videos created by users under a cluster. In other words, "vv" captures the "demand" (for TikTok) of a cluster while "vv-ed" captures the "supply" (to TikTok) of the same cluster. The higher the demand and supply, the more important these users are to our content ecosystem:

DOCUMENT METADATA

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