Research on the User Experience of Infinite Up-scrolling on Chinese Short Video Software Douyin

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Abstract: Douyin/TikTok is a popular short-form video application popular around the globe. The infinite up-scrolling video stream system that it is using is applying to more and more diversified applications. This research focused on the infinite up-scrolling video stream system's influence on the Chinese user group and the public reaction towards it. A survey was conducted, and 145 valid answers were received. The questionnaire focused on the public's daily interaction with the up-scrolling system. Through the statistics received, it is shown that most people like the feeling caused by up-swiping, and they easily use it over time. This phenomenon is explained from the perspective of psychology. The psychology analysis also explained why people often spend more time in this system than they planned or expected. Meanwhile, there is a large percentage of the public using the up-scrolling system in applications that are primarily for other usages. The system was adopted into these applications later on through program updates. With this system, applications are able to make their users more dependent on them. Therefore, this system is getting more and more popular in all kinds of applications.

Keywords: up-scrolling, Douyin/TikTok, short video

1.   Introduction

TikTok (also known as Douyin in mainland China particularly) is a popular short-form video application owned by Chinese company ByteDance. Douyin was launched into the Chinese application market in September 2016 and has hit 100 million users within a year, facing all age groups of users. Users create lip sync videos based on the music provided in the application and post videos on Douyin. These videos are often short. A first-time user is only allowed to post a video that is 15 seconds or less. However, this short video system received the public's attention. Since 2016 till now, Douyin and its company Bytedance have developed drastically.

At first, Douyin was accused of having a similar design to another short-form video application Musical.ly. Nevertheless, the rumors stopped as Musical.ly merged into TikTok in August 2018. TikTok, the international version of Douyin, was first released outside mainland China in 2017. In October 2018, TikTok became the app with the highest monthly downloads and installs in the United States. TikTok has been downloaded about 80 million times in the United States and nearly 800 million times in over 150 countries besides mainland China by that time.

In June 2018, Douyin had 500 million monthly active users globally and 150 million daily active users in mainland China. At the beginning of 2018, TikTok was the most downloaded app on

Apple's App Store. It was estimated that there had been 1.04 million downloads. By the time of September 2021, TikTok has reached 1 billion monthly active users globally. Nevertheless, it was estimated that the main user group of TikTok/Douyin remains in China.

In mainland China, Douyin's brand value of film and television media ranks first in December 2019. On the same year, on December 12th the Huiju.com 2019 Hurun Brand List was released, Douyin ranked 36th with a brand value of 50 billion CYN and ranked 2nd among the top ten leading growth brands with an increase of 285%. The number of active daily users in China exceeds 600 million in August 2020.

At first, the main user groups of Douyin in China are young adults and teenagers. However, it changed over time. By March 2020, only 10.1% of the users were under the age of 18 and 13.3% of the users are between 19-24 years old. There was a big increase in the adult user group, specifically between 31-35 years old. By 2020, 20.6% of all Douyin users in China mainland are between 31-35 years old. This percentage increased by 5.0% from the previous year (2019) [1].

Douyin/TikTok and other similar applications all applied the same video playing strategy-infinite up-scrolling video stream. When users open Douyin/TikTok, the first thing that comes is the For You page. This page provides an unlimited number of videos. By up scrolling, the users would lead by the application to see the next video. The next video is chosen based on the calculation of individual user's preferences so that the application can make sure that users would keep focused on the provided content. First-time users may not be interested right away, but as users keep watching videos, the algorithm of short video applications can analyze more about them. The algorithm of Douyin/TikTok is very complicated, it is based on user activities such as positive feedback (including likes, comments, shares, completion, and re-watches), subject matter (including caption keywords, sounds, hashtags, effects, content), location and language (including posting location, language preferences, type of mobile device), audio (background music of videos), and negative feedback (including skipping through video, marked as "not interested") [2]. Combining all factors, the application can provide users with a limitless scroll of videos that interests them.

Douyin/TikTok is only one of the countless applications that contain such algorithm and the infinite up-scrolling strategy. Many other video applications have adopted them too, such as Bilibili in China, and Instagram globally. Bilibili used to focus on long, horizontal videos, but it adapted to the vertical mode in June 2022. The vertical mode is mostly identical to the Douyin/TikTok infinite up-scrolling strategy. Similarly, Instagram revealed the Instagram Reels on August 5, 2020. The Instagram Reels is also mostly identical to the Douyin/TikTok up-scrolling strategy. Instagram used to be a social media application focusing on the publication of pictures, but Instagram Reels could be changing the picture. In 2022, Instagram updated Instagram Reels and decided to make it the main feature of the application. However, this move received many major criticisms. Besides social media applications, almost all applications are also adopting the up-scrolling short video displaying system, some are even irrelevant to videos, such as the Youdao Dictionary, Meitu (picture editing application), and many others.

2. Literature Review

With short videos becoming viral among mast majorities, many scholars have conducted research about the behavior of watching short videos. In Chauncey J. Neyman's research, he addressed infinite up-scrolling as an addictive software design. By putting all content on a single page rather than spreading them across a series of pages, people will keep scrolling the screen in order to get to the next content. Since there's no virtual end provided that tells one to stop consuming, one can easily consume past the assumed point of consumption without knowing. This results in users spending much more time on applications than intended [3]. He stated that this strategy applied a psychological phenomenon illustrated by the "Bottomless Bowl" study. It is conducted in 2005 by

Cornell professor Brian Wansink, showing that people decide how much to consume based on visual cues. When there's no visual cue, people are likely to overconsume. In the paper that professor Wansink published in 2012, he states that the visual cue of the amount of food that remains in the bowl would create a bias on the consumer to consume in the direction that is past the point where they would have stopped consuming if they were provided with a limited amount of supply. These visual cues are everywhere in people's lives, and they influence people's decision-making processes without people deliberately accepting them [4]. Nevertheless, the visual cues are not that the bowl is empty, but in the experiment, 25% of the food is left in the bowl [5]. As this phenomenon applies to the infinite up-scrolling video displaying strategy, people would watch the video for a longer time than they intended to, which attracts many application firms to adapt this strategy to their products.

In another research, the concept of "flow" was mentioned. Flow is a positive state of mind that keeps one immensely focused [6]. It is hard to get out of the highly concentrated state of mind without having a natural stop such as the visual cues mentioned in the study of the "bottomless bowl" [4]. It should be a positive phenomenon, considering how hard it is for nowadays people to keep concentrated and efficient. However, Christian Montag states that when this concept is used in social media, users can lose track of time and space in a negative way [7] and fall into the endless trap of short videos. An example of forgetting time and space would be the traffic accidents caused by smartphone usage [7]. When people are watching short videos on an endless scroll, they would fall into the flow of videos. After each up-scrolling motion, they are likely to receive a reward-an interesting video. This displays the intermittent conditioning principles, which refer to receiving rewards in a seemingly irregular interval that drives the most effort from one [7]. This same strategy is used in video games and gambling [8], The up-scrolling video scream strategy used exactly this phenomenon. There is a possibility for users so scroll to interesting videos, therefore they would keep scrolling. Moreover, it is also similar to auto-play functions in many systems. As soon as the previous video ends, the next recommended video starts to play. The YouTube-style auto play function used to be referred to as the "radicalizer" because of its high influence on people's actions as they watch videos [9]. The article states that with no natural stop provided for them, users tend to keep in the flow for a longer time.

In the research of Yulun Ma and Yue Hu, they introduced how the AI algorithm of TikTok/Douyin chose videos for individual users from the wide pool of contents and make sure the video fits one's taste. In years of running this application, Bytedance used Douyin/TikTok to prove the success of their algorithm [10]. This sophisticated algorithm presents users with an endless and highly interesting video stream that keeps them to keep scrolling the screen. Echoing back to previous research of Montag, users receive rewarding content picked specifically for them once in a few swipes, the "bottomless bowl" disposes of their visual cues for stop, hence they would fall into the flow and keep watching videos in the endless up-scroll video stream while losing the sense of time and space. Over usage of screens could lead to physical harm such as tiring eyes [11].

Though there is much research about the function behind the infinite up-scrolling video stream, they often stay on the theoretical level by using psychological studies, few researchers focused on the public's opinion and action towards the infinite up-scrolling video streams in life. People's opinion can affect their behavior; therefore, the study of their opinions can help infer their behaviors in using the infinite up-scrolling video streams in reality. This research will study the Chinese public's opinion and acceptance of infinite up-scrolling video streams through a questionnaire.

3. Methodology

In the released questionnaire, there are in total 6 questions each related to the opinion in infinite up-scrolling video streams. The survey was conducted in Chinese, but it will be translated into English

in the following. The questionnaire title is "Infinite up-scrolling video stream public acceptance and opinion survey". It was made through the Chinese popular survey application "Wenjuanxing". The survey was released on September 18, 2022, at 8：00 AM and stopped at 2:00 PM the same day. It was spread through WeChat moments and WeChat chats. There are in total 145 valid answers gotten. Answers that are contradictory (such as choosing "I don't watch video" and "I watch videos on TikTok") are not counted as valid answers.

4. Result

There are in total 145 valid answers gotten. Among the 145 survey takers, only 5 of them (3.57%) do not watch any kind of short videos on a regular basis. On the other hand, among the 140 survey takers who do watch short videos, the top 4 choices are Bilibili, Douyin/TikTok, Xiaohongshu, and WeChat Channel (listed in order from top to fourth). In the 68 of the survey takers who do watch short videos (44.74%) watch Douyin/TikTok, 97 of them (69.28%) watch Bilibili, 56 of them (40.0%) watch WeChat Channel, and 62 of them (44.29%) watch Xiaohongshu, 19 of them watch Instagram (13.10%), 14 of them use News applications (9.66%), 3 of them watch Youdao Dictionary (2.07%), and 4 of them chose "Others" (2.76%).

In the question of how long they think they watch per time, 7 of them believe that they watch under 5 minutes, 24 of them between 5 to 15 minutes, 60 of them between 15 to 30 minutes, 40 of them between 30 to 60 minutes, 13 of them between 60 to 120 minutes, and 5 of them above 120 minutes. The average percentage of videos swiped into that would be watched is 57.97%. 94 out of the 140 survey takers (67.14%) who watch short videos like the feeling of up-scrolling, the rest (46, 32.86%) does not. Nevertheless, this result is based on the survey taker's self-evaluation. In another question, 124 out of 140 of them (85.71%) believe that they spent more time on social media than they have previously evaluated.

As for the reason for them to stop scrolling for videos, the reason of "can't swipe into anything interesting" got an intensity of 41.54 (100 as always happen and 0 as never happened), "remembered something to do" as 66.87, "tired" as 50.83, and "reached the plan" as 30.14.

Out of the 145 participants, 84 are under 18 years old (57.93%), 6 between 18 to 24(4.14%), 1 between 25 to 30(0.69%), 23 between 30 to 39(15.86%), 31 between 40 to 49(21.38%), and none above 50.

Among the 66 participants who use Douyin/Tik Tok, 40 of them also watch Bilibili, 25 of them also watch WeChat Channel, and 29 of them also watch Xiaohongshu. Most of the Douyin/TikTok users watch short videos for 15-30 (33.33%) or 30-60 (31.82%) minutes every time they start. They would watch an average of 63.38% of all videos that they swiped into. 50 of the 66 Douyin/TikTok users (75.56%) like the feel of swiping up. 58 out of the 66 participants (87.88%) think they are spending more time than expected. As for the reason to stop scrolling, the most common one is that they've suddenly remembered something to do (average intensity of 67.61). Subsequently, the second common is feeling tired (average intensity of 67.61), the third is can't find anything interesting (average intensity of 40.25), and the last is they've reached their original plan(average intensity of 28.5). Most of the 66 survey takers (61 out of 66) are from China's first-tier cities.

As for the Bilibili users, most percentages in questions 1,2,4,5, and 6 are similar to Douyin/TikTok users. However, the percentage of users who like the feel of up-swiping is smaller; only 60.2% of Bilibili users who took this survey like the feel of swiping up, which is significantly lower than 75.56% of the Douyin/TikTok users.

Most of the statistics of other applications remain similar to Douyin/TikTok's results.

5.   Discussion

Overall, 67.14% of the survey takers liked the feeling of up-swiping. This phenomenon can be explained by the psychological term intermittent reinforcement. The irregular receive of interesting videos makes users keep swiping for new videos. Also, up-swiping is a very simple action. It does not require much thinking or physical input. It is much easier than the other ways of watching videos: no searching, no choosing. By a simple action, users can receive various enjoyable contents to watch. The algorithm and the easy design helped users to avoid any unnecessary actions. They can intake more content than ever.

But being highly dependent on the system can easily lead to a backlash. The first condition is that the algorithm miscalculates and fails to find what interests the user. In this case, many users would stop swiping, which is also shown in the survey that "can't swipe into anything interesting" got an average intensity of 41.54. If people's continuous swipes lead to nothing but boring content, it is a simple waste of time. However, there's another case where people keep swiping into interesting videos. Is that a better case? Not necessarily. Without a natural stop, it is hard for people to stop swiping. At the end of the day, users would find themselves spending way more time up-swiping for videos than they have expected to. These two cases could be rather extreme, but almost never the algorithm provides you a "stop" at the right time.

To avoid these backlashes, people have to provide themselves with a stop according to their plans. It could be as simple as a timer. It may not solve the problem completely, but it would help to have a visual cue.

Most of the applications' statistics remain consistent. Nevertheless, one answer from Bilibili users is different- the likeness towards up-swiping. The reason why Bilibili users have a significantly lower likeness towards up-scrolling could be that Bilibili includes not only infinite up-scrolling video streams like Douyin/TikTok but also includes the traditional long video functions like YouTube. People could be using this application to watch a long movie or a long video from an uploader they like.

Nevertheless, most of the users still like the feel of up-swiping. Also, since 41% of the survey-taking Bilibili users also use Douyin/TikTok, it could be reasonably inferred that many of them do watch up-scrolling video streams. This short video stream function in Bilibili is newly introduced to the users this year, but it quickly blends into an important function of this app. Before, there weren't many vertical videos posted on Bilibili, so the application did not form a sophisticated function for it. But as short vertical videos became more and more common, this "vertical mode" do seem necessary. Short videos that are each about 15 seconds long do not match the previous setting. In the previous setting, users would have to choose the next video out of a lot of options after every single video. It fits long videos because this action does not have to be repeated very frequently, but when it must be repeated every 15 seconds, it's tiring. As shown in the results, getting tired is one of the important factors of why users stop swiping for new videos.

This function does provide some benefits. Many content creators who used to post videos alone on TikTok would now post videos on both platforms to receive more influence. Therefore, users could receive a wider choice of videos.

However, the "vertical mode" also created some major downsides. The most significant one is that people would spend more time on short videos. Not only that it eats up people's free time, but it also makes people less likely to sit down and patiently go through long things such as a movie. People's time is cut into pieces by short videos, and this phenomenon is shown by how short videos tend to have more views than long videos.

Among the 8 choices of applications, even the least chosen one- Youdao Dictionary- got 3 of the survey takers using it to watch short videos. Technicality speaking, only Douyin/TikTok is

primarily made for short videos in all these choices. All other applications adopted the infinite up-scrolling short video stream as an additional function: such as the vertical mode in Bilibili, Instagram Reels in Instagram, WeChat Channel in WeChat. etc. These applications used to focus on other functions, some are for long videos, some are for pictures, some are for studying, some are for news.

So many different applications adopted the infinite up-scrolling system, and users are using these functions on them. These functions give users an alternative choice when they are watching videos. However, this choice may not be voluntary. In many applications, the infinite up-scrolling system is unavoidable. The different functions are often mixed together, and people do not have the power to completely turn it off. Many people would actually prefer the original functions of these applications. To them, the infinite video stream is more of a distraction, but not an enjoyable choice.

It would be helpful if the applications can separate different systems, and not let infinite up-scrolling short video streams take over every application and every moment.

6.   Conclusion

Infinite up-scrolling video stream is a common system that is used in all kinds of applications nowadays. It first started being used in short video applications such as Douyin/TikTok and Musical.ly. But as short videos became more and more common, many other applications start to adopt this system. This system can cause users to spend more time watching short videos for several reasons. First, users get rewarded with interesting videos once in a few swipes, which is an action of intermediate reinforcement. This irregular rewarding system makes people like the action of up-swiping and spend more time scrolling for new videos. Secondly, the video stream is infinite. In this system, users do not get any artificial visual cue to stop. Therefore, people cannot acknowledge how much they have watched. When people lose reference to their expectations, people would consume more than planned. In this case, users would watch more videos than they planned or expected. Thirdly, the up-swiping action is easy. Different from the traditional YouTube-style video displaying system, this action does not require much thinking or physical effort. Users would easily get tired if they must decide what to watch next after every 15-second video. Therefore, the easy up-swiping action fits better with the short video displaying system. Because of all the reasons above, more application designers are putting the infinite up-scrolling video stream into their applications in order to have their users get more dependent and loyal to the application. There are benefits provided by this system, but there are also downsides. Hence, users must carefully evaluate their usage of these functions in order to avoid high dependence on them.

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