Does the use of big data influence our actions and the content we consume on online platforms?

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Introduction

Big data can be defined as data that is very complex and large, which would not be possible for traditional data processing software to handle (Oracle, 2021). With the rapid rise of technology, even the tiniest trace of our digital footprint can be used to reveal something about ourselves. Every single action we carry out on the Internet contributes to an endless stream of data, which can be accessed by companies to alter their business strategy and to persuade us. This essay will explore how online platforms use our personal data to provide recommendations on the content we consume, and how this could affect our decision making and behaviour. This will be done by discussing the use of big data in three main sections: the 2016 United States presidential election, the Netflix recommendation system, and social media platforms.

The 2016 United States Presidential Election

Cambridge Analytica

Cambridge Analytica (CA), a British political consulting firm, gained attention by claiming that they had an advanced campaign heavily driven by data which was a key factor that caused Donald Trump's victory in the 2016 United States presidential election. Aleksandr Kogan, a researcher who worked at the University of Cambridge, built a quiz app on Facebook that was used by 270,000 users. This collected data from the users who took the quiz, as well as data from their friends on Facebook due to a fault in the Facebook API (Application Programming Interface) which allowed CA to access data from over 87 million profiles (Chang, 2018). The Trump campaign spent $100 million on digital advertising through CA alone (Kaiser, 2019). This signifies that the Trump campaign was heavily invested in using CA's strategies to aid their campaign.

Cambridge Analytica's "Behavioural Microtargeting" Strategy

Alexander Nix, the former CEO of Cambridge Analytica, claimed that with the data that CA had collected from various sources, including the data collected via Kogan, they were able to "form a model to predict the personality of every single adult in the United States of America" (Vaidhyanathan, 2018). The basis of this model, known as the Big Five personality scale, was based on five factors: a person's agreeableness, neuroticism, extraversion, openness, and conscientiousness (Chen & Potenza, 2018). The data collected would be analysed to understand a person based on the scale, and psychologists used this information to determine the motivations behind their actions (Kaiser, 2019). Kaiser stated that "behavioural microtargeting" was a term that CA created, where they would use different approaches to group individuals together based on their personality traits and concerns, message them repeatedly and adjust their messages until they had achieved their desired results. If this were true, messages could be created to encourage Clinton supporters to not vote for her, or persuade undecided voters to vote for Trump, which could influence the outcomes of the

election. This method of advertising and targeting would be more effective than traditional advertisements as they are tailored towards an individual, rather than being designed for a group of people with similar personalities and backgrounds.

Other factors that guided Trump's success in the 2016 US Presidential Election

Election campaigns in the United States had traditionally used public records of demography and voter habits instead of large databases providing a wealth of information regarding an individual (Vaidhyanathan, 2018). There are many speculations that Trump did not heavily rely on CA's techniques and strategies but instead opted in using Facebook to display ads, which also require the use of big data to promote their campaign.

David Carroll, who is an associate professor at Parsons School of Design in New York City, made an inquiry to CA regarding the data that they held about him. The information that CA had turned out to be quite simple, such as the location in which he had voted in and the party that he voted for. This data was incomparable to the large database that CA has previously claimed to have collected and analysed. With this information, CA was just using typical regression methods based on basic information regarding age and place of residence to predict a person's voting preference (Sumpter, 2018). This disregards all the previous statements that CA has made regarding their use of data to analyse and map out an individual's personality traits and behaviour in order to perform behavioural microtargeting. With strategies that were used in many campaigns before the Trump campaign, the current size of big data was not essential, as this huge variety of data would be too complex and difficult to analyse.

The Trump campaign stated that Facebook ads were central to their strategy in winning the 2016 United States presidential election. They created around 50 thousand variants of their ads every day and displayed them to users to test their performance, changing minimal features such as the format and the inclusion of subtitles (Lapowsky, 2016). With the information Facebook had about any user, including the pages they follow and the content they interact the most with, ads could be tailored to specific groups of people. Whilst the ads were designed for people with different opinions regarding their preferred candidate, they divided their target audience into large groups, such as young women and African American voters. Then, they designed messages dedicated to these specific groups of people that had bad claims about Clinton, which would hopefully minimise the number of people voting for her (Vaidhyanathan, 2018). Even though this tactic still relies heavily on the use of big data, it does not analyse an individual completely in-depth as CA had previously claimed. Instead, the campaign relied on clustering people into large groups based on their Facebook data and targeted these groups as a whole. This method would be more efficient compared to behavioural microtargeting and would allow Trump's campaign to be more effective and possibly influence more people.

Did Cambridge Analytica's "Behavioural Microtargeting" have any effect on Trump's victory?

Many opinions state that Cambridge Analytica's "behavioural microtargeting" was a false claim that they made. The Trump digital team realised that older, and more basic data sets provided by the Republican Party about voter information from previous years were more reliable than the data that CA had gathered (Vaidhyanathan, 2018). This suggests that the data CA had was too complex to analyse and would require much more time and effort compared to using traditional voter data. Political scientist David Karpf claims that the targeted advertising that CA had promoted was "conceptually quite simple and practically very complicated" (Vaidhyanathan, 2018). Analysing data of millions of voters, grouping them according to their personality traits, then targeting individuals with personalised messages would require a lot of people to work on the campaign. These methods claimed to be adopted by CA would probably not be possible if they were auto-generated by code, as it would not have any sense of emotion as humans do, and it would not be able to create unique messages that touch the hearts of millions of Americans to change their preferences.

In general, the effects of microtargeting could be seen as limited and even ineffective. The use of big data to target specific people could be unreliable and the data becomes less informative as people's preferences change (Chen & Potenza, 2018). When people's habits of consuming online content change rapidly, the vast amounts of data collected could affect the judgement of their personality, as the type of content they consume on one day could be different to the content they consume on another day. Eitan Hersh, who is a professor at Tufts University teaching political science stated that there is only a weak correlation between personality traits and political values (Chen & Potenza, 2018). Hence, the microtargeting advertised by CA would not be effective, and messages could be targeted to the wrong people even by accurately analysing their personality. This could be proved by a New York University research paper from 2009, where they found that an individual's parents were more likely to provide a reliable prediction of voting behaviour rather than using the Big Five personality scale (Resnick, 2018).

Even though advertisements that suit a person's personality would seem more appealing, they could work purely based on reinforcing people's previous political opinions, as persuading someone to vote for Clinton instead of Trump would very unlikely be successful (Resnick, 2018). This could be due to a person's preconceived opinions regarding a particular candidate or political party, and it would be hard to convince a person to vote for a different candidate due to personal favouritism and bias. It would also be hard to design ads to convince an individual to change their political opinion despite fully understanding their personality (Resnick, 2018). This suggests that human beings all have different perceptions of the exact same piece of information, so despite having an ad that may have

been perfectly designed to suit their personality, different people may find it persuasive on a variety of levels, as no individual is the same.

Summary

CA's behavioural microtargeting strategy if were true would rely on huge amounts of big data of the US population collected through Facebook. Their tactic of analysing people's behaviour in order to design specific ads for them based on their personality may seem like the best way to persuade people to vote for Trump instead of Clinton. However, there are many speculations that this was not true, and would be very hard to implement. Hence, the Trump campaign partly used traditional campaign strategies, which relied on previous user voter data in the US. Whilst this still relies on big data, the data required is not as extensive, which would be easier to analyse and interpret, and target messages to specific groups of people. The campaign also utilised the Facebook platform to promote ads to specific groups of people. This requires the use of Facebook data to cluster individuals into groups and to find out their interests to target ads to them. Overall, the Trump campaign heavily relied on data to make informed decisions. Whilst it was not the largest scope of data CA had bragged about, big data was still used in their campaign for Facebook ads to influence people.

Netflix

Shifting away from politics, it is important to consider the platforms that we use every day. Netflix is the most popular online streaming service with over 200 million paying subscribers in 2021 (Statista, 2021). They mainly purchase shows and movies from other companies, but they also produce their own content, which are labelled as "Netflix Originals". A major feature of the streaming service is its recommendation system. By collecting a large variety of their users' data, Netflix is able to suggest content such as movies and TV shows for their subscribers to watch based on their previous watching habits.

Personalisation

There are multiple forms of personalisation that Netflix utilises for their users, such as the image of a title and how the titles are ordered on their homepage. Xavier Amatriain, who was an engineering director at Netflix, suggested that all user behaviours on Netflix such as search history and browsing activity plays a role in influencing the content that a user sees on their homepage. He also stated that their algorithms assume that users who exhibit similar viewing patterns have similar user tastes (Vanderbilt, 2013). By using the data of other users, Netflix is able to categorise people into groups that have similar taste preferences, which allows them to provide recommendations that would theoretically appeal to any user who belongs in that specific group.

Netflix realises that artwork consumes the most attention of a user and has a large significance in helping them decide the content they choose to watch (Nelson, 2016). They carry out thorough testing

to ensure that the best artwork that represents the title is shown to the user and ultimately captures their attention to take interest in the title. Through these tests, they were able to gather that the best performing images were villainous characters as well as ones that display lots of emotion. Since such minor details can be informed from just testing and observing the actions of their subscribers, the data they gather is important in guiding their future artwork titles for other users, in order to make their content appeal to an even wider audience.

However, the previous testing method was only able to determine one winning artwork for each title, which would be displayed to all their members. Netflix has since developed this concept of artwork personalisation further at an individual level: finding the best artwork for each user based on the data Netflix have on their taste and preferences (Chandrashekar, et al., 2017). By designing multiple artworks for all their titles, they are able to choose the best artwork that would appeal the most to each user individually instead of displaying one artwork that would only appeal to the majority of their users.

The Netflix homepage is sorted into horizontal rows, where the titles within each row have a common theme or genre. Since the top left corner is the first thing a user sees, the ranking is sorted from left to right and top to bottom. This feature allows for the content that is most compatible with the user's interests to be the first thing they see, and as they browse downwards or scroll towards the right of each row, the content displayed becomes less of a "match" to their usual preferences. There are over 75 thousand row labels within the Netflix catalogue, with the most popular categories being "Comedies", "Action", and "Adventure" (Databricks, 2019). There are a wide variety of categories that would suit a user's taste preference, which would allow them to find something they would enjoy watching.

By looking at the popular content consumed on piracy sites, it acts as a guide for Netflix to decide on the content they should add to their catalogue (Kelion, 2013). This approach could attract people to subscribe to their service, as the content they wanted to watch was previously not available. The data Netflix had about their users helped them inform their future decisions, such as investing $100 million to produce two seasons of their first Netflix Original: House of Cards. Their user data suggested that there was a potential audience for this show since users liked the original BBC version, and they enjoyed content from actor Kevin Spacey and director David Fincher who was involved in the Netflix production (Grandinetti, 2017). Investing a large sum of money on a new show would be a huge risk, and the user data Netflix had ensured that the show would be successful on the platform, and its success would gain them even more subscribers as the show was not available on other platforms.

Comparison of Two Netflix Profiles

I gathered my own data by using two different active user profiles on Netflix and comparing the content suggested within each profile. In the 4 figures below, figures 1 and 2 include the profile of

user 1, and figures 3 and 4 include the profile of user 2. The two profiles demonstrate the variety and personalisation of the Netflix recommendation system.

Firstly, a wide range of row labels can be seen. For US TV shows alone, the four specific row labels "Western TV Dramas", "Western TV Shows", "US TV Shows", and "Binge-worthy US TV Shows" exist, even though they would theoretically contain very similar content. This shows the specificness of the row labels, as these could influence the user's choice of the title they would click on.

Secondly, the two profiles have six titles in common. Apart from Modern Family, which is highlighted with the grey rectangle, the other five titles (The Good Doctor, How to Get Away with Murder, Outer Banks, Breaking Bad, and The Blacklist) have different images displayed, which can be matched with the rectangle of the same colour between the two profiles. This signifies that Netflix does use their algorithms to display different title images to different users based on their past activity on the platform.

All these aspects highlight that every user experience on Netflix would be different, as there are infinite combinations of row ranking, row titles, and title images that are possible. With personalisation that is designed specifically for a user, they would be influenced by the titles displayed on their homepage, as they may not be exposed to the same titles as another user unless they specifically search for it.

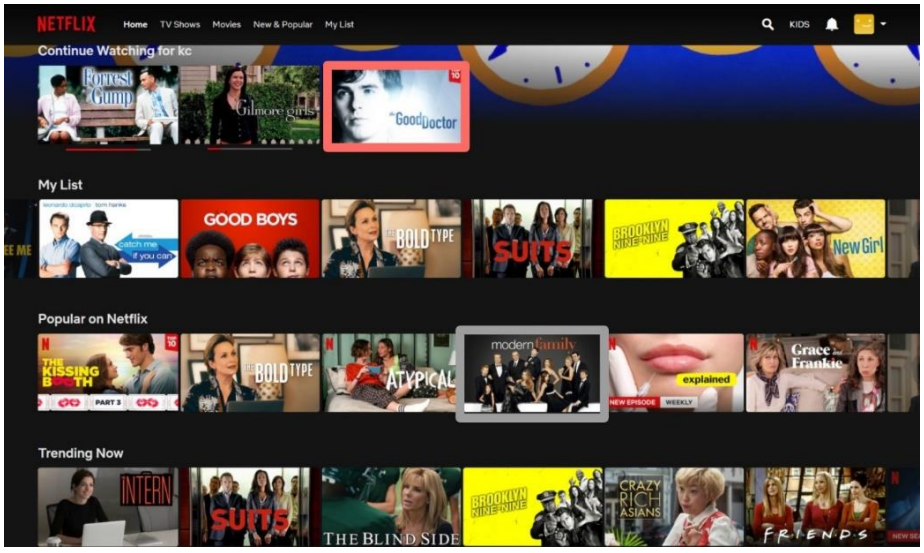

Figure 1 – Netflix user 1 profile, part 1 (Source: Netflix)

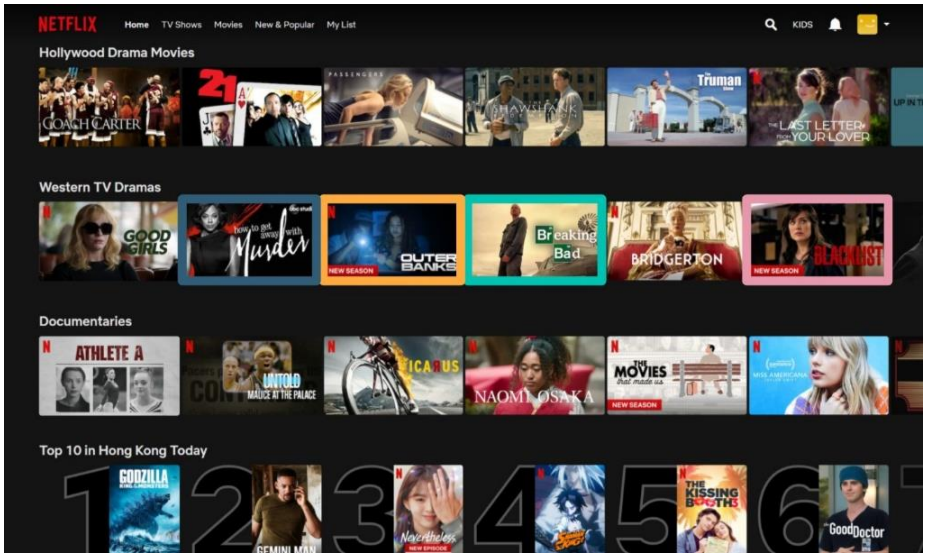

Figure 2 – Netflix user 1 profile, part 2 (Source: Netflix)

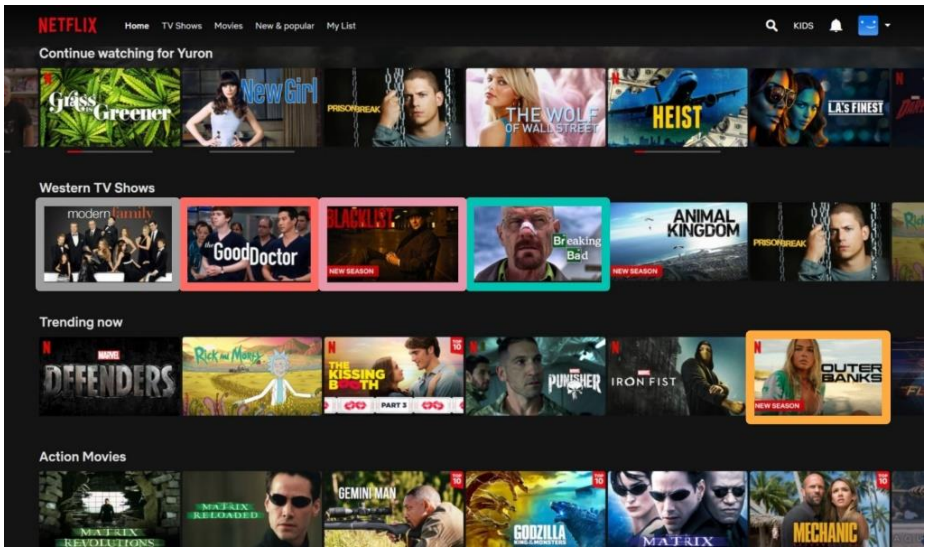

Figure 3 – Netflix user 2 profile, part 1 (Source: Netflix)

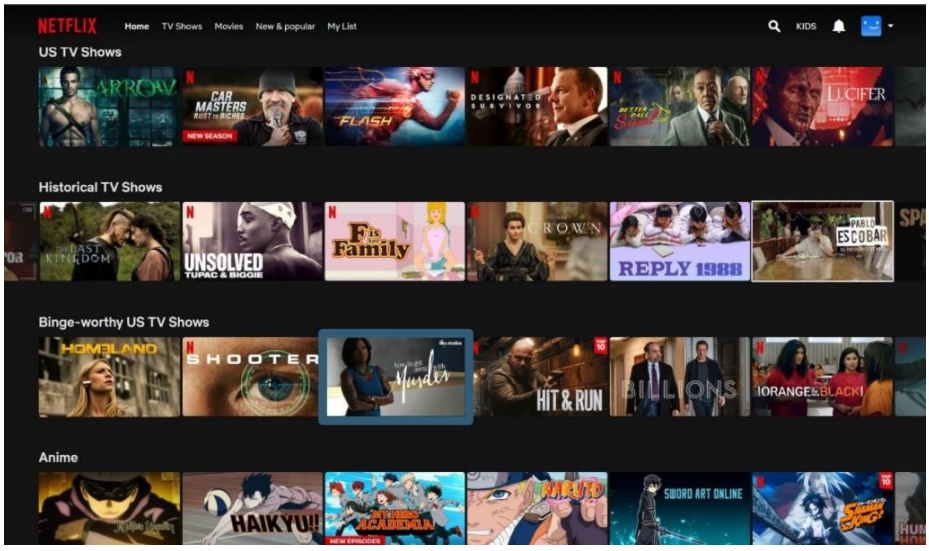

Figure 4 – Netflix user 2 profile, part 2 (Source: Netflix)

How Netflix Has Changed our Consumption Habits

With the rise of streaming services, binge-watching has become a huge phenomenon in our everyday lives. This encourages television show writers to have their story arcs span over multiple episodes, even though they are being written for broadcast television where the episodes are aired on a weekly basis (Steiner, 2017). This allows their shows to be consumed on streaming platforms like Netflix, hence encouraging binge-watching behaviour in order to find out how the narrative progresses in a show, which ultimately demonstrates that the show is successful if many people are engaging with it.

This type of behaviour has guided Netflix to have their own release strategy, where they release the entire season of a show. They first did this with House of Cards, which has proved to be a huge success, where they have influenced other streaming platforms to do the same (Baker, 2017). This allowed viewers to watch the entirety of a new show without having to wait for new episodes to be released weekly and has since changed the way we consume television shows. This release strategy also enables viewers to watch shows at their own pace, allowing the consumption of television to be scheduled in their own free time.

From Theodoropoulou's (2017) interview with Netflix subscribers in the UK, multiple interviewees have stated that they don't watch the news or sports as often anymore since they had Netflix. Some interviewees viewed it as a loss of control over the content that they consume. However, they appreciated the ability to watch content wherever and whenever they wanted. This demonstrates the shift in consumption of streaming instead of watching television the traditional way before streaming services existed.

An interview that was conducted by Novak (2017) involving Netflix users who were millennials has shown mixed feelings towards Netflix's recommender system. Some interviewees appreciated that the system removes the hassle of finding something to watch, as well as providing content they would enjoy but have never thought of searching for. Other interviewees found that the recommendations were limiting their experience, as they were unable to have content suggestions that they don't consume regularly but have an interest in. While there are positives and negatives to this new way of consumption, people are able to see how the recommender system has influenced their user experience and the content that they consume.

According to Netflix Technology Blog, 75% of content watched by Netflix users is suggested through the recommendation system (Amatriain & Basilico, 2012). Since most of the content watched on Netflix comes from the recommendation system, it plays a major role in influencing the content that a user watches, as the content suggested may be a movie or TV show that they have never come across before. This form of personalization allows users to have an endless amount of content that is suited towards their interests to consume on Netflix, ultimately keeping users entertained on the service. Whilst some of the arguments above suggest that the recommendation system has some minor flaws,

it is hard to quantify this using actual figures, other than by conducting interviews. It is also difficult to find data on how much time we spend watching Netflix compared to watching television, but it is evident that there has been a change on how we watch shows and movies.

Summary

Through the extensive use of big data, Netflix is able to deduce the content that a user would be interested in, and hence provide quite accurate recommendations as to what they would enjoy watching. Without comparing different user data and placing them into groups with similar tastes, the Netflix platform would not be the same since the main part of using the platform is its accurate suggestions to users. It is also partly due to the success of the overall layout and design of the streaming service that allows people to consume content that is best suited to them in the most frictionless way.

Social Media

Whilst Netflix provides recommendations for shows and movies based on individual's data, social media also does this by displaying posts that are most relevant to you in the form of pictures and videos. Personalisation is a major factor that lures people to use social media. However, its addictive design could suggest that big data is not the major factor that influences us to use it so frequently.

How Social Media Is Designed to Be Addictive

Habits are described to be "things we do with little or no conscious thought" by cognitive psychologists (Eyal & Hoover, 2014). Eyal describes how a product can be designed to become addictive through using the "Hook Model" which contains four steps: trigger, action, variable reward, and investment. All social media platforms follow this four-step model, which allows users to form habits, which could be seen as a form of manipulation as this behaviour could become part of our subconscious mind. This does not rely on any data collected about individuals, but instead, it is done through the tactical design of the user interface.

There are two types of triggers: external and internal triggers. External triggers are things that provide distractions, while an internal trigger is caused by our emotions where we want to seek an escape (BBC Ideas, 2020). For social media, an external trigger could be a notification and an internal trigger could be the need to post pictures displaying significant moments in your life. Our emotions can be easily controlled once companies are aware of this concept, which demonstrates that the use of big data is not essential to motivate us to use social media.

For an action to take place, the Fogg Behaviour Model states that a given behaviour will occur when motivation, ability and a trigger are all present with sufficient significance (Eyal & Hoover, 2014). In the context of social media, a form of motivation would be to seek social acceptance from your

friends and peers. The ease of using a social media platform also plays a major role as it reduces the effort required to perform an action on an app. Platforms such as Instagram have made posting photos much easier now compared to the older versions of the app, as it provides users with the ability to capture a photo and edit it to their liking all on the app itself.

The variable reward provided to a user reinforces their motivation for their action that has taken place in the previous phase and is connected to the last phase which is their investment in a product (Eyal & Hoover, 2014). Eyal describes that variability is important as various experiments demonstrate that it increases levels of dopamine, which motivates us to search for rewards. There are many forms of rewards on social media, such as receiving likes and comments on your post or simply opening the app with an endless number of posts to scroll through. Every time the app is open, different posts appear, and every post you scroll to is a surprise. This constantly causes us to have internal triggers to open these apps to ensure we are not missing out on anything that is happening around us.

The design of social media follows the concept of slot machines, where the app replicates the experience of "pulling down a lever" in order to refresh the page and see the most updated content, which gives the user a false sense of control (Vox, 2018). After pulling down on the screen to refresh the page, the user may be rewarded with new content, but there may also be no updates if there is no new content available. This unpredictability leads us to constantly check these apps (Price, 2018). Once this habit is formed, the addictive nature of social media alone is sufficient for you to use the platform. Hence, the use of big data to display highly relevant posts is insignificant.

Online Behavioural Advertising

Online behavioural advertising (OBA) is a term used to describe the action where advertisers watch people's behaviour online and use the data collected to display advertisements that are specifically aimed at them based on their interests (Boerman, et al., 2017). This method heavily relies on big data as it is used to inform the advertiser's decisions on the type of content they should promote to users, or whether it's worth investing money in displaying advertisements towards an individual. OBA is seen as the most important method of reaching specific, targeted audiences and it is strongly seen as "the future of advertising" (Boerman, et al., 2017). The act of OBA also minimises the amount of advertising that is irrelevant to a consumer, which could be seen as a positive for online users (Strycharz, et al., 2019). Whilst these advertisements are suited to a potential consumer's interests, there are different opinions and concerns regarding the ethical use of OBA.

The amount of personal information about an individual used depends on the level of personalisation required by an advertiser. The level of personalisation is mainly based on two factors: the types of personal data used to target the ad and the amount of information used (Boerman, et al., 2017). This suggests that the less data used, the less personalised an advertisement would be perceived. However, this could be seen as more ethical if basic information was used such as age and gender, rather than

tracking a person's browsing data or search history. Through multiple studies where researchers created various levels of personalised advertisements using one or more types of information about an individual, the level of personalisation influences the feelings of a consumer, such as feelings of intrusiveness, vulnerability, as well as having privacy concerns (Boerman, et al., 2017). The outcomes of these studies show that there is an overall negative outlook from a consumer's perspective, which should be seen as an impact on a consumer's behaviour.

Highly accurate use of OBA by advertisers also has an impact on a consumer's self-perception, as they are aware that an advertisement was based on their past actions online, which ultimately leads them to change their purchase behaviour based on how they see themselves (Boerman, et al., 2017). This demonstrates that users are typically aware that displayed advertisements online are chosen based on their past online behaviour, and it does change their thoughts towards themselves and influences the items they purchase online. This change in consumption behaviour shows that big data has a significant impact in altering a person's decisions and attitudes. As a consumer gains knowledge about OBA or simply recognises that an advertisement is targeted towards them, they are less susceptible to these persuasive tactics as they are able to resist the temptation and make a clear decision for themselves (Segijn & van Ooijen, 2020). The ability to recognise OBA requires high cognitive thinking, hence the awareness of OBA leads to a diminished desire to purchase a product and the advertisement become less persuasive (van Reijmersdal, et al., 2017). Therefore, OBA should be seen as less effective on adults compared to children, and they form negative attitudes towards a product, which is the opposite of the aim of an advertisement.

When consumers are aware that OBA, their beliefs towards an advertisement seem to change. While they tend to overestimate the effects of OBA on others, they underestimate its effects on themselves, which may affect their ability to have clear decision making towards purchasing a product (Boerman, et al., 2017). Whilst people are aware that OBA is being used, their ability to judge whether they truly need or want the product is hindered, so the advertisement that they see could sway them to purchase a product even though they never wanted to buy it. Consumers also want to have control over the amount of personal data that is being collected about them, and they do this by deleting their cookies to protect their online privacy (Boerman, et al., 2017). Since large amounts of information about a person can be collected from cookies, they are ultimately limiting the amount of data that is available for advertisers to use OBA. It is clear that people are aware that their data is being collected, resulting in the need to control their cookies, which can be seen as changing their online behaviour due to privacy concerns. However, these concerns could be mitigated if the benefits outweigh the costs (Segijn & van Ooijen, 2020). This would make them feel more comfortable that their data is being used, as well as form a positive attitude towards OBA.

A study has been conducted targeting children aged 9 to 13 to see if OBA affects their attitude towards a brand and their purchase intention. The results from the study demonstrate that online advertisements that display products that are based on the child's interest promote positive attitudes towards the brand, which then increases their purchase intentions (van Reijmersdal, et al., 2017). Since the children have low awareness of OBA as stated by van Reijmersdal et al., their attitude towards a product is not affected by the action of OBA, unlike adults. This demonstrates that the study only relies on whether an advertisement is effective enough to form a positive impact on a child's attitude towards a product, which makes them want to buy it. Therefore, a child is very likely to have a positive attitude towards an advertisement that is targeted towards themselves without any awareness that the advertisement was tailored towards their interests, which makes them easily persuaded by advertisers.

With current technology on Facebook, companies are able to target individuals who like specific pages on the platform based on their age, race, gender, location, etc., whilst remaining anonymous to the company itself (Chen & Potenza, 2018). With the promise of protecting user identity, people should feel more comfortable when their data is being shared, as companies are only aware of their interests and demographics. Advertisements that matched an individual's personality profile had a 40 percent increase in clicks and a 50 percent increase in sales compared to ads that weren't suited to their tastes (Chen & Potenza, 2018). This signifies that ads that were targeted to specific people may have influenced their decision on purchasing a product. However, it doesn't show that the ads increased sales as a user may have had previous interest in the product and were deciding to purchase it anyway.

By interacting on social media platforms through viewing, liking, and commenting on other people's posts, the vast amounts of data gathered can be used to infer the content that we enjoy consuming and interacting with. Facebook is developing methods of evaluating your feelings through your facial expressions on photographs and the rate of interaction with content (Sumpter, 2018). This shows the increasing importance of the consequences of our actions online, as every minuscule behaviour can be used to infer our personality, which could be ultimately used to manipulate us for social media platforms to make a profit, such as through the use of OBA.

Summary

Our addiction to social media could be seen as stemming from the conceptually thought-out design of these platforms, as they make us feel uneasy without constantly checking them. The use of OBA influences our decisions to purchase items online, as we may be persuaded by the ads we see on social media. However, the concern of privacy issues by some people worries about their data being used for the wrong reasons, and laws will need to be implemented to improve this situation.

Conclusion

The use of big data is vital to persuade the final decision on a person's vote for the presidential election, to influence the content we watch on Netflix, and to change our purchasing behaviour online. Considering all the three areas I have discussed, social media relies on big data the least to influence our actions, whilst Netflix relies on big data the most to influence the content we consume. Social media is the least reliant on big data to influence us because of our nature of addiction, which can be explained through the hook model. The intentional design of social media apps also helps to reinforce this addiction. Whilst the use of OBA relies on big data, it is hard to prove that it truly influences our purchasing decisions, as a user could have been previously interested in buying a product before seeing a targeted ad. The Trump campaign was somewhat reliant on the use of big data, as they used a mixture of traditional data and Facebook ads. The Facebook ads heavily relied on their user data, in order to target specific audiences with personalised messages and ads. Lastly, big data is an integral part of the Netflix recommendation system, as the majority of content consumed by users is suggested through it. The form of personalisation on the Netflix homepage relies heavily on big data, and it is the major reason why it is the largest streaming platform in the world. In conclusion, big data is essential for businesses and companies to make informed decisions and manipulate our behaviour based on our interests.

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