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Targeting of Online Advertising

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Table of Contents

1. Introduction	3
1.1 Motivation	3
1.2 Brief overview of online advertising	5
1.3 Structure of the thesis	6
2. Relevance of online ad targeting	6
2.1 Case – YouTube Ad Crisis	8
2.2 Effectiveness of targeting	9
3. Evolution of Targeting	10
3.1 History	10
3.2 Current situation	11
3.3 Future possibilities	13
4. Empirical study on YouTube Advertising	14
4.1 Findings	15
4.1.1 YouTube advertising on a computer with plenty of user data	15
4.1.2 YouTube advertising on a computer with very little user data	17
4.2 Limitations	19
5. Limitations of Targeting	19
5.1 Privacy limitations	20
5.2 Case – Adblock Plus	20
5.3 Cost & Data Limitations	22
6. Mobile ad targeting – A key focus point in future targeting-related research	23
6.1 Mobile ad targeting	23
6.2 Case – Privacy Assistant	24
6.3 Case – Facebook eavesdropping allegations	25
7. Conclusion	25
References	27

List of Figures

Figure 1: The different players of online advertising	5
Figure 2: YouTube ad study – Targeting with plenty of user data (Total results)	15
Figure 3: YouTube ad study – Targeting with plenty of user data (Results split into the four video categories)	16
Figure 4: YouTube ad study – Targeting with very little user data (Total results)	17
Figure 5: YouTube ad study – Targeting with very little user data (Results split into the four video categories)	18

1. Introduction

The purpose of this study is to shed light on targeting in the online advertising industry and especially its recent development, and to find out what factors affect said development. Online advertisement targeting means matching advertisements with those web users that are most likely to be interested in the product or service in question. This matching process can be done in many ways, all of which depend on the collection and use of data (Yan et al. 2009).

This study does not focus on any specific type of online advertising as the targeting methods should be the same or very similar for all forms of online advertising. Gathering information about users and websites and then allocating advertisements to said users by utilizing the collected data should be a similar process whether we talk about video pre-roll ads or banner ads.

For the most part, this study is a literature review, rounding up existing literature and studies, and trying to create a complete picture of the targeting business. Also included are four case studies, which aim to link the research with the real world and provide topical examples of some of the difficulties of ad targeting. A small-scale study was also conducted to test how successfully targeting is currently handled on YouTube, which is one of the largest websites in the world. By combining these research methods, this study aims to provide answers to the following research questions:

- 1) How is targeting of online ads currently done?
- 2) How effective is the targeting?
- 3) What are the limiting factors of targeting and why?
- 4) What things affect the future development of targeting?

1.1 Motivation

The motivation behind this study derives from personal experience as a consumer regarding online advertisement. It seems that targeting is not yet very efficient and in most cases, is done only on a very broad level, such as basing ads on an approximated location. For example,

Finnish internet users will typically see advertisements for products that are sold in Finland, but not for products that are only sold in the US.

However, with the emergence of big data and effective data mining tools, the targeting of online advertising could be done on a much more precise level – personalized advertising. Based on personal experience, it seems that a small part of online advertising (usually banner advertisements, which are very clearly linked to previous browsing) is already done this way, and I am interested in finding out why it seemingly is not used more often, if it is indeed possible in the first place.

Another noticeable issue in online advertising is that it often uses the same kind of repetitive nature as television advertising. This means that the same advertisements are shown over and over again to the same person. While repetition can be used as an effective advertising method to some extent, many studies have shown that excessive repetition can lead to consumers having negative feelings towards the products, which is referred to as the wear-out effect (Haugtvedt et al. 1994). This can be due to the consumer either feeling irritated by the ad or even questioning the product's quality, if a lot of repetitive advertising is required (Kirmani 1997).

There are many possible reasons why this method is used. It could be that this is considered to be the most effective way of advertising, or perhaps advertisers want to stick to the familiar TV method of advertising. There could also be a limited amount of companies that want to advertise online, which results in a small number of possible ads that a consumer can see. This does not seem very likely though, as the dynamic, interactive possibilities of online advertising are much greater than with any other advertising platform, and companies should be more than willing to advertise online.

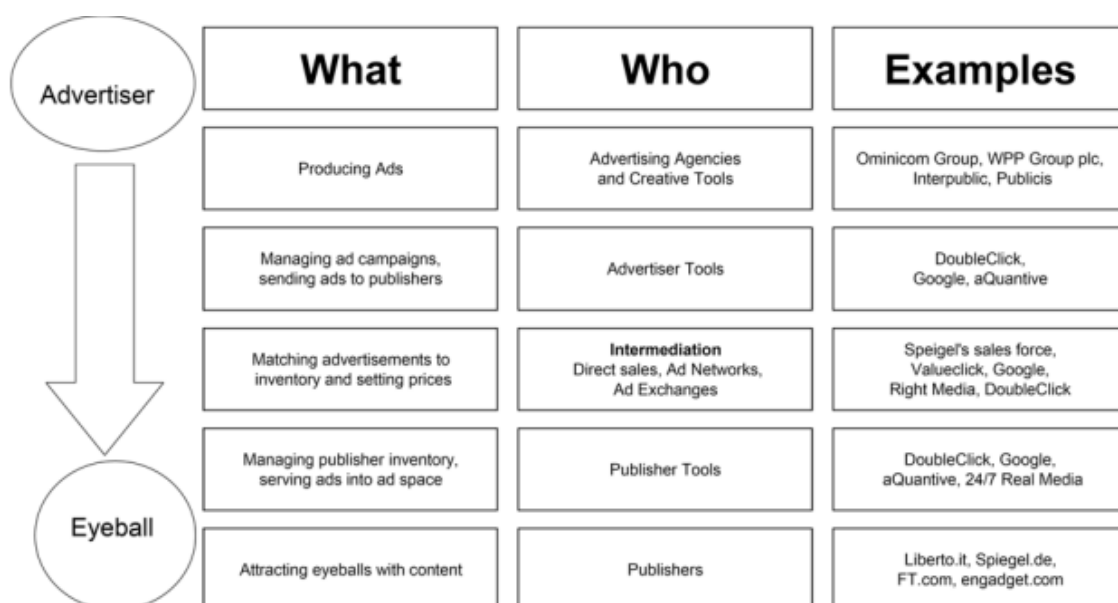
Whatever the reason for this issue is, it could be fixed by improving the targeting systems. The systems should recognize when a certain ad is shown too often to a specific consumer to avoid the wear-out effect. Also, if the repetition is currently caused by a small number of advertisers, an effective targeting system should also attract more advertisers and help solve the problem that way.

1.2 Brief overview of online advertising

Online advertising began with spam-like emails in the late 1970s and evolved with the revolutionary banner ads in the early 1990s (Oberoi 2013). As the amount of global internet users has climbed rapidly over the years, online advertising has grown into a massive business. What sets online advertising apart from other forms of advertising is the consumers' ability to transact with advertisements by clicking them, essentially requesting more information about the advertised product. This transactional relationship can be advanced with advertisement targeting, as consumers are then more likely to notice ads for products they are interested in. Theoretically, this makes advertising more cost-efficient, as consumer engagement increases and the number of ads for products that the consumer is not interested in is minimized. Of course, even with successful targeting, the engagement level will not rise indefinitely, as consumers are only willing to spend a certain amount of their browsing time by looking at products and will instead dismiss ads even though the content might interest them.

The online advertising market is quite complex, as there are many different parties involved in buying and selling ad spots (Evans 2009). As this study focuses on ad targeting, the different intermediaries between the advertisers and the consumers are not discussed thoroughly. Instead, to simplify things they will all be collectively referred to as **ad spot providers** in this study. This group consists of for example Ad networks, advertisers that advertise on their own websites and other publishers (Evans 2009). Figure 1 gives some insight into the online advertising market. The arrow on the left side represents the ad spot providers in this case.

Figure 1: The different players of online advertising



(Evans 2009)

1.3 Structure of the thesis

To start things off, Section 2 explains why online ad targeting is a relevant research topic. A fresh real-life case is provided as an example of topical issues that the field deals with. As the relevance of targeting depends on it being a useful means of advertising, Section 2 also discusses what makes targeting effective. Section 3 follows a chronological order and analyzes how targeting has evolved over the years. A key focus point is how targeting is done currently and this is followed up in Section 4 by providing empirical research on how well targeting is currently done on YouTube, which is one of the largest websites in the world. The empirical research suggests that targeting is not yet done on a very intricate level and therefore in Section 5 we explore the limiting factors of targeting. The last content chapter focuses on the future of online ad targeting as a research topic. In it the emergence of the mobile advertising industry is discussed. The Conclusion Section provides readers with a summary of the study.

2. Relevance of online ad targeting

The thing that drives all business is of course money. In online advertising, there is certainly lots of it to go around and the amount keeps growing quickly. According to PwC, the total yearly global online advertising revenue is now greater than that of TV advertising at over 150 billion US dollars and will continue to grow at an estimated rate of 11,1% per year until 2020 (PwC 2016). As the financial value of the online advertising business keeps growing, it will get an increasing amount of attention from all directions: ad spot providers, advertisers, academics, governments and even consumers. In my opinion this inevitably leads to an increase in the demand for more effective advertising methods. A key way for ad spot providers and advertisers to stand out will be the targeting of the advertising.

When done correctly, targeting can benefit all of the parties involved in online advertising. Firstly, for the advertisers it improves the efficiency of their marketing strategy, as their ads are shown to the people that they expect to be interested in their products, in other words their target audience. Also, it can help with growing target audiences, as companies can test the market by targeting a product to a new audience and then observing how it influences the sales. Targeting is particularly helpful for small niche companies, as they might not have the

marketing budget required for a large ad campaign, but instead opt to narrow down their target audience and buy less ad spots but with better targeting (Chen & Stallaert 2014).

The ad spot provider, who will likely be the one to supply the targeting services, can sell ad spots at a higher price because targeting offers clear benefits to the advertisers. The ad spot providers can also increase the number of customers with successful targeting. When they minimize mistargeting, they can divide the limited amount of ad spots more effectively amongst customers.

It is also important to note that the consumers benefit as well from successful targeting. For most internet users, advertisements are a nuisance. Continuous video advertisements test the user's patience and excessive banner ads fill up the screen and take away from the browsing experience. If advertisements were properly targeted, it would alleviate at least some of the annoyance, as you would no longer have to watch repetitive advertisements for products that you have no interest in and no intention of ever buying. Aalberts et al. (2016) point out that online advertising also makes it possible for consumers to enjoy a large amount of free content. They argue that consumers are in effect paying for the content with their personal information. If targeting is done efficiently, the value of the advertising space grows, which further improves the consumers' chances of not having to pay for online content, as the content creators can profit by selling ad spots instead.

While researching for this study, it was notable that a large part of the articles about online ad targeting were affiliated with some of the largest companies in the online business world. Most studies were either done for, or financed by companies like Yahoo, Google and Microsoft. This is a clear sign of the relevance of targeting. These large companies, which all play a key role in the online advertising business, see uncapped potential in targeting and are actively studying it to gain a better understanding of it and to come up with new ways of improving it.

As the online advertising business keeps growing, it brings along a bunch of new opportunities and challenges. The following case is a fresh real-life problem situation in online advertising that, in my opinion, could be solved with an effective targeting solution.

2.1 Case – YouTube Ad Crisis

In early 2017, YouTube, the world's largest online video-sharing platform, faced an issue regarding their advertising policies. Many significant global advertisers such as Pepsi and Walmart pulled their advertisements from the Google-owned website, as they claimed that their adverts were shown on inappropriate videos, such as terrorism-linked videos and other unethical content (Solon 2017). As news of this started spreading, more advertisers began to pull their ads and it became clear that a solution was needed to avoid future financial repercussions. Perhaps a crisis like this is what Google needed to incentivize further development of their targeting methods.

What makes this case interesting is the fact that it does not necessarily affect consumers, but instead the conflict is between the ad spot provider and the advertisers. These kinds of situations are much more urgent to fix, as they pose a larger threat financially to the company. In other words, a case like this makes ad targeting much more relevant, even though it does not deal with the traditional idea of targeting ads for the internet consumers.

Google's initial response was that they are going to attempt to solve the issue by hiring more staff to work on the matter at hand and by tightening the regulation of monetizable videos, essentially weeding out the unethical content in a more efficient way (Reuters 2017). Although this probably is the quickest and easiest solution to this problem for now, an intricate targeting system could be an effective solution for this problem. In addition to targeting advertisements to consumers, an ad spot provider like Google could target ad spots towards specific advertisers. Currently, this is only done on a basic contextual level; for example, a sport equipment manufacturer might be more interested in buying ad spots on sports related videos. But if advertisements were truly targeted in an optimal, somewhat utopistic way with each advertisement shown to a member of the advertiser's target audience, surely the content of the video that the ad was shown on, no longer matters. However understandably, it can be argued that a video containing terrorism propaganda is not beneficial for anyone to advertise on, and those videos probably should not be allowed on YouTube in the first place.

Whether it matters to advertisers, if their advertisements are shown alongside unethical (but less extreme than terrorism-related) content, as long as the person viewing the content is part of the advertiser's target audience, is a question worth looking into. This is however not a part of this study, as it deviates away from the actual targeting of advertising.

2.2 Effectiveness of targeting

Another thing that must be considered when talking about the relevance of targeting, is whether it actually works. For targeting to work, the system needs to complete at least these two tasks:

- 1) Differentiate between consumers and choose which advertisements are to be shown to which consumer
- 2) Improve the effectiveness of advertising.

If targeting does not accomplish task 1, the methods used for targeting need to be improved. If task 2 is not completed, targeting is not having the effects that it is intended to have. Neither of these situations necessarily mean that targeting would be an irrelevant thing to study, but they would influence what it is that should be studied about it.

Based on personal browsing experience, it seems that surprisingly few advertisements are properly targeted towards the user. While most ads are targeted in basic ways, like with location data, it feels like user data is not used efficiently enough. A good example of this is that over the last few years, I've often seen video advertisements on YouTube for Finnish secondary schools. As a user of Google's web browser Chrome and as someone who does not do anything exceptional to hide personal information, I would imagine that Google can see that I visit university websites almost daily. Also, based on my browsing, they should be able to estimate my age accurately enough to decide that it is not useful to advertise secondary schooling to me anymore. It is of course important to note that more intricate targeting can be expensive. If the advertiser is not willing to pay for it, an ad spot provider cannot offer them targeting services.

The important message however, is that there is room for improvement in targeting. Either it must become more cost efficient so that more advertisers become interested in it, or the used methods must be improved so that it does what it is supposed to more successfully. So, something to figure out is whether advertisers are not always interested in targeting or not currently willing to pay enough for these services.

3. Evolution of Targeting

This section, which is split into three parts, covers the last few decades of online ad targeting and is written in a chronological order. The first part discusses the early days of online ad targeting and its evolution towards the current state. The second part sheds light on how targeting is currently done, by thoroughly explaining the most popular targeting methods. The last part briefly showcases some of the technologies and methods that seem to be the most promising in terms of improving targeting in the near future.

3.1 History

Some targeting methods have been used since the very early stages of online advertising in the 1990s. These methods were mostly copied from other advertising platforms (Pumphrey 2012). For example, television advertisements are often targeted very broadly, so the advertisements are likely to appeal for the “average” viewer. On a sports-related TV show, it is likely that at least some of the ads are somehow related to fitness and wellbeing as it is probable that a person watching that show cares about these topics. On the online platform, this meant placing fitness and wellbeing ads on sports websites. While targeting on a broad level is clearly better than not targeting at all, there is a lot that can be done to improve this kind of targeting on the online platform, which allows advertisers (or ad spot providers) to gather user data unlike traditional advertising platforms (TV, radio & paper).

Early on, online ad targeting was limited by the lack of computing power. Some user data, such as an estimated location based on the user’s IP address and in some cases browsing history, could have been gathered, but sorting through all the data and targeting ads based on it quickly enough would not have been possible (Pumphrey 2012). Storage of the data would also have caused problems. As computing technologies improved over the years, it became possible to collect and use consumer data in targeting in the early 2000s (Pumphrey 2012; Lund 2014). Further technological development provided more possibilities for handling and utilizing the data. This kind of targeting is now referred to as Behavioral Targeting and it is now the most relevant means of targeting online advertising (Yan et al. 2009; Jaworska & Sydow 2008).

3.2 Current situation

There are multiple ways that advertisers and ad spot providers can gather data about internet users. Nowadays, Behavioral Targeting means that many of these methods are often used together to profile users in as much detail as possible. In addition to the aforementioned IP address, which can supply the targeters with the consumer's approximate location, Pumphrey (2012) lists the following ways to collect user information: clickstream data, search data, purchase data and profile data. Contextual advertising and retargeting are also often used as a means of Behavioral Targeting (Lambrecht & Tucker 2013; Broder et al. 2007).

Clickstream data refers to a user's browsing history and habits. Computers receive so called cookies from websites that users visit. Cookies are small text files, which the websites use to identify a person. They can contain for example a user ID and related information such as temporal keys like date or duration of last visit. Large ad spot providers that place advertisements on all sorts of websites can compile a record of the user's browsing habits based on these cookies (Pumphrey 2012). Because consumers' browsing habits are subject to change, clickstream data collection must be done constantly to keep up with their new interests. In fact, studies show that tracking short term user behavior leads to better results than tracking long term behavior (Yan et al. 2009). Because websites send cookies to the users' computers, often without the users realizing it, this method has raised a lot of discussion about online privacy. Privacy issues in online ad targeting will be discussed later in more detail.

Search data is related to the advertisements shown when using a search engine like Google or Yahoo. The service provider analyzes the search term and displays a suitable advertisement. Typically, this is used together with the location provided by the users IP address to target ads for products or services in the area (Pumphrey 2012). This is a key form of income for search engines, as companies are willing to pay high prices for appearing at the top of the search results (Ghose & Yang 2009). Although it seems like a very simple method of targeting, as no extra user information is necessarily needed, this might be one of the most impactful targeting methods. This is because when a user searches for something on a search engine, especially if it is a search for a product or service of some kind, they are very likely to be making a purchasing decision in the near future.

Contextual advertising is a more advanced form of using search data in targeting. Instead of using a search term, contextual advertising systems analyze webpages and target

advertisements based on keywords found on the site (Broder et al. 2007). Contextual advertising is useful in situations where collecting user data is difficult as targeting is based on the viewed page instead of the viewer.

Purchase data is what online stores gather about their customers. By analyzing a user's purchase history and search history, they can advertise similar products to that user (Pumphrey 2012). This is a great example of a situation where targeting benefits both the advertiser and the consumer. The advertiser of course increases the likelihood of additional purchases by the user. On the other hand, if done in a non-intrusive way, a listing of products that are in some way related to one's previous purchases can improve the user experience as it makes shopping easier and perhaps more interactive.

Another key method of Behavioral Targeting is retargeting, which is closely linked to using purchase data. Consumers tend to do quite a bit of research before buying products, especially when it comes to more expensive goods. The idea of retargeting is to advertise specific products to people who have been searching for information or looking at reviews about those, or similar products. Lambrecht and Tucker's study (2013) suggests that the effectiveness of retargeting depends on how much research a consumer has done. When consumers know what they are looking for, retargeted advertisements can be helpful in making purchase decisions. However, if a consumer has not yet narrowed down the desired product requirements, retargeting is not as effective. Lambrecht and Tucker (2013) argue that this is because consumers are not usually willing to make purchase decisions before comparing products and learning about the trade-offs.

Profile data can be used on websites where users create profiles and willingly submit information about themselves – a good example being social media sites. Users want to share details about themselves to other people and because they have full control over what information they decide to share, they are not as likely to complain about privacy issues related to targeted advertising. All of the personal details, hobbies, other interests and updates that people post on social media sites can be used to target advertising and create a more personalized browsing experience on these sites for the user (Pumphrey 2012). However, it is important to note that not all users realize that their profile data can be used for targeting advertisements. To reduce the amount of problems resulting from this, transparency is needed between the websites and the users. Users need to be informed more clearly about data collection and usage.

3.3 Future possibilities

With the emergence of big data and the continued development of computing technologies, it is evident that targeting will continue to improve in the future. As discussed earlier, the issue with targeting has been the lack of computing power and the lack of mass storage solutions that would be needed to gather and handle massive amounts of consumer data. Big data systems aim to solve the problem of handling vast data amounts.

Another trend in targeting is the emergence of profile data usage. Online privacy, which will be discussed in-depth later, has been an issue in the targeting business. Many consumers feel that data collection has been happening behind their backs, which causes distrust between consumers and advertisers. Social media is now playing an important part in bridging together consumers and advertisers. By giving users the possibility of choosing how much they share about themselves, social media allows data collection to happen much more transparently. Of course, some people still complain about companies using the information that people share on these sites, but the validity of these arguments can be questioned, as people have the option of not sharing personal details about themselves.

Sites like Facebook now use very complex algorithms to target advertising to users and there is a possibility that social media sites could begin offering targeting services to other websites as well. Currently, something like this is probably prohibited by online privacy laws however, and it remains to be seen if the situation changes in the future. For example, the General Data Protection Regulation, GDPR, which was adopted in 2016 in the EU and will apply from May 2018, aims to unify and modernize data protection regulations in the EU, which makes things easier for international companies (European Commission 2016). However, the GDPR also aims to increase citizen's rights concerning data protection, which makes the above-mentioned use case for sites like Facebook less likely. In any case, it seems that the eventual solution to the privacy issue is ensuring that consumers have a say in the data collection. If it continues happening behind people's backs, it will not be looked well upon, but with the right kind of transparency, the public opinion about the privacy matter can change.

4. Empirical study on YouTube Advertising

To explore the current status of online ad targeting, data was collected about video advertisements on YouTube. There were multiple reasons for choosing YouTube as the study platform:

- 1) Google-owned, lots of resources and expertise
- 2) Personal experience pointing towards lackluster targeting on the site
- 3) Video advertisements are relatively expensive -> companies might be willing to pay a little extra for efficient targeting
- 4) Google's user profile system, which should help with targeting

The plan was to click through enough videos about varying topics to collect information about 40 pre-roll video advertisements. The idea was to gather 10 samples from 4 different types of videos: sports, cooking, movie trailer and gaming videos. These categories were chosen at random; the only goal was to have four distinct video types to see if there were any significant differences between them regarding the ad targeting. Answers were searched for the following research questions:

- 1) Are the ads relevant to a Finnish viewer?
- 2) Are the ads clearly related to the video's topic? (Contextual advertising)
- 3) Are the advertised products or services goods that I could consider buying/using?
- 4) How much repetition is there?
- 5) Does the video type influence the success of targeting?

The study was conducted twice. Phase one was done on a computer that has been in daily, personal use for about one year. With this setup, the goal was to give Google a fair chance of using user data to target advertising. Therefore, Google's browser Chrome (user's default) was used, in which cookies had been allowed for the whole year and had never been manually deleted. Within YouTube, a Google account that has been in active use for about 8 years was logged into, to give Google more user data to work with.

Phase two, on the other hand, was done on a freshly rebuilt old computer with all user data wiped clean. Google Chrome was used on this setup as well, but this time cookies were disabled and no Google account was used when gathering the sample. The purpose of this

secondary test was to find out how much difference user data made in the perceived targeting of the advertising.

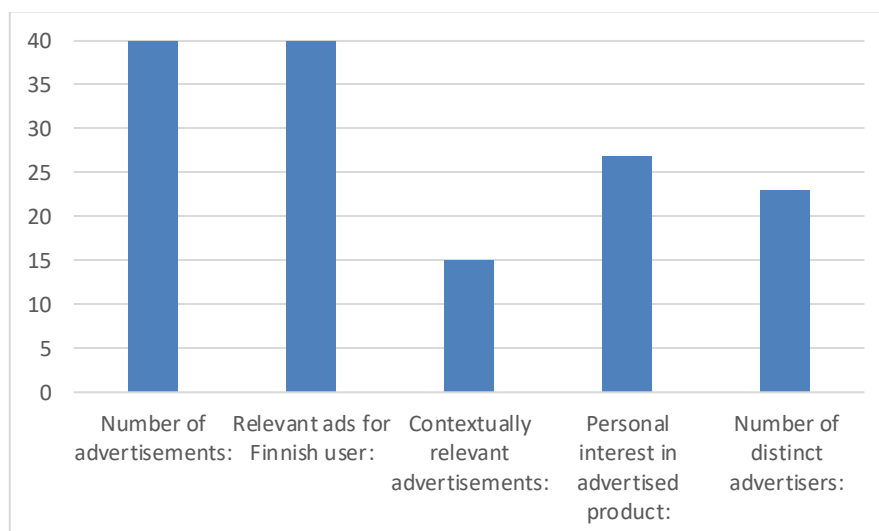
4.1 Findings

The findings of this study are divided into two. The first part goes over the results from phase one. The second part contains the results of phase two and compares them with the results of phase one. This division was done to emphasize that phase one is the key focus of this study, while phase two is mostly a supplementary part that aims to confirm some of the findings of phase one. Phase two is also somewhat unrealistic as few users use websites with cookies disabled, as it leads to many sites losing important features and functionalities.

4.1.1 YouTube advertising on a computer with plenty of user data

It was clear from the beginning that the targeting is mainly done on a very broad level. All of the advertisements were relevant to a Finnish user, but only 37,5% (15/40) of the advertisements were related to the video's topic. In other words, the use of contextual advertising could be improved.

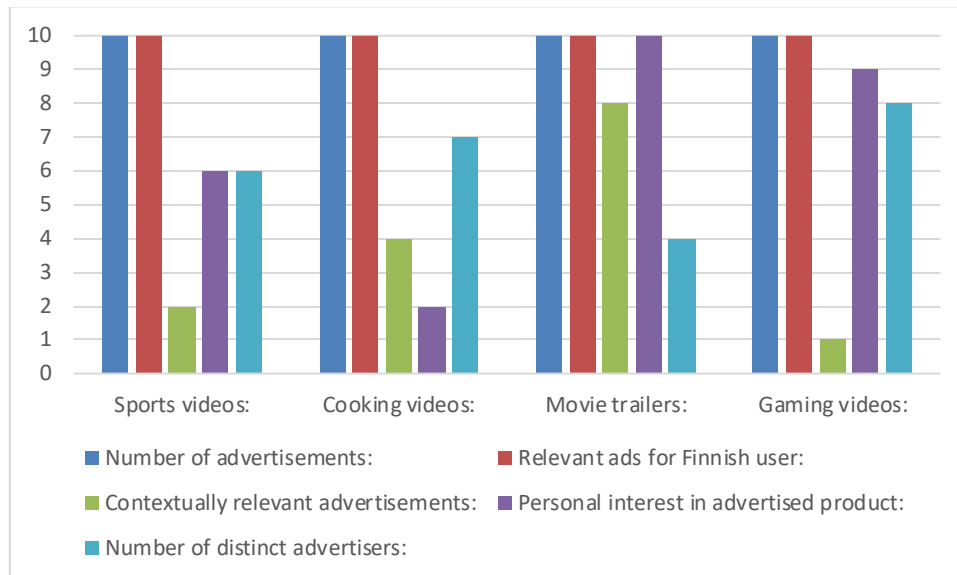
Figure 2: YouTube ad study – Targeting with plenty of user data (Total results)



Interestingly, out of the 15 contextually relevant advertisements, 8 were shown on movie trailer videos. All 8 of them were ads for online streaming services like HBO and Netflix. This

means only 23,3% (7/30) of the ads for the other three types of videos were contextually relevant, compared to 80% (8/10) on movie trailer videos.

Figure 3: YouTube ad study – Targeting with plenty of user data (Results split into the four video categories)



There are a few possible explanations for this. Firstly, it could just be a statistical anomaly caused by the somewhat small sample size. The second and possibly most likely reason is that companies that are online-savvy, like streaming websites, are more familiar with the idea of targeted advertising and are willing to buy targeting services from Google. For comparison, some of the ads that were not contextually targeted were about gardening tools and construction supplies. The companies behind these adverts might not even be familiar with the idea of contextual advertising and therefore are not willing to pay Google extra for targeting services. This does not however explain why only one of the 10 ads on gaming videos was contextually relevant. One would expect gaming companies (especially companies making online games) to be very familiar with online advertising techniques as they are typically more modern and tech-savvy. A third possible explanation is that either YouTube or HBO Nordic, the advertiser in question, was testing out a new way of utilizing contextual advertising and it happened to sway my results.

The amount of ads for products or services that I could be interested in was quite high at 67,5% (27/40). Despite most of the advertised products being of interest to me, instead of a personalized user experience, the advertisements seemed to be shown in the TV-method of one size fits all. Instead of products that reflect my hobbies and browsing habits, the advertisements mostly dealt with goods that most people would find somewhat interesting,

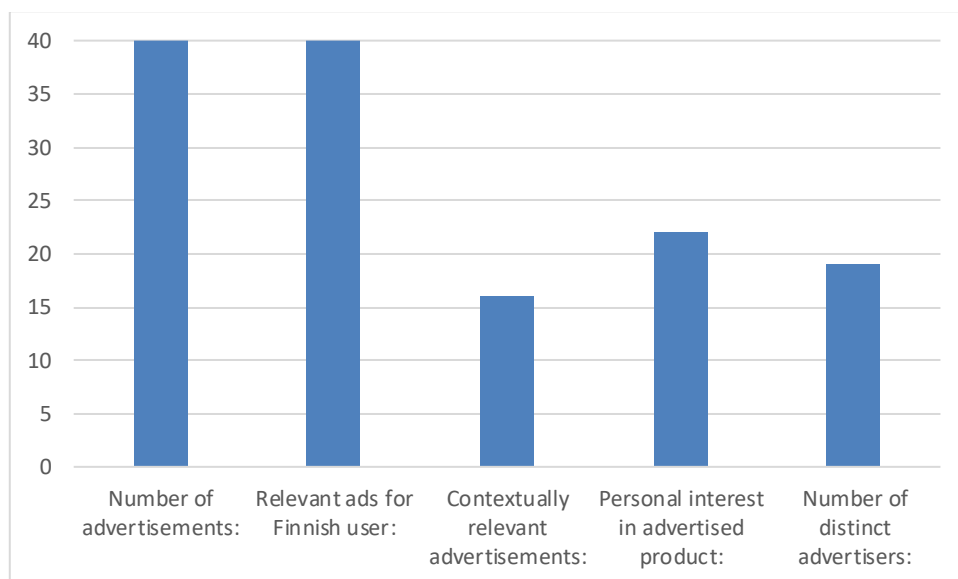
for example popular soft drinks. Of course, this is bound to happen to some extent, as large popular brands have large advertising budgets and their ads will be distributed to all consumers. The problem is though, that only two of the 40 advertisements felt like personalized advertising, the other 25 “interesting” ads were from generally likable and popular brands. Due to this, even though Google attempts to use personalized advertising, it did not feel efficient in this small-scale study.

When it comes to ad repetition, Google has done a good job. A few years ago, you would regularly see the same advertisement over and over again, which would get annoying very quickly. In this sample, the 40 advertisements were from 23 different advertisers and there were 27 different ads. One ad was shown five times, but apart from that, repetition was not an issue at all.

4.1.2 YouTube advertising on a computer with very little user data

Like in phase one, all 40 of the ads were geographically relevant. This was expected, as Google can see a user’s approximate location from the user’s IP address, even when cookies are disabled. More interestingly however, the other measured qualities also seemed to be in line with the results of phase one.

Figure 4: YouTube ad study – Targeting with very little user data (Total results)



40% (16/40) of the ads in phase two were contextually relevant, which is very similar to the 37,5% (15/40) in phase one. The similarity here is not that surprising, as contextual advertising

can be done without user data. In phase two 55% (22/40) of the ads were for products that I could consider buying. This is a bit less than in phase one, but not as much less as one would expect if targeting was done successfully on a personalized level. In fact, the advertising seemed to be done very similarly on both computers. In phase two, the ads were again mostly for products that most people would consider buying, such as popular food products. The number of distinct advertisers was similar in both tests, 23 in phase one and 19 in phase two. An unexpected finding is that YouTube’s advertising system seemed to have trouble working properly at times when cookies were disabled. It seemed that the website showed much less ads with the cookies disabled. As it was not a measured quality, no exact temporal data was gathered, but an approximate estimation would be, that phase two took about twice as long as phase one, as more videos had to be watched to gather data about 40 ads. As most of YouTube’s revenue is made by selling ad spots and some reports estimate that the site is not even profitable (Beattie, 2016), it seems odd that disabling cookies would purposely lead to users seeing less ads. Instead it is more likely that there is currently a flaw in YouTube’s advertising system. As mentioned earlier, disabling cookies often takes away some of the features and functionality of websites, for example on YouTube, the comment system does not work when cookies are disabled; perhaps a similar issue is holding back some of the ads.

Figure 5: YouTube ad study – Targeting with very little user data (Results split into the four video categories)

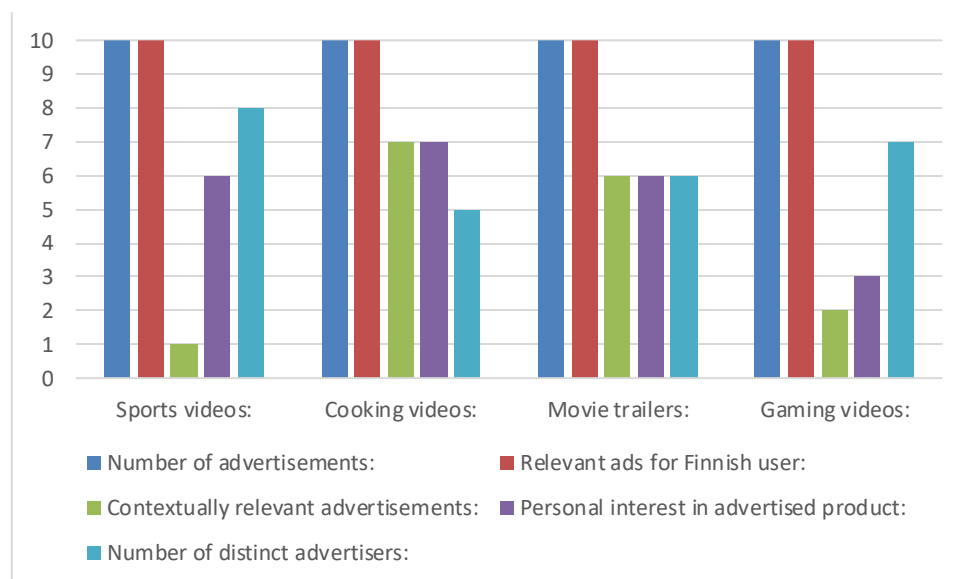


Figure 5 splits the phase two results into the four video categories, like Figure 3 did with phase one results. An interesting correlation is that contextual advertising was used significantly

more on cooking videos and movie trailer videos than on sports and gaming videos in both tests. As discussed in Section 4.1.1, it seems odd that tech-savvy game developers would not take advantage of contextual advertising if food manufacturers and film companies can do so. Further research is needed to see if this result is just coincidental or if there are other reasons behind it.

4.2 Limitations

It is important to note that there are many limitations to this explorative small-scale study. Firstly, the results were gathered on only two PCs, a different one for each phase. Both phases were conducted by the same user and in phase one only one Google account was used. A larger scale study could give us more detail about the accuracy and repeatability of these results. Some of the results are quite subjective and another person could see things differently, especially when it comes to personalized advertising. Secondly, there are a limited number of advertisers at any given time, which means some videos cannot have contextually related advertisements, no matter how well the targeting system works. Thirdly, as each phase was conducted within a matter of days, the limited number of advertisers did not have time to change, which understandably might lead to unrealistic amounts of repetition. It is safe to say that most internet users do not watch dozens of YouTube videos in a matter of days.

5. Limitations of Targeting

Although the seemingly endless amount of online user data offers many possibilities for targeting, there are some limiting factors slowing down the development of targeting methods. The most significant one is online privacy concerns. Data protection laws aim to protect people from all kinds of scams and frauds, but from an advertiser's point of view, they can make targeting difficult. Other main problem sources are ad blockers and the difficulties in mass data storage and handling. It is also worth discussing how much interest advertisers have in advanced targeting methods, which can be quite expensive.

5.1 Privacy limitations

The internet has become an important part of consumers' lives, which has led to consumers becoming increasingly savvy about the risks of the online world. One such risk is the misuse of consumers' personal information. Governments have responded to this by working on new privacy regulations that limit companies' capabilities of collecting user data (Goldfarb & Tucker 2011). Although it is unlikely that a typical online advertiser has malicious intent regarding user data, they are affected by these laws, which makes targeting much more difficult. According to Goldfarb and Tucker (2011), the effectiveness of banner ads reduced by 65% in the EU after the introduction of an online privacy directive in the early 2000s.

As public awareness about the online privacy matter has increased, consumers have started to question online advertising. Because consumers are now more likely to understand how much information about them is collected, they are more likely to feel violated. This leads to negative feelings towards targeted advertising and causes consumers to lose trust in the advertisers (McCole et al. 2010).

According to Krafft et al. (2017), permission marketing, which means advertising to consumers only after they have allowed it, can be used to reduce privacy concerns. Their study suggests that whether consumers grant permission to advertise or not is as much a psychological matter as it is an economical one. In fact, they found that in Germany, financial incentives like coupons and rebates are not effective ways to get people to agree to advertising. Instead, giving consumers control over the advertising relationship and providing them with relevant and entertaining content is more effective. The study also suggests that allowing consumers to see what data is collected about them is a good way of avoiding future privacy concerns. (Krafft et al. 2017)

5.2 Case – Adblock Plus

Ad blockers, as the name implies, are a type of software that allow users to browse the internet without seeing ads. Although ad blocking does not directly tie in with targeting, it plays a significant part in the online ad industry and is therefore worth discussing. Over the last few years the use of ad blockers has been rising drastically, which is a clear indication of internet users being fed up with the amount and the disruptiveness of advertisements.

According to a 2017 report by PageFair, ad blockers are used on an estimated 615 million devices around the world, and the usage of ad blockers grew by 30% in 2016 (Cortland 2017). This indicates that the effect that ad blockers have on the online advertising industry keeps increasing and it can in my opinion be considered as a serious problem. So far advertisers seem to have focused on working against ad blockers and they have not paid attention to the real issue at hand – the problems internet users have with advertisements.

One of the most popular ad blockers is Adblock Plus, a free browser extension that is available on all major browsers. As online advertising companies try to stay one step ahead of ad blockers, which hurt their income, ad blockers must be updated regularly to function properly. As most ad blockers are free-to-use for internet users, they do not typically generate any income for the programmers, which makes it difficult to maintain the continuous improvement of the software.

Adblock Plus tried to solve this problem by introducing ‘acceptable ads’. This meant that a team the company calls ‘Acceptable Ads Committee’ would whitelist some advertisements, based on their idea of non-intrusiveness (O’Reilly 2017). These advertisers would then pay a small fee for Adblock Plus and their ads would not be blocked by the software. Of course, this led to unhappiness amongst the users as they could not control these ads, and they felt that the software stopped fulfilling its purpose. Therefore, many of Adblock Plus’s users moved to using other ad blockers. Clearly this method of gathering revenue is not optimal.

What if a new innovative business model could solve the issue between internet users, ad blockers and advertisers? A large part of internet users worry about their online privacy and do not like the idea of companies gathering personal information about them behinds their backs. A possible solution to this situation that involves targeting could be a transparent middleman, which collects surveyed information from consumers. This data could then be used to target advertisements more efficiently.

In order for internet users to be willing to answer these surveys, they would have to get something in return. This could be for example a reduced amount of advertisements and only non-intrusive advertisements, similarly as in Adblock Plus’s case. Consumers would also have to be able to decide how much information they share and this could be managed by for example decreasing the number of ads shown based on how much information they have

shared. In other words, the amount of ads that a user sees would be based on how well advertisements can be targeted to them.

A fresh business model like this would bring benefits to all parties. Advertisers could target ads more efficiently, which should lead to a higher consumer engagement rate. The middleman could now also run a profitable business by becoming a data handling company rather than an ad blocker software developer. The internet users would end up seeing ads that correspond with their interests and possibly fewer ads as well.

Of course, there would still be users that would prefer using an ad blocker so this solution is not perfect. However, a business model like this could be a step in the right direction. It would result in a more transparent exchange of data between internet users and advertisers, which could alleviate the negative feelings internet users often have against advertisements.

5.3 Cost & Data Limitations

Targeting can make advertising more efficient, as it helps advertisers reach their target audiences. However, whether the benefits of targeting outweigh its costs is another matter. Diminishing returns is a term often used in economics and it can be applied to targeting as well. Common sense tells us that even a basic way of targeting ads is more efficient than not targeting them at all. But there comes a point when the cost of more intricate targeting is greater than the benefits it provides.

According to Terlep and Seetharaman (2016), Procter & Gamble, one of the largest advertising spenders in the world, recently realized that their strict, expensive targeting strategy was limiting their reach and not increasing sales as much as they had hoped. They have since loosened their targeting strategy and opt to use less expensive ad spots instead. Terlep and Seetharaman (2016) also point out that the potential benefits of targeting vary depending on the advertisers. For large, well-known brands it might be more important to have a large reach, but for smaller companies, a niche target market might be worth targeting to, even if it means relatively high advertising costs. As computing technologies continue to improve over time, the now expensive data handling costs will decrease. This means that the point where costs and benefits meet will change and strict targeting might become more of a viable option for all advertisers in the future.

6. Mobile ad targeting – A key focus point in future targeting-related research

Large players in the online advertising business such as Google and Facebook have access to practically unlimited user information and enough computing power to run complex targeting systems. As ad revenue is a key source of income for these companies, they are constantly trying to find new ways to create value in advertising. It is safe to say that targeting methods and their cost efficiency will be improved.

The recent emergence of mobile advertising means it is likely going to be a key focus point of targeting-related research in the next few years. Mobile advertising brings along new challenges and possibilities for companies like Google and Facebook as well. This section showcases some of these possibilities and challenges. The two case studies show why mobile ad targeting is a relevant topic and how difficult it is for companies to find ways to target mobile ads successfully while avoiding obtrusiveness.

6.1 Mobile ad targeting

Already back in 2005, before modern smart phones like the iPhone were available, Leppäniemi and Karjaluoto described mobile advertising as having “the potential to be one of the most powerful one-to-one digital advertising mediums if utilised in the right manner.” According to their study, key elements of the mobile ad market were cost-effective targeting and an enhanced capability of using time and location based advertising. After a few years of slow development due to privacy regulations and finding ways to make mobile advertising user-friendly rather than intrusive, mobile advertising has become one of the fastest growing advertising platforms. PwC estimates that the total global mobile advertising revenue is currently about 60 billion US dollars and it is expected to grow by about 20% yearly (PwC 2016).

As mobile advertising has become an increasingly important part of the online advertising business, companies have come up with innovative ways of utilizing the real-time user data. Mobile ad targeting is of course done partly with the same methods as normal online ad targeting, but it also creates new opportunities. One example is geofencing, which allows advertisers to send mobile coupons to users that are near an outlet. As mobile advertisements are seen ‘on the go’, advertisers can also use environmental factors, such as time of day and

the weather, as a basis for targeting. This allows a more dynamic approach to targeting (Andrews et al. 2015; Grewal et al. 2016).

Although mobile advertising has been researched since the early 2000s, it is likely going to be a key focus point of targeting-related research in the next few years. The fast growth of the mobile advertising market and the increasing threat of personal information getting into the wrong hands due to the weak level of security measures in smartphones make it a relevant topic.

6.2 Case – Privacy Assistant

Due to the growth of the mobile advertising market, phone applications have become increasingly dependent on advertisements as a source of revenue. Many, if not most, applications are now free to use, but come with ads. As discussed, the mobile platform offers many ways to target advertising at a personalized level. Currently, when downloading and installing applications, users are prompted to give the application a varying list of permissions. These permissions might include for example access to the user's calendar, location, photos, camera and microphone. As the applications require these permissions before installation, many users allow them, without really considering how much information is shared with the application developer (Orcutt 2017). This information can be used to identify and profile users and target advertisements to them.

Managing the permissions can be time-consuming and confusing work. One solution to this issue is Privacy Assistant, an application developed by researchers at Carnegie Mellon University. This application aims to simplify the confusing permission settings by asking the user a set of straightforward questions. Then the application combines and analyzes the answers and gives user-specific recommendations regarding the permission management. (Orcutt 2017)

Although Privacy Assistant is not yet readily available for all mobile devices, it seems like a useful tool for consumers that want to regain some control over their privacy. The application also highlights a key issue of online advertising and targeting: most of the data collection is still happening behind the backs of consumers. The application might not solve the root of the

problem, but if the app becomes more common, application developers might be forced to change their ways and take a more transparent approach to data collection and usage.

6.3 Case – Facebook eavesdropping allegations

A good example of the confusing nature of permissions given to applications is the alleged eavesdropping Facebook does through its application. Upon installation, the Facebook application requests permission to access the user's microphone amongst other things. In 2016, a professor at the University of South Florida suggested that the application might use the microphone access to listen in on conversations and target advertising based on keywords that it identifies (Griffin 2016; Statt 2016). Naturally, this made some consumers upset, as they felt it was a clear breach of privacy.

Facebook responded to the allegations by denying that the application uses the microphone access for targeting ads (Statt 2016). The company maintains that the microphone access is used only when the user is "actively using a specific feature that requires audio" (Facebook newsroom 2016). It seems unlikely that a company like Facebook, which already has access to a vast amount of profile data to work with, would use questionable methods of data gathering like eavesdropping. In fact, Statt (2016) suggests that this kind of breach of privacy would likely be illegal, at least in some countries. A more likely explanation for the multiple reports that people have made about receiving targeted advertising right after talking about a specific topic, is that those people have also searched and posted about similar things in the past. Facebook's statement claims that only people's interests and other profile data is used for targeting ads (Facebook newsroom 2016).

7. Conclusion

Targeting has come a long way since the early days of online advertising. Continuous development of increasingly powerful computing hardware leads to new innovations and capabilities in collecting and handling data. This has been key in online ad targeting, which relies on finding value in the endless oceans of data. Multiple methods of data collection are currently in use for targeting purposes in all kinds of different situations. Search engines, that do not necessarily have a lot of user information to work with, use search data for targeting.

Social media websites on the other hand take advantage of the vast amounts of user information that is readily available for them as profile data.

Despite the multitude of ways that targeting can be done, my empirical study suggests that there is still a lot of room for improvement, even for the large players in the online ad business, like Google. It is also possible that some traditional companies have not yet realized the full potential of ad targeting and are not willing to pay for targeting, even though it would be possible for Google, or other similar companies, to provide such services.

Key limiting factors of targeting include privacy regulation, ad blockers, continuing difficulties with data (collection, storage and handling) and consumer dissatisfaction, which is often related to the privacy concerns. These limitations will continue slowing the development of targeting in the future. Data processing capabilities improve constantly but at the same time the amount of data grows exponentially. Privacy regulations and the public opinion will change over time and it seems that the best option to alleviate some of the tension in the privacy discussion is transparency. If data collection continues to happen in the dark, consumers will remain unsatisfied.

Although a lot research on the public's attitude towards data collection and use in ad targeting and towards online advertising in general has been done over the years (Schlosser et al. 1999; Chowdhury et al. 2006; Bragge et al. 2012; Watson et al. 2013), more research on these topics is needed continuously, as the attitudes are subject to change over time (Watson et al. 2013). As the internet keeps becoming an increasingly important part of consumers' lives, attitudes towards different kinds of online interactions change. After all, it is the public's reactions to advertising that creates value for the ad spot providers and advertisers alike. Complex and expensive targeting systems are not worth creating if people do not appreciate targeted advertising and instead consider it a breach of their privacy. As mobile continues to grow as an advertising platform, it will likely become a key focus point in targeting research, since it is still a relatively new phenomenon.

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