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Adware as one form of disinformation

Abstract

   Human existence has allowed a dynamic development of technology, particularly in cyberspace. One of these technologies is the internet, which has become an inseparable part of man's everyday life. This state of affairs increasingly blurs the boundary between real and virtual life. It is evident in the current pandemic situation, where society has been forced to live in confinement for fear of health. This has resulted in increased activity and the use of cyberspace, creating greater opportunities for cybercriminals. One of these threats is disinformation on the internet, especially in social networks. The following article outlines the threat of disinformation and its methods of spreading it through adware modules.

Keywords: disinformation, adware

Introduction

Every behaviour, novelty, technology has its positive and negative sides, which are not evident to everybody. Sometimes a person simply does not see a phenomenon in the way that another person perceives it. Any information can be received in different ways by different individuals in the current world. The internet is becoming the most prominent place for information, particularly social networks, where the public spends a lot of time. Information on networks can have different effects and different reasons for being posted. Not all information is valid. We can divide it into three groups: true information, misleading information or disinformation, but the last two groups should be treated as disinformation. The difference lies in intentionality[1]. We can distinguish many
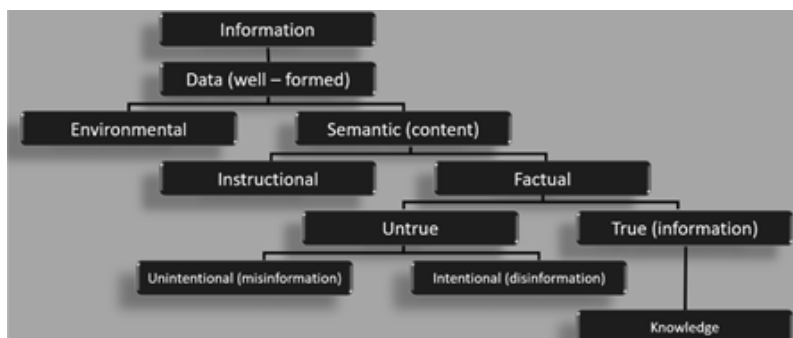
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[1]   L. Floridi, *Philosophical Conceptions of Information*, [in:] *Formal Theories of Information*, ed. G. Sommaruga, Berlin–Heidelberg 2009, p. 13-53.

methods of disinformation activities. This article will present one of them, namely, disinformation based on adware modules. The paper aims to deliver the scale of the adware threat and its impact on society's disinformation.

1. The nature of disinformation

The term disinformation is closely related to information. The very definition of information in everyday language does not strictly define meaning. If we want to identify its essential elements, we can only say that this is a part of critical knowledge. The concept of information is difficult to define because of its primordial and elementary character. It is most often considered in three aspects[2]:

- − syntactic, related to the amount of data that a specific piece of information contains,
- − semantic, i.e. the meaning and content of the message itself,
- − paradigmatic, i.e. the validity or relevance of the information communicated to the individual.

Figure 1. Breakdown of Information
Source: own elaboration based on: Floridi L., *Philosophical Conceptions of Information*, [in:] *Formal Theories of Information*, Sommaruga G., Springer Publishers, 2009, p. 15.

The above picture shows the division of information. According to it, information can be either true and manifest itself in the form of knowledge of a particular situation or false, which is divided into misinformation and disinformation.

Compared to its use, the concept of disinformation was introduced relatively recently. The term itself originated in Russia more than 100 years ago, while disinformation methods and techniques took place in the distant past. According to

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[2] https://encyklopedia.pwn.pl/haslo/informacja;3914686.html [accessed on 9.04.2021].

the literature, the term disinformation began to be used in Russia. In 1923, a special disinformation bureau was established to carry out intelligence operations[3].

Over the years, disinformation has been coined in many terms. In the beginning, it referred mainly to activities in the military sphere and referred to actions aimed at misleading the enemy by providing false information about the facts. A. Golitsyn is a well-known author who presented the term disinformation in the military and political sphere. He claimed that these are "systematic efforts to spread false information and falsify or block information concerning the real situation and policies of the communist world"[4]. Analysing the definition given above, we should pay attention to the sender, which is the communist state, and the recipients, i.e. all citizens of enemy states, including armed forces personnel.

Currently, disinformation can be considered in three aspects. The first one is a method or masking technique, which focuses on the intentional spreading of false information about the masked object's actual state, including its structure and activities. An essential element, in this case, is actions aimed at confirming the validity of the misleading information provided. The second aspect of defining disinformation is to see it as actions or operations intended to conceal secrets from the enemy and mislead him on matters related to, for example, politics, the economy, and the military. This is designed to force actions by the opposing side that benefit those using disinformation. The third aspect of defining disinformation is materials, data, and information to mislead the recipient[5].
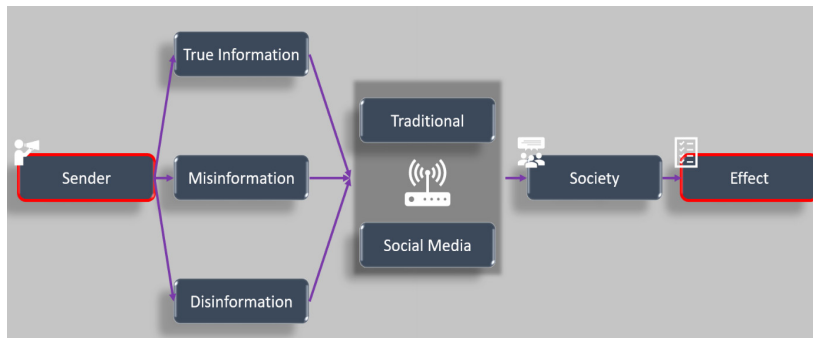
Figure 2. Information flow model
Source: Floridi L., *Philosophical Conceptions of Information*, [in:] *Formal Theories of Information,* ed. G. Sommaruga, Berlin-Heidelberg 2009.

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3 http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.baztech-dfc8239a-2340-4442-892b-b337b0cc-8b30/c/wachowicz_Ujecie_teoretyczne_pojecia_dezinformacji.pdf [accessed on 11.04.2021].
4 A. Golicyn, *Nowe kłamstwa w miejsce starych*, series „Biblioteka Służby Kontrwywiadu Wojskowego", Warsaw 2007, p. 5.
5 https://ceo.com.pl/dezinformacja-definicja-teoria-praktyka-i-zarzadzanie-59816 [accessed on 10.04.2021].

In the figure above, the model of information flow is presented. Starting with the introduction of information, the initial element is the sender, which can be any entity. The information given by the sender can be true information, misinformation or disinformation. The information can be delivered to the recipient through traditional methods such as conversation, radio or television, and what is more popular these days through social media such as Facebook or Instagram. The information then reaches the audience, creating a particular effect. For this article's purposes, let us assume that the information given by the sender takes the form of disinformation. Social media can quickly reach many recipients, causing them to believe that such information is true, mainly if the sender is a popular organisation that uses, for example, adware advertising blocks.

2. Advertisements and disinformation

Ways of processing information have been developing since the beginning of human history. They are all kinds of objects, behaviours or technical devices capable of storing in any way and also distributing information both in time and space. We can distinguish three categories of means of communication[6]:

- means of expression – attitudes of human behaviour, including verbal and non-verbal speech. These are primarily the ability to produce sound, which is influenced by timbre, force, pitch and facial expression, changes in posture, features of appearance or gesticulation,
- means of transmission – systems or devices, including printers, radio and television receivers and transmitters. Currently, the best means of communication are telephones using the internet, through which information can reach a large number of recipients in a short time,
- means of recording – all tools and devices capable of recording the products and manifestations of human behaviour, including a pencil, pen, paper, camera, telephone. With the help of these devices, the sender can record the material on the medium they want to share.

The presented division may seem logical, but it should be noted that some of the listed tools and devices may occur in more than one group, i.e. they may occur both as a means of recording and transmission. The best example here are smartphones, which have such a possibility.

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[6] M. Mrozowski, *Między manipulacją a poznaniem: człowiek w świecie mass mediów*, Warsaw 1991, p. 12.

The invention of printing in the 15th century had a considerable impact on the transmission of information, including the possibility of advertising or announcing one's services. However, it was possible to transmit information through writing before that. Thanks to this possibility, the first newspapers appeared in the 17th century, but it was not until the 18th century that their production began on a larger scale[7].

The next technology that influenced the development of information distribution was the radio, which started in 1920. In the beginning, it served as an entertainment, but over time, it has been seen to potentially spread disinformation. At present, the radio is a medium in which we have many advertisements, which aim to persuade the audience to purchase goods[8].

Radio as a transmission method did not lose its importance even with the development of television. Initially, television was limited, and it was not until the 1950s that it became the most effective way of transmitting the information. At first, a few channels broadcast black-and-white images. Still, over time, television development made it possible for viewers to receive broadcasts in colour on a large number of channels, from entertainment to news[9].

Currently, the internet is the largest source of information, ahead of television and radio. Anyone with access to the internet has the opportunity to follow news that is interesting and noteworthy from the point of view of that entity. According to the Digital report, there are approximately 5.19 billion tpeople worldwide who own mobile devices, of which 4.54 billion have access to the internet, including 3.80 trillion active social media users[10]. The above statistics show the scale of the potential for misinformation in the world of social media, which has become an integral part of many people's lives.

The evolution of disinformation is closely linked to technological developments, thanks to which certain actors can disseminate it and reach a more significant number of followers. Social media have greatly influenced the development of disinformation, namely the possibility of its dissemination. Thanks to this technology, true information, misinformation or disinformation can be disseminated virtually without any control. However, we can distinguish several aspects that limit disinformation in some way. Among the elements that can affect the spread of disinformation occurring in Social media, we can include:

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[7] A. Kłoskowska, *Kultura masowa. Krytyka i obrona*, Warsaw 1964, p. 171–172.
[8] A. Kozłowska. *Oddziaływanie mass mediów*, Warsaw 2006, p. 49.
[9] Ibidem, p. 50.
[10] https://datareportal.com/reports/digital-2020-global-digital-overview [accessed on 19.01.2021].

‒ economic situation – people excluded from the information society due to lack of resources do not have access to the internet[11],
‒ language barrier – to reach a particular group, you need to speak a language you can understand. English is currently the most popular language, but not every person in the world can speak it,
‒ knowledge – the aspect that matters most when verifying whether the information is true or is intended to mislead. In one of the documentaries focusing on social media titled "The Social Dilemma" and available on the Netflix platform it is argued that each person has their own world of facts, which means that they only see what they know.

The above elements are only some of those that affect the distribution of disinformation. We can include many more factors in this group, but the authors only aimed to present that disinformation is not a phenomenon against which there is no protection. In Schanon's model, all factors that influence the distribution of disinformation fall into the element of noise[12].

One threat of disinformation that has developed rapidly using technology is advertising. A seemingly short video aimed at persuading an audience to buy or behave in a certain way is also a disinformation method that can pose a significant threat. According to the Cambridge dictionary, the word advertisement means a picture, short film, song, etc., attempting to persuade a specific group to purchase a product or service[13]. Currently, adverts are present on radio, television and the internet, adopting different forms in each of these mediums. One of these forms is adware, fully named ad-supported software, which is computer software designed to generate revenue by displaying advertisements. The software itself is free and can be found on the internet in banner adverts or pop-ups on websites. Adware has also evolved, with creators no longer limiting themselves to short video clips and images. They have begun to create adverts that prompt the user to interact. Currently, it has become fashionable to add an option where the user can turn off the display of adverts for a fee. Unfortunately, although it is free, the very idea of the adware has adverse effects, in addition to the disinformation provided by the ads. With this technology's help, entities can track online activity, display unwanted ads, or move Internet users to other sites. Another software called

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[11] A. Ostrowska, *Nowe media – przykład polski*, [in:] Media a wyzwania XXI wieku, ed. M. Bonikowska, Warsaw 2009, p. 145.
[12] T. Goban-Klas, P. Sienkiewicz, *Społeczeństwo informacyjne: Szanse, zagrożenia, wyzwania*, Cracow 1999, p. 14.
[13] Definition available at: https://dictionary.cambridge.org/dictionary/english-polish/advertisement [accessed on 10.04.2021].

spyware has a similar idea, but as John Aycock points out, adware programs are less harmful than spyware, and this is because they take an overt form[14].

There is no doubt that adware software is mainly associated with obtaining material goods, but there are also other reasons – they are closely linked to marketing. By tracking online activity, Adware programmes display advertisements for products previously viewed by users, showing the advantages of this software over television or radio. Before distributing a product, producers carry out market research and identify a group of consumers who are potential sales for the product. This group is determined by specific characteristics such as age, gender, interests, views, hobbies or participation in a particular sport. In the case of advertisements on television or radio, it reaches this specific group and the entire audience. This is why such a solution as adware, which displays particular advertisements to an already specified group, maximises the possibility of making a transaction and the possibility of passing on disinformation influencing decision-making[15].

The year 2020 was quite difficult for internet users due to the exploitation of the Covid-19 pandemic situation by cybercriminals. This period saw a significant increase in cyber threats, in which we can include stalkware and adware. This situation is related mainly to people's increased dependence on mobile devices, primarily remote working. According to a report by Avast, many advertising campaigns created by shops selling drugs were discovered during the pandemic. The World Health Organisation logo was placed on them to make the adverts look more credible. As a result, a lot of people downloaded malware that was related to the coronavirus theme. One of the most significant risks during the pandemic was undoubtedly false information, since many people spread information without verifying it. One example is the news that Bill Gates financed the spread of Covid 19 and the virus itself is just a cover-up fabricated to turn a democratic country into an autocracy[16].

3. Selected statistics

Virtual reality is a space where there are no clearly defined boundaries, creating many opportunities, particularly in globalisation. The internet world is used for communication between people and is also a place for producers of products who

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[14] J. Aycock, *Spyware and Adware,* Calgary 2010, p. 3.

[15] Ibidem.

[16] https://indianexpress.com/article/technology/tech-news-technology/covid-19-theme-cyberattacks-2020-avast-report-ransomware-phishing-fake-news-7083730/ [accessed on 11.04.2021].
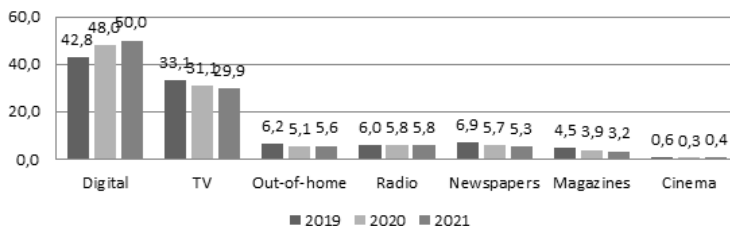
want to make a particular profit. To maximise their income, manufacturers use all means, one of which is advertising. As mentioned earlier, the Internet world does not use traditional advertising, consisting of short films, images or soundtracks. In contrast, the virtual world uses various types of advertising modules, from banners to interactive advertising. Unfortunately, the online advertising world also poses a threat to users, one of which is adware.
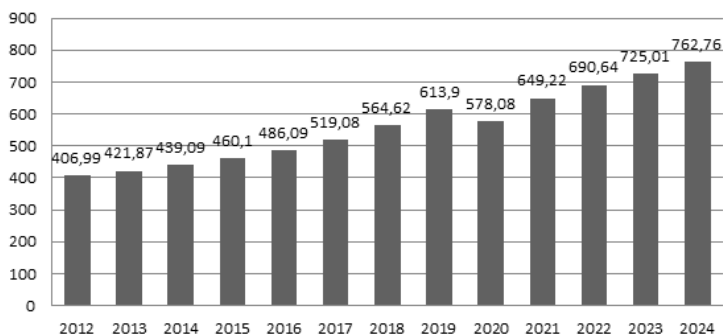
Chart 1. Ad media revenue worldwide (in billions of U.S. dollars)

Source: compiled from: https://www.statista.com/statistics/236943/global-advertising-spending/ [accessed on 11.04.2021].

The graph above shows the revenue from advertising. As you can see, the profit amounts are enormous and increasing year by year. The exception is the year 2020, which recorded a decrease. This phenomenon's main factor is the current pandemic, but 2021 already upholds the trend. In the pandemic era, most human activities, such as work have been transferred to the virtual world, affecting the amount of advertising displayed. The graph also shows the importance of advertising in marketing and how willingly it is used by manufacturers. The graph figures show the total income from advertising, without dividing it by TV, radio or the internet.


Chart 2. Global Ad Spend by Medium 2019-2021

Source: own study based on https://www.marketingcharts.com/charts/share-of-global-ad-spend-by--medium-2019-2022-f/attachment/dentsu-share-global-ad-spend-by-medium-2019-2022-feb2021 [accessed on 11.04.2021].

Year by year, we can see an increase in spending by specific media advertising entities. In 2020, total ad spending in digital media accounted for 48% and is expected to increase next year. Other media, relative to the previous year, have seen a decrease. The highest growth is expected from social media estimated at 18.3% among digital media, followed by paid search 11% and online video 10.8%. According to the report, YouTube, Instagram, TikTok and Google have the most prominent marketing share. The chart also shows a trend of a 2 percentage point decrease in ad spending on TV and the same downward trend in other media[17]. It is worth noting that Digital accounted for the largest share of adverts, which use, among other things, adware aimed at targeting people based on specific characteristics, which shows how significant the threat of ads in the Internet world will be.
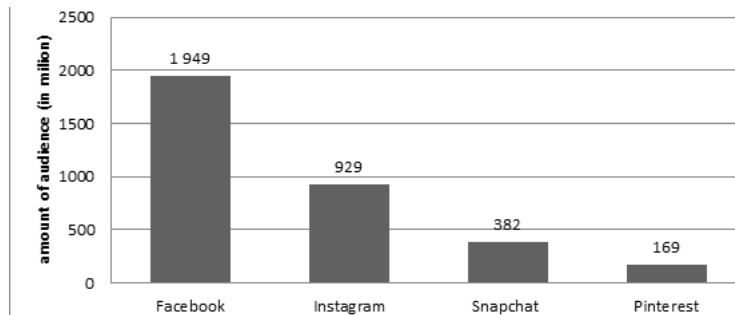
Chart 3. Advertising Audience
Source: own study based on https://datareportal.com/reports/digital-2020-global-digital-overview [accessed on 11.04.2021].

The graph above shows how much advertising is displayed on the internet. The data presented shows the number of ads displayed on specific platforms. Most were displayed on Facebook, one of the most extensive datasets. The age group that saw the most adverts on social networking sites were people aged 25-34. These are quite young people, yet they are often the potential buyers of products and, moreover, the most exposed group to manipulation in advertising.

Another aspect that deserves attention is the price of advertising on social media. Each platform adopts different rates for the dissemination of advertising by the producer. We can distinguish four groups of costs resulting from advertising[18]:

- − cost-per-click: based on paying costs only when an ad is clicked by a user,
- − cost-per-thousand-impressions: refers to the cost incurred when an advertisement is viewed by one thousand users,

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[17] https://www.marketingcharts.com/advertising-trends/spending-and-spenders-116193 [accessed on 11.04.2021].
[18] https://www.webfx.com/how-much-does-social-media-advertising-cost.html [accessed on 11.04.2021].

- cost-per-like: costs for liking the manufacturer's website,
- cost-per-action: expresses the costs incurred for performing an action resulting from an advertisement, e.g. a transaction.

This breakdown shows the categories of the cost incurred by advertisers. The following statistics show cost-per-click for selected social media platforms.
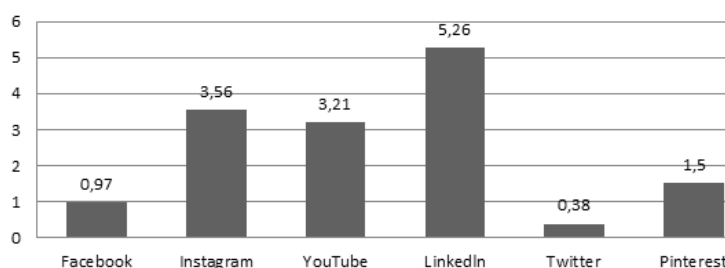
Chart 4. Advertising – Cost per click
Source: own study based on https://www.webfx.com/how-much-does-social-media-advertising-cost. html [accessed on 11.04.2021].

As you can see, the prices per ad click range from $0.38 to $5.26. Each platform offers different prices. It should be noted that it is the charge per ad click and the flowing information about who, where, when, and what ad was clicked on.

The above figures illustrate the scale of the problem that stems from advertising, adware placed on the internet. Where not only the relevant actors can present a product but can also collect information about users. Advertisements are also a source of misinformation aimed at a material gain, which can operate directly and indirectly. Directly, the advertisement itself is disinformation. Indirectly, data are used, which can then be sold to other entities to target the right groups more easily.

4. Prevention

Regardless of preventive measures in the form of scanning or filtering and sent warnings about malware in the form of adware, there will always be someone who unknowingly clicks on the wrong link, thus causing problems online. Adware modules quite often appear on websites or social networks, causing a decrease in the device's productivity. Great attention should be paid to adware, which displays itself even when the person is not actively using the web browser. Adware can

affect the operating system's functionality, causing such things as loss of data, damage to the system, or slow-down of daily activities.

To counteract adware malware, you should first of all[19]:
- − use common sense when using a web browser,
- − use pop-up blockers,
- − install a program/extension in your browser that blocks the ads, such as AdBlock or uBlockm
- − use antivirus software.

Such actions do not guarantee that adware will not be found on our device. As people become more active on the internet, which is particularly evident during a pandemic, their vulnerability to disinformation from adware fads increases.

Summary

To sum up, the threat of disinformation has a very harmful effect on society, causing false information to take root, which in the future may result in a misunderstanding of reality. One of the methods of spreading disinformation is using advertising modules in adware, which aim to influence relevant groups' decision-making and collect information about users' activity on the net. Such a procedure carries considerable risk, as the problem is not only disinformation coming from adware modules but also from data sets collected by entities. Disinformation with adware use can take two forms. Directly, where the ad itself has elements of disinformation, and indirectly through the use of collected data that facilitates a specific group's targeting. To effectively counteract disinformation emanating from adware modules on the internet, it is necessary to use blocking programmes and software that prevent web traffic from being tracked.

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