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# Eye Tracking as a Research Method. Selected Cases

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**Abstract**
The aim of this article was to describe the eye tracking method, its variants and selected research methodologies with its application. The measurement of dispersion of visual attention helps, among others, to determine so called scan paths and heat maps. Keeping track on movements of the eyeballs using a device called the eye-tracker depicts changes of width of the apple of the eye, direction, order of gazes, number and time of their duration; indicates what the tested person records using its eyesight, how long he keeps a gaze on a subject and how often looks at it. Eye tracking is often connected with electromyography, which allows quite precisely to indicate what kind of emotions is evoked by particular elements of a tested material. In a way, the methods or a bunch of research methods under consideration enable to reach human subconsciousness and are particularly helpful in a process of optimization various marketing tools (products placement on shop shelves, advertising and packaging tests, design of the website). Keeping track on movements of the eyeballs provides with valuable information on each level of management of marketing undertaking i.e. starting from concept testing, through implementing experiments, ending on proof tests, which is to stimulate broadening scientific research sector using literature research, to analyse available research results and to run selected case studies. In this article, the author pointed out usefulness of the discussed methods and also she described selected examples of their applications e.g. for the following brands: IKEA, Unilever, Mercedes, Toyota, Coca cola, Mercedes Benz, Volkswagen, Warka, Gazeta.pl and Aflofarm.

**Keywords**: eye tracking, research methodologies connected with eye tracking, eye tracking applications in marketing activities, case studies.

**JEL classification**: M31, M14, Q01.

## Introduction

Researchers' achievements in the area of neurology and psychology (cf.: Szymusiak 2012, Davidson, Begley, 2013, Bulska, 2014, Bridger, 2015) concerning the processes taking place in the human brain and the significance of its subconscious reactions contributed to the development of research tools, methods, and procedures enabling diagnosis of physiological responses to stimuli for the purpose of making marketing decisions. Humans are emotional, not rational beings. They perceive the world with the senses first (among which eyesight plays a special role), then feel emotions, and only later try to rationalise their decisions and behaviours. Hence the area of interest in the study is eye tracking research enabling measurement of gaze distribution on marketing stimuli.

The aim of the study was to present the eye tracking method and examples of its application in economic practice along with the resulting functionalities.

The research methodology involved literature studies, analysis of the available online information resources (including related content, publications, reports, studies, expert opinions, websites of agencies offering eye tracking research), examples of applications, and a case study.

The article is a review and research paper, epistemological in nature. Eye tracking was presented according to the following model: what it is, what equipment it requires, for what purpose it can be used, what the previous studies on the subject are, who uses it and in what areas of activity, what examples of its application can be found in the Polish market, what

results can be expected, and whether a case study and what kind of case study can illustrate its functionality.

The description of the results of the work carried out may inspire theoreticians and practitioners interested in the methodological application of eye tracking research in business management, including in particular for the purpose of various marketing activities and decisions.

**Eye tracking – primary characteristics**

Generally speaking, the eye tracking method consists in following eyeball movements with the use of an eye tracker and appropriate recording software enabling data analysis. This method of research is used to check which specific elements are noticed first thanks to a camera recording the slightest movements of the respondent's eyeballs (Burch, et al., 2017, Jerzyk, 2017, Conklin, et al., 2018, Strzelecki, 2019, Was, et al., 2017). Importantly, this takes places in awareness processes, both open and latent.

Stationary eye trackers can be built into the computer and/or constitute a kind of accessory connected to the computer in order to carry out the tests. Mobile eye trackers in turn are usually put on the head for the purpose of conducting the tests (Leube, Rifai and Wahl, 2017). A mobile eye tracker makes it possible to collect data in the customer's natural environment, e.g. in a store, so the tests are more reliable. The researcher may see what drew the respondent's attention and what their response was. Test results can be used to optimise the layout of informational and promotional elements. The challenge is to transfer the data to a computer equipped with software for its analysis. Pupil movements of a person taking part in the tests are recorded by the device. Next, thanks to the use of radio communication between the device and the workstation, the data is sent to the latter, where it undergoes digital processing, and then the collected information material is analysed and interpreted (Wasikowska, 2015, Burch, et al., 2017).

Research helps verify the manner in which people perceive the object in front of them, e.g. a website, product packaging or an advertisement. This way, we find out where our potential customer is looking, on which elements they focus and which ones they skip completely. The aim is to check whether when looking at a specific graphic design, the recipient sees the elements we want them to see, whether an Internet user browsing through an online store selling dresses focuses on the products or rather on the models presenting them. A question comes to mind about how the product should be visualised so as to satisfy the customer and motivate them to choose and purchase it.

Thanks to eye tracking research, detailed information may be obtained about which elements are visible, how they are perceived, and what to change in order to highlight the key elements. Research results can be obtained in different forms (Wąsikowska, 2015, Burch, et al., 2017, Leube, Rifai and Wahl, 2017, Conclin, et al., 2018):

- fixation maps (maps of the elements which draw the most attention) along with the movement trajectory across consecutive areas;
- proportion maps for the analysis of the visual exploration patterns in specific points of interest, e.g. special offers, prices or pre-defined menus;
- extensive reports with conclusions from eye tracking research and suggestions for the improvement of visibility of key modules or elements.

Eye tracking involves both quantitative and qualitative research. Due to the fact that we obtain a measuring and physiological result, we receive hard data, which is, in principle, indisputable. Eye tracking research constitutes usability research which makes it possible for us to reach the user with specific information and thus eliminate or modify the elements they skip completely (Bergstrom and Schall, 2014, Mościchowska and Rogoś-Turek, 2016). This

results in increasing the effectiveness of the marketing message and enhancing the level of customer satisfaction. The benefits of using this type of research are much greater, however. We obtain better accessibility of our offer, easier-to-use applications, and lower rate of "escapes" from the website. And most importantly, we save not only our customers', but also our employees' time.

**Potential applications and usefulness of eye tracking research to marketers**

Eye tracking research is finding increasingly broader application in obtaining information about the perception of various objects for the purpose of effective marketing activities (Bradley, 2013, Feinberg, Kinnear and Taylor, 2013, Wąsikowska, 2015, Strzelecki, 2019), for instance related to the product and its packaging or ad testing at different stages of preparation. It is also used for the optimisation of commercial units, their arrangement and decor, the development of merchandising strategies, and finally proper product exposure and product range management.

Researchers state, in turn, that eye tracking makes it possible to identify the following problems: What draws the customer's attention and what remains unnoticed? Is the information included in the materials under study visible? Are the most important elements of press adverts and television commercials noticed? Are the logo and brand name put in the best possible places? Are websites, user manuals, forms, etc. constructed and formulated in a correct and comprehensible manner? Does the material under study contain distracting elements? Is the product displayed properly at the point of sale? They present eye tracking as a marketing research method in a comprehensive and intelligible way illustrated with simple examples.

Iga Mościchowska and Barbara Rogoś-Turek (2015) and Adam Strzelecki (2019) describe the applications of eye tracking in website usability tests and product variant selection tests. They present example research scenarios, formulate guidelines and tips for potential researchers concerning the sample size, provide examples of research problems, the course of research, good practices in the analysed projects, personal and tool-related limitations, as well as technical and analytical problems. They list the advantages and disadvantages of eye tracking.

In the era of development of digital technologies and ever new functions available online, eye tracking research plays a special role in the optimisation of websites aimed at streamlining selected online marketing activities. For instance, it is used to test the effectiveness of product presentation, reception of communicated content, photographs, video productions, infographics or other forms of marketing in social media and other network profiles, channels, and web resources in general.

It should be emphasised that research is also carried out in order to increase customer satisfaction, e.g. due to better website readability, usability, intuitiveness, and functionality (Bergstrom and Schall, 2014, Booth and Freeman, 2014). The benefits are manifold and difficult to estimate precisely, but a satisfied customer – thanks to proper arrangement of materials in the traditional and virtual setting possible owing to response testing, including eye tracking – definitely means a lot.

**Methodology and research results**

The primary aim of the study was to obtain information about the eye tracking method and the possibilities of its application for the purpose of making marketing decisions. Emphasis was placed on the usefulness of this kind of research in management-related activities. The following research hypotheses were formulated: H1. An excess of stimuli and information chaos encourage research of gaze distribution in humans in order to optimise various marketing activities. H2. Marketers appreciate and use the eye tracking method to an increasing extent in

order to optimise management-related decisions. The object of the study was industry experts and scientists, as well as agencies supporting their clients' marketing activities in particular in terms of tailoring them to the buyers' expectations. The subject of the study was eye tracking application projects for different brands. Research was carried out over a few months, although the examples obtained come from the last several years.

Research on the applications of eye tracking consisted in the diagnosis and analysis of the available online information resources, i.e. reports, studies, and examples of executed projects on agency websites, which was compiled in Table 1.

***Table 1. The applications of eye tracking and methodologies with its use and research project functionality***

| Analysed cases | For what kind of marketing activities? | What purpose they serve (functionality) |
|---|---|---|
| **IKEA** | proper display of products in the store and merchandising strategy | determination of the customer's path, taking into account the elements they notice, on which they focus for a longer time, what they buy |
| **Unilever** | proper display of products on the store shelves and development of merchandising concepts | product visibility tests and ensuring visibility among other products |
| **Mercedes** | testing television commercials | decision on the selection of the optimal commercial from the point of view of its potential neural effect, taking into account: emotional valence, attention, engagement, skin temperature, respiration rate, heart rate |
| **Toyota** | advertisement testing, taking into account overall engagement, emotional valance | decision on the selection of the optimal advertisement from the point of view of its potential effect |
| **Coca-Cola** | advertisement testing, TVC neuromarketing research with EEG + eye tracking + biometrics | decision on the selection of the optimal advertisement from the point of view of its potential effect, taking into account emotive affectivity and engagement / boredom; emotive affectivity and excitement; shimmer sensor (test) and heart rate (BPM); galvanic skin response (GSR) peak and peak detected |
| **Mercedes-Benz** | advertisement testing involving eye tracking and EEG | decision on the selection of the optimal advertisement from the point of view of its potential effect through respondent live face camera analysis and fully integrated and synchronized emotive EEG EPOC affective metrics through Attention Tool's interface |
| **Volkswagen** | advertisement testing | which parts attract attention and what emotions they stir up |
| **Warka** | advertisement testing from the point of view of their effect on women and men | optimisation of stimuli in the advertisement taking into account the recipients' gender |
| **Gazeta.pl** | website testing | decision on the optimal website content |

Source: author's own elaboration based on the analysis of secondary sources of information with the use of the following online resources: https://www.youtube.com/watch?v=VCf3L4pUpOg, https://www.youtube.com/watch?v=QEUTmhIMCTY, https://www.youtube.com/watch?v=619TzVbGC1c, https://www.youtube.com/watch?v=-IUM-vZaWhc, https://www.youtube.com/watch?v=rkE2s6UTsVs, https://www.youtube.com/watch?v=Nhm7jIdyjVg, *https://poradnikprzedsiebiorcy.pl/-eyetracking-czyli-na-co-zwracamy-uwage,* http://www.neuro-innovations.pl/, https://www.youtube.com/watch?v=JMDKz9ICTLs&index=3&list=PLzfUx30ER9I0WrEmJUQTDcIJ5Ly6VyWd6, https://www.youtube.com/watch?v=_ubHwQmToiA&list=PLzfUx30ER9I0WrEmJUQTDcIJ5Ly6VyWd6&index=4.

Moreover, the author searched for answers to the research questions, which were compiled in Table 2. along with the most important results.

***Table 2. Description of research results including the formulated problems***

| Research questions | Description of the results |
|---|---|
| **Who offers research with the use of eye tracking and what type of research is it?** | Such research is offered and carried out on a growing scale on account of its functionality and increasing availability. In Poland, there are a number of agencies specialising in eye tracking research, but also neuroresearch, as well as full-service agencies providing such services, among others. There are also quite a lot of scientific and research institutions interested in the use of eye tracking research. In general, it should be noted that in each individual case, the research is adjusted to the situation. |
| **Who uses eye tracking research in the management of market projects?** | The presented cases of the application of eye tracking or research methodologies with the use of eye tracking give reason to claim that both marketers and research (or scientific and research) institutions use eye tracking tests in the management of various market, commercial, and scientific projects. |
| **For the purpose of what kind of marketing activities?** | Eye tracking research is useful in many marketing decisions, for instance concerning improvements to the implemented solutions, e.g. product packaging, website, advertisement, shelf display or interior design. It may also help check the customers' response to the solutions used in order to adjust them to their expectations. It enables identification of the actual influence of content arrangement or layout on product selection and purchase. It can be used for the purpose of more in-depth testing of respondents' reactions to marketing stimuli. It might help verify whether the test participants – as potential customers – saw the key elements of the object under study, such as the logo, photographs or content, how they scanned the resource, what they focused on, etc. Finally, it can be used to determine the optimal content arrangement or layout in various media. |
| **What research projects with the use of eye tracking were analysed?** | Projects for the IKEA, Unilever, Toyota, Coca-Cola, Mercedes-Benz, Volkswagen, Warka, Gazeta.pl, and Aflofarm brands involving usability tests of packaging, advertisements, stocking up of commercial units, shelf display, and websites. |
| **How useful is this type of research in stakeholder-oriented company / brand marketing management ?** | The degree of usefulness of eye tracking research is high (which can be concluded from the discussion and research included in the study, as well as the sources mentioned herein), although it is neither cheap nor simple. Benefits can be derived by marketers, scientists and researchers, buyers, sales personnel, Internet users, and other stakeholders, depending on the project and undertaking. |
| **What kind of eye tracking research project can give a picture of the functionality of the analysed method? Who can benefit from eye tracking research?** | The case study (for which company, in what area of marketing activities, how were the results obtained, what were they used for and to what effect) carried out (for the Aflofarm company and its Esseliv duo and Linea detox products, and selected forms of marketing communications related to their promotion, primarily with the use of heat maps, which may help make marketing decisions in order to optimise activities such as packaging selection, advertisements, etc. to increase customer satisfaction and improve sales results), as well as the available research study reports and the described examples of different applications of eye tracking research or the triangulation of methods with its use. |

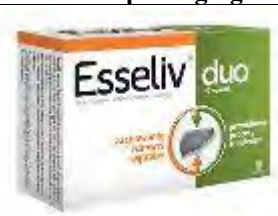
Source: own study using the sources indicated in the references and the author's own experience.

Presented in Table 2. information based on the research carried out clearly confirms that eye tracking enjoys increasing popularity as a research method in Poland and is valued by both commercial and non-commercial project managers. The projects from the analysed area match the current market conditions very well. Research confirms that marketers and scientists can and should conduct eye tracking research on account of the high degree of usefulness both for market-related purposes, including making marketing decisions, and for science-related purposes, including studies of buyers' behaviours and their subliminal responses.

The Eyetracker agency carried out eye tracking research for the Aflofarm company. It involved tests of the Esseliv duo and Linea detox product packaging and of selected forms of marketing communications related to the promotion of the products. In order to present the

functionality of the described research method, some detailed results will be presented. The product packaging usability test report includes the obtained heat maps, which were presented in Table 3.

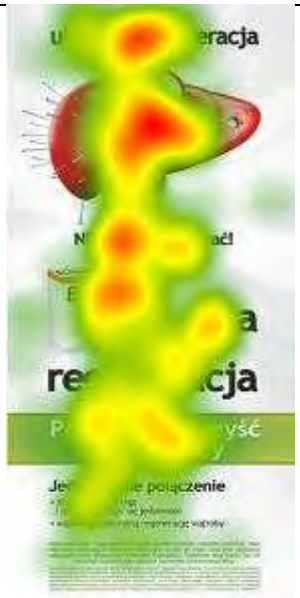
***Table 3. Tested Esseliv duo and Linea detox packaging and test results***

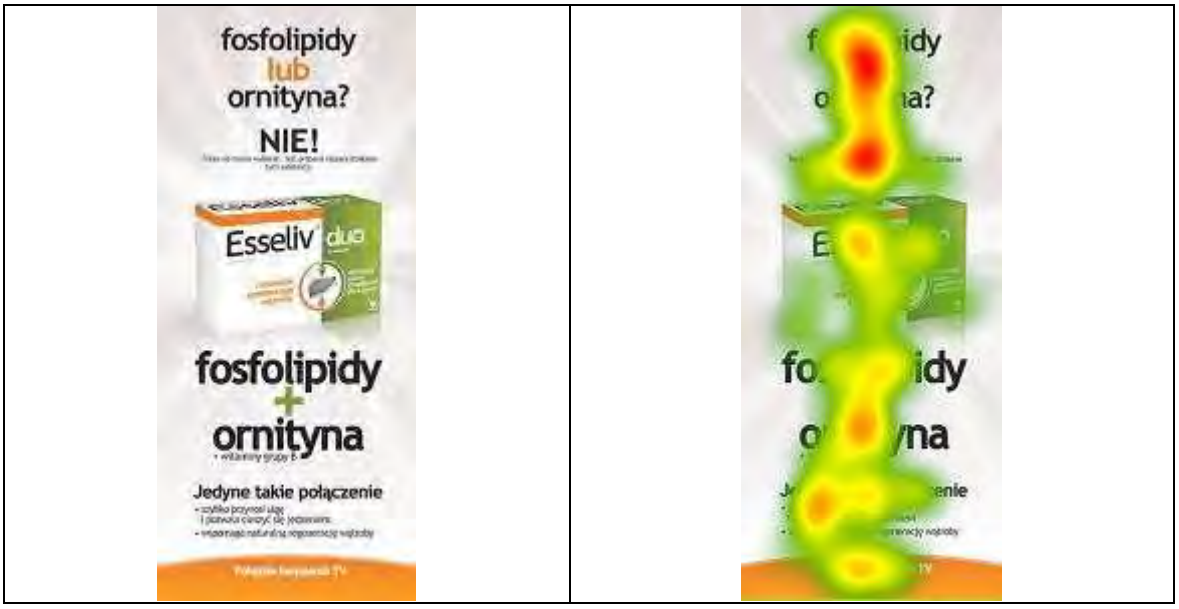
| Tested packaging | Heat maps obtained based on the eye tracking tests carried out |
|---|---|
|   |  |
|   |  |

Source: http://www.aflofarm.com.pl/pl/produkty/suplementy-diety/esseliv-duo/, https://www.flickr.com/photos/84007375@N04/8089724928/in/photostream/, http://www.aflofarm.com.pl/pl/produkty/suplementy-diety/linea-detox/, https://www.flickr.com/photos/84007375@N04/8089724956/in/photostream/.

In the research project described, the eye tracking method was also used to test online advertisements, including the generation of heat maps, which was presented in Table 4.

***Table 4. Tested online advertisements of the products and test results***

| Tested advertisements | Heat maps obtained based on the eye tracking tests carried out |
|---|---|
|   |  |




Source: with the use of https://www.flickr.com/photos/84007375@N04/8089725006/in/photostream/ and http://www.eyetracker.pl/uncategorized/aflofarm-wyniki-badania-eyetrackingowego/.

The application of the eye tracking method is also useful on account of the possibility to identify differences in the perception of the objects by women and men, which can be used to generate gender-relevant stimuli. An example from the analysed project was presented in Table 5.

***Table 5. Linea detox advertisement tested with the use of eye tracking and selected test results***

| **Selected information about the tests** | **Tested objects and heat maps taking different respondents into account** |
|---|---|
| Tested advertisement |   |
| Women |   |

| | |
|---|---|
| Men |   |
| Averaged result |   |

Source: with the use of https://www.flickr.com/photos/84007375@N04/8089723405/ and http://www.eyetracker.pl/uncategorized/aflofarm-wyniki-badania-eyetrackingowego/.

Yet another element of the research for the Aflofarm company was the use of eye tracking in order to test three packaging variants in terms of how they attract the customer's attention when displayed on the shelf. The results were compiled in Table 6.

***Table 6. The use of eye tracking to test different packaging variants on the shelf and selected test results***

| Tested packaging | Photographs included in the report |
|---|---|
| Packaging no. 1   |  |

| | |
|---|---|
| Packaging no. 2<br>  |  |
| Packaging no. 3<br>  |  |

Source: with the use of http://www.eyetracker.pl/uncategorized/aflofarm-wyniki-badania-eyetrackingowego/, http://www.aflofarm.com.pl/pl/produkty/suplementy-diety/esseliv-duo/, http://www.eyetracker.pl/wp-content/uploads/2013/01/polka1.jpg, http://www.eyetracker.pl/wp-content/uploads/2013/01/esel-opakowanie-2.jpg, http://www.eyetracker.pl/wp-content/uploads/2013/01/polka2.png, http://www.eyetracker.pl/wp-content/uploads/2013/01/esel-opakowanie-3.jpg http://www.eyetracker.pl/wp-content/uploads/2013/01/polka3.jpg.

The heat maps presented in Tables 3-6 are the overall results of the tests checking how respondents focus their gaze on the tested objects. They make it possible to determine which elements of the product packaging, advertisement or shelf display attract the most attention. They also indicate which elements were skipped by the respondents and which ones were noticeable, but not necessarily comprehensible to them. In light of the conducted research of the visibility of product packaging on a store shelf, packaging no. 2 came out the least visible, while packaging no. 1 the most, yet with little advantage over no. 3.

**Conclusions**

One of the greatest benefits of eye tracking research is the physiological instead of declarative nature of the measurements, which leads to a higher degree of objectivity of the data obtained. The hypotheses were verified and confirmed.

In light of the meta-analysis of the available sources of information, eye tracking is used in qualitative research, although it is possible to use it in quantitative research involving statistical analysis of the results. Unfortunately, if a proper level of accuracy is to be maintained, eye tracking research is both time-consuming and cost-intensive. It requires the use of appropriate tools, primarily an eye tracker and a computer with special software, but also a suitable place to carry out the tests, as well as specialist data analysis and reporting skills. However, it enjoys increasing popularity.

The eye tracking services market is developing, also in the area of neuroresearch. The examples, product descriptions, and reports found indicate that demand for this type of research is growing and its functionality in marketing projects is highly valued.

It should be stressed, however, that research projects with the use of eye tracking very often involve the triangulation of methods and/or agencies claim that they have unique methodologies, e.g. with the use of the described method combined with others.

In light of the research carried out, it is reasonable to say that eye tracking enables the researcher to discover: which packaging prototype captures and holds attention most effectively; whether key brand attributes are effectively communicated; how products perform against competitors' products; whether the Point of Purchase (POP) material attracts the shoppers' attention.

Summing up, eye tracking provides valuable insights at all stages of the packaging development process, from strategy and concept testing to design validation and campaign effect research. These insights contribute to refining designs, increasing impact, findability levels, foreseeing the effects of product line extensions, etc.

**References**

BERGSTROM, J. R., SCHALL, A. J., (editors). 2014. *Eye tracking in user experience design,* Elsevier Inc.

BOOTH D, A., FREEMAN, R. P. J. 2014. Mind-reading versus neuromarketing: how does a product make an impact on the consumer?, *Journal of Consumer Marketing, 31*(3), 177–189.

BRADLEY, N. 2013. *Marketing research. Tools & techniques,*3rd ed., Oxford University Press.

BRIDGER, D. 2015. *Decoding the irrational consumer. How to commission, run and generate insights from neuromarketing research,* Kogan Page Limited.

BULSKA, D. 2014. Oczy zwierciadłem duszy konsumenta?*, Brief 1* (171), 60–63.

BURCH, M., CHUANG, L., FISHER, B., SCHMIDT, A., WEISKOPF, D., (editors). 2017. *Eye tracking and visualizations, techniques and applications. ETVIS 2015,* Springer.

CONKLIN, K., PELLICER-SANCHEZ, A., CARROL, G. 2018. *Eye-tracking. A guide for applied linguistics research,* Cambridge University Press.

DAVIDSON, R. J., BEGLEY, S. 2013. *Życie emocjonalne mózgu,* Wydawnictwo Uniwersytetu Jagiellońskiego.

FEINBERG, F. M., KINNEAR, T. C., TAYLOR, J. R. 2013. *Modern marketing research. Concepts, methods and cases*, 2nd ed., South-Western Cengage Learning.

http://www.aflofarm.com.pl/pl/produkty/suplementy-diety/esseliv-duo/.

http://www.aflofarm.com.pl/pl/produkty/suplementy-diety/linea-detox/.

http://www.eyetracker.pl/uncategorized/aflofarm-wyniki-badania-eyetrackingowego/.

http://www.eyetracker.pl/wp-content/uploads/2013/01/esel-opakowanie-2.jpg.

http://www.eyetracker.pl/wp-content/uploads/2013/01/esel-opakowanie-3.jpg.

http://www.eyetracker.pl/wp-content/uploads/2013/01/polka1.jpg.

http://www.eyetracker.pl/wp-content/uploads/2013/01/polka2.png.

http://www.eyetracker.pl/wp-content/uploads/2013/01/polka3.jpg.

http://www.neuro-innovations.pl/.

*https://poradnikprzedsiebiorcy.pl/-eyetracking-czyli-na-co-zwracamy-uwage.*

https://www.flickr.com/photos/84007375@N04/8089723405/.

https://www.flickr.com/photos/84007375@N04/8089724928/in/photostream/.

https://www.flickr.com/photos/84007375@N04/8089724956/in/photostream/.

https://www.youtube.com/watch?v=_ubHwQmToiA&list=PLzfUx30ER9I0WrEmJUQTDcIJ5Ly6VyWd6&index=4.
https://www.youtube.com/watch?v=-IUM-vZaWhc.
https://www.youtube.com/watch?v=rkE2s6UTsVs.
https://www.youtube.com/watch?v=JMDKz9ICTLs&index=3&list=PLzfUx30ER9I0WrEmJUQTDcIJ5Ly6VyWd6.
https://www.youtube.com/watch?v=Nhm7jIdyjVg.
https://www.youtube.com/watch?v=QEUTmhIMCTY.
https://www.youtube.com/watch?v=619TzVbGC1c.
https://www.youtube.com/watch?v=VCf3L4pUpOg.

JERZYK, E. 2017. Możliwości i ograniczenia wykorzystania eye-trackingu w badaniach zachowań starszych konsumentów. *Marketing i Zarządzanie, 2* (48), 133–140. DOI: 10.18276/miz.2017.4812.

LEUBE, A., RIFAI, K., WAHL, S. 2017. Sampling rate influences saccade detection in mobile eye tracking of a reading task. *Journal of Eye Movement Research, 10*(3):3, 1–11. DOI 10.16910/jemr.10.3.3.

MOŚCICHOWSKA, I., ROGOŚ-TUREK, B. 2016. *Badania jako podstawa projektowania user experience*, Wydawnictwo Naukowe PWN.

STRZELECKI, A., 2019. Badania okulograficzne w wyszukiwarkach internetowych – przegląd badań. Uniwersytet Ekonomiczny w Katowicach, https://webm.ue.katowice.pl/strzelecki/papers/badania-okulograficzne.pdf.

SZYMUSIAK, H. 2012. *Neurobiologiczne techniki stosowane w biznesie,* Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu.

WAS, C., SANSOSTI, F., MORRIS, B., (editors). 2017. *Eye-tracking technology applications in educational research,* IGI Global.

WĄSIKOWSKA, B. 2015. Eye tracking w badaniach marketingowych. *Zeszyty Naukowe Uniwersytetu Szczecińskiego nr 863, Studia Informatica nr 36,* 177–192. DOI: 10.18276/si.2015.36-13.