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**A szemkamerás piackutatás bemutatása – hatékony-e az Arany Ászok
display hirdetése?**

**Eye tracking in marketing research – is an Arany Ászok display ad
effective?**

2014.06.20

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1. INTRODUCTION

Eye tracking is an emerging method in marketing research. With developing technical opportunities it is getting more and more useful and therefore popular among market researchers. It can be used for a variety of different fields in marketing, for example usability testing of websites, testing advertisements both display, or television and nowadays mobile eye trackers also allow us to create in store researches, where store layout or product placing can be examined. Considering these we came to the conclusion that this subject would be an ideal topic for a research project.

In the first part of this study we introduced some new, popular marketing research method and the importance of measuring unconscious thinking. This can be interesting, because an eye tracking measurement can show useful results about the unconscious mind. In the next section we highlighted the main characteristics of this method, like the history, the ways of recording the eye, some devices those are available nowadays, and the possible outputs. This part is a brief summary of the eye tracking technology from a marketing research viewpoint.

The next step was to find a possible research, where we could effectively and spectacularly present the methodology. We had to consider factors like the research should be made with a stable eye tracking device, it should be interesting for participants around 18 to 25 years old, and display ads to be analyzed should be also available. With these in mind we decided to examine a Hungarian display ad from Arany Ászok that reached laudable results recently. Therefore, we arrived to our main hypothesis: An award winning Hungarian beer ad is effective, because it can reach the consumers effectively. So, we wanted to know, whether it is as good as the awards and results suggest?

We also wanted to compare the results to other participants of the market. Therefore, we selected seven more display ads to set against Arany Ászok. We wanted to show the results of competitors, smaller local players and brands with higher or lower awareness in Hungary. After measuring and analyzing these advertisements we received interesting results, which are being explained in this paper.

2. LITERATURE REVIEW

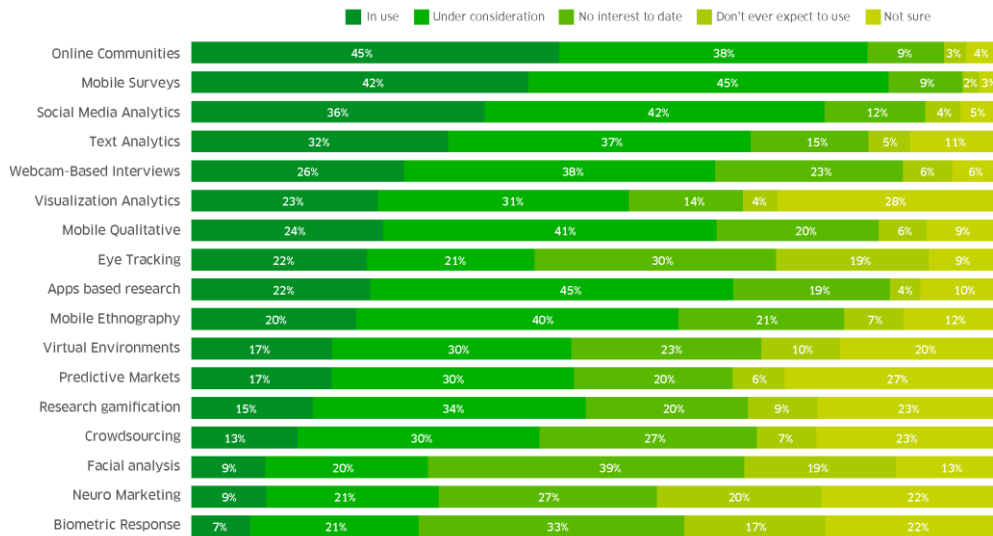
2.1. New trends in marketing research

Nowadays' economic and social processes make it inevitable to get all of the relevant information as fast as it is possible. Business men and also private people want to react on this information flow quickly and creatively. Marketing researchers, and also clients, cannot afford to always use the ordinary solutions. Those days are gone, when researchers sent out their surveys by post or they used just the telephone to reach a sample.

Therefore the importance of marketing research continues to grow. The reasons behind this are collected by Malhotra and Peterson (2001). First, the speed of business has increased due to the diffusion of computers, digital technologies and telecommunication devices. Such advances have enabled firms to be more responsive to customers through flexible manufacturing and reduced cycle times in channel operations. Instant communication has become a prerequisite to develop a viable market. It also mentions advances in technology have enhanced the scope, effectiveness and efficiency of marketing research leading to its increased use. Malhotra and Peterson's second reason is the new international system of globalization. Competitions are becoming more global and citizens of the world are increasingly aware of consumption opportunities elsewhere. These factors lead to the birth of new markets and marketing research can provide essential knowledge to management teams of firms entering these new markets.

This growing interest and the technological improvement led to different new methods of market research. Examples for these methods can be mobile surveys, social media analytics, webcam-based interviews or research gamification. Greenbook Research collects information about the new trends and methods in marketing research periodically and it reports them in its' GRIT Report. In picture number 2.1 there is data about the use and consideration of some relatively new methods. This data was presented in the winter 2013, GRIT Report. In this report Greenbook writes about the first three most popular methods: "Of the new research methods we've examined in the past two years, these three have had the most industry vetting, and subsectors of well-known suppliers already exist for each. Last year, these were the new techniques that GRIT respondents were likely to use in 2012, and recent data show that these are still the most promising techniques moving forward. Specifically, 45% of respondents plan to use online communities in the future, followed by 42% for mobile surveys and 36% for social media analytics. The optimism toward these techniques is officially a trend." On the

What use of these techniques and approaches do you see ahead in your future?



2.1. The use of new methods

other end of the list there is neuromarketing, what is the field that bridges the study of consumer behavior with neuroscience (Morin, 2011) and biometric response with only 9% and 7% of the respondents using these techniques. However 21% still considering them to use and there is also 22% of the respondents, who are not sure about the future of these. Eye tracking is in the mid-range of the examined methods. It is still used by 22% of the respondents and another 21% would consider using it as a research technique.

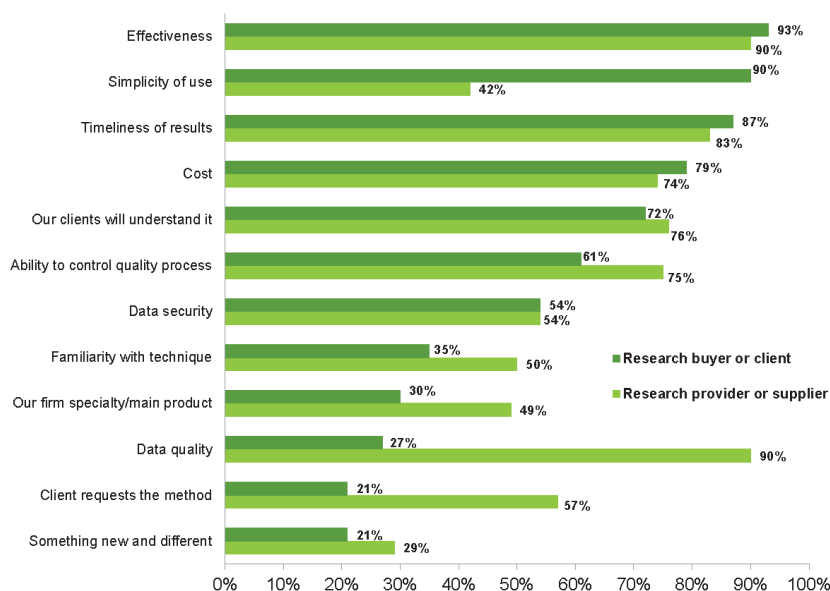
In its 2013 report Greenbook Research also collected the main forces restraining companies to use different techniques. Three traditional methods, focus groups, face to face and telephone interviews are considered to be too expensive by the majority of both of the asked suppliers and clients. About 20% of them also said that these three research methods are too difficult to organize. Mailing is similar to these three ways of data collection, but it is still considered to be cheaper. However it became the least fashionable by 40% of the suppliers. Telephone was the least fashionable at the clients' side, with 38% of them selecting this answer. About 30% of the respondents say that there are still technological limitations at online research. Therefore, there is also a lack of proof if online research works by more than 30% of both clients and suppliers. Technological difficulties are also a problem, with more than 30% mentioning them, in text analytics, mobile surveys and social media monitoring. Text analytics is mentioned in both surveys. It is a tool that allows researchers to do quantitative research on open-ended questions. With it they can categorize, or code, and filter respondents' important words and phrases. It showed up as fourth among techniques that will be in used in the future, as it is shown in picture 2.1. It has technological limitations and also the

knowledge is not too broad in the public about it, but it is still a fashionable method of researchers.

Despite almost half of the respondents mentioned the lack of knowledge as a difficulty of it, research gamification is one of the most fashionable method nowadays. Gamification as a term originated in the digital media industry. The first documented uses dates back to 2008, but gamification only entered widespread adoption in the second half of 2010, when several industry players and conferences popularized it (Detering, et al.). Even if it has not got a long history 15% of the respondents of GRIT winter 2013 report use it and another 30% is considering it as a possible research method.

In an earlier GRIT Report, the 2012 spring edition, Greenbook Research made an investigation on what are the important factors, when selecting data collection method. On picture number 2.2 it can be seen that most of the respondents mentioned effectiveness, timeliness and costs. It can be interesting that creating something new and different is important only for about 25% of the respondents. Of course, there are differences between responses from clients and responses from suppliers in some parts of the research. For example

Importance in selecting data collection method



Note: Among research buyers (n=149) and research suppliers (n=669).

2.2. Data collection methods

simplicity of use is more important for clients, 90% of them mentioned this factor and only 42% claimed from the providers' part. A factor that is really important for suppliers is the

quality of data. Most of them (90%) found it important, but only 27% on clients consider it a major factor. Ability to control quality process or familiarity with the techniques is also factors that concern providers and suppliers more.

2.2 Measuring emotions

However neuromarketing was not rated among the most popular research methods nowadays in the latest GRIT Report, there are other methods emerging that are dealing with emotion tracking or the measurement of unconscious. Examples for these types can be facial analysis, speech analyzing systems, or eye tracking. It can be important to understand emotional processes, because customers tend to think that they choose reasonably, but emotions often influence objectivity. As Häusel (2008) writes the majority (75-80 percent) of the decisions made by customers is unconscious, automatic, and emotional. He also suggests that only the 0.00004% of the incoming information from the outside world reaches the conscious mind. Most of the other signs and stimulus is translated into behavior immediately, without the brain recognizing it. Häusel also writes that all of the essential decisions made by customers are emotional. Decision containing no emotions has no importance for the brain. Therefore, it is worth to measure emotions if the clients want to see the changes caused by its products or advertisements. To understand the customers and also that how it makes its decisions, researchers have to deal with the unconscious processes within the brain.

Philip Graves, who is a professional dealing with the psychology of consumer behavior, wrote in his book (Graves, 2010): The unconscious mind is the real driver of consumer behavior. Understanding consumers is largely a matter of understanding how the unconscious mind operates, the first obstacle to this is recognizing how we frequently react without conscious awareness. He also collected the four primary factors that influence customer's unconscious decisions. The first is that people like shopping more if they do not have to think while doing it. As a solution he suggested to create a more simple consuming process that offers less choice and less information to the customer. It better worth to influence them with the most important ones, because it generates more secure income. The second assumption is that people dislike losses than they like the joy of gains. The suggested solution is that companies should focus on - instead of convincing customers to buy the new product – what they miss, if they do not buy their product. The third assumption is that the first thing a customer meets is the most likely to grab its' attention. Therefore the first impression is very important. The customer's first steps in the shop, the first sentences in an advertisement or the first offer

should be planned very carefully. Graves' last factor is that people tend to follow the crowd, instead of being a pathfinder. They depend on others and others' opinion is important for them. That is why product review forums are so popular on the internet. Therefore companies should convince customers that buying the same product as other will give them safety and will be recognized socially.

Häusel (2008) also examined the relationship between the unconscious mind and different products. He created four different types of product and these types have diverse effects on the brain one by one. These types can simplify sales and marketing decisions and can create a scientific background to them. He states that effects like individual preferences can have an influence on these divisions, so it can be different for different people. In his first group the products are relatively boring for the brain. For most of the customers the emotional importance of products like pencils, detergents, or toilet paper is small. The reason behind this is that these kinds of products activate emotional and motivational systems just a little. Therefore, the customer will not find these things interesting and it will not be willing to pay a high amount of money for them. So these products are relatively price sensitive and can be easily substituted. With a well-planned product politic the emotions can be strengthened towards these products, but even these will not cause real shopping enthusiasm, or deeper desire in the customer. The next group is the "brain activators". This group of products creates higher motivation and emotion in the customers, so these will have higher significance for them. These products are important for the customer, it often spends money for these, but it can also give up on this type. Examples for these kinds of products can be: fashionable clothing, vitamins, books or beauty care products. For customers it is much harder to give up on the next group of products. This group is different from the previous, because the products in it create more and stronger effects for the motivational and emotional systems. It is usual that these products have a direct chemical effect on these systems and they create positive feelings in the brain. These products can be coffee, wine, beer, chocolate, or the cigarette. The last group has the highest power on the brain. These products create endless desire for the customer, who can feel like he or she could not live without the product anymore. These strong emotions are often caused by a famous brand that offers status or individuality for the customer. Typical products can be luxury cars, designer fashion, or high-tech products like mobile phones.

2.3. The eye tracking technology

How technical improvement and the unconscious mind are connected to eye tracking is written by James Breeze in his article (2013). He writes: “Our brain receives visual information about colors, shapes, and movement of objects and then leaves the unnecessary details to the subconscious mind that plays a major role in decision making. Eye tracking studies basically offer several best practices for the effective use of this visual information. Businesses use the collected data to identify valuable information about the subconscious mind of their consumers, or consumers they would like to attract. This further helps product owners make decisions about product size, packaging design, and the placement of products on store shelves. It is too risky to rely on shoppers’ experience solely because they may say they like a product and they will buy it. What we find is that their actual purchases tell a different story. Because much of a person’s decision making when purchasing is subconscious, it becomes necessary for marketers to use eye tracking outputs to support a better understanding of consumer behavior.”

Eye tracking, as an alternative to get relevant information from our customers, can be applied also in several cases if we want to observe a target group’s visual attention, or if it is a physical product that can be seen. If consumers’ eye has a part in decisions about or usage of products than an eye tracking research can provide very useful information and results for product developers or for effectiveness investigation.

2.3.1 History

The term of eye tracking has a relatively long history. According to an article by David Leggett (2010) the origins of eye tracking leads back to Louis Emile Javal in 1879. Javal recognized that people do not read smoothly across a page, but rather pause on some words while moving quickly through others.

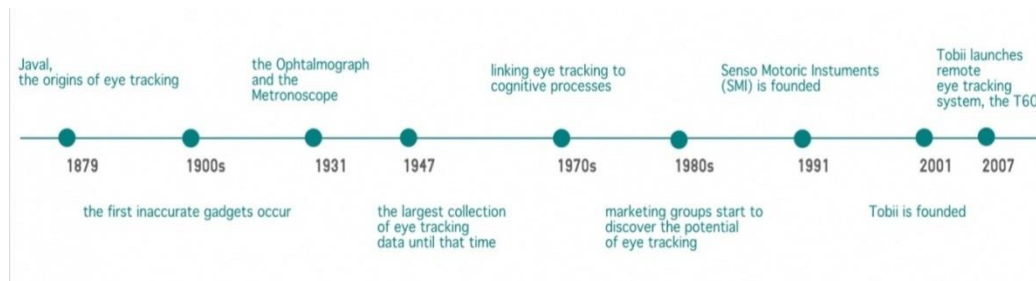
The first gadgets recording eye movements were created in the beginning of the 1900s. The goal of this was to understand the process of reading. These were very inaccurate devices with a high margin of error, or it was even an uncomfortable torture for the tested subject.

However, the technique has developed a lot since then. In 1931, Earl, James, and Carl Taylor created the Ophthalmograph and the Metronoscope, devices used to record the movement of eyes while reading and tools that trained people to read more effectively. The Ophthalmograph could record the fixations and saccades of the eye. The Metronoscope was a

device that helped users to develop their reading speed. The main purpose of these devices was to help medical treatments.

After the Second World War, one of the first measures of gaze direction was done in 1947 by the group of Fitts, Jones and Milton. They published technical reports in the late 1940s that are considered to be the seminal research on visual sampling and represent the largest collection of eye movement data collected in a visual monitoring task. The data encompass over 500000 frames of movie film of over 40 pilots taken under various flight conditions. Following this work, authors were able to propose a more efficient arrangement of instruments and identified those which were difficult to read, for possible redesign of the actual instrument (Mohamed et al, 2007).

Jacob and Karn (2003) wrote about the changes in the 1970s. Eye movement research and eye tracking flourished in the 1970s, with great advances in both eye tracking technology and psychological theory to link eye tracking data to cognitive processes. Psychologists who



2.3. The history of eye tracking

studied eye movements and fixations prior to the 1970s generally attempted to avoid cognitive factors such as learning, memory, workload, and deployment of attention. Instead their focus was on relationships between eye movements and simple visual stimulus properties such as target movement, contrast and location. Much of the relevant work in the 1970s focused on technical improvements to increase accuracy and precision and reduce the impact of the trackers on those whose eyes were tracked. Jacob and Karn (2003) writes about the discovery by Cornsweet and Crane in 1973 that multiple reflections from the eye could be used to dissociate eye rotations from head movement, increased tracking precision and also prepared the ground for developments resulting in greater freedom of participant movement.

In the 1980's, marketing groups really began using eye tracking to measure the effectiveness of ads in magazines. Eye tracking was able to determine what parts of a magazine page were seen, which elements of the page were actually read, and how much time was spent on each

part. The boom of the personal computers was also a good basis for the development of eye tracking. Mohamed et al (2007) also mentions here Dr. Levine who was the one of the first to see the potential of eye tracking in interactive applications.

The development's speed even increased rapidly in the past years. The eye tracking hardware today can collect information about human behavior and eye movement in an easy and fast way. It has become possible for researchers to use the appropriate form of eye tracking, and for subjects to be observed without realizing it.

2.3.2. Today's technical requirements

This development led to specific requirements of the eye tracking devices. These were collected by Mohamed et al (2007) and the non-intrusive techniques by Milekic (2003). Highlighting some of them, the eye tracking device should:

- offer an unobstructed field of view with good access to the face and head
- make no contact with the subject
- meet the practical challenge of being capable of artificially establishing the retinal image if necessary
- possess an accuracy of at least one percent or a few minutes of arc
- offer a resolution of one minute of arc sec^{-1} , and thus be capable of detecting the smallest changes in eye position
- offer a wide dynamic range of one minute to 45° for eye position and one minute arc sec^{-1} to 800 sec^{-1} for eye velocity
- offer good temporal dynamics and speed of response (e.g. good gain and small phase shift to 100Hz, or a good step response)
- possess a real-time response
- measure all three degrees of angular rotation and be insensitive to ocular translation
- be easy to use on a variety of subject
- allow natural head movements that occur during viewing
- not require individual calibration
- be able to perform with a wide variety of eye shapes, contact lenses or glasses



2.4. Tobii TX300

2.3.3 The eye's movement

Eye tracking method is very useful, because of the human attribute that we nearly could not influence our eye movement. It has been researched that it is difficult for the human brain to control what we see and to influence the visual information process. However eye movements replicate such cognitive processes that researchers would really like to know.

According to Chandon et al (2009) there is a broad consensus on the following aspects of how people visually process scenes. First, what appears as smooth and conscious eye movements actually consist of eye fixations (during which the eye remains relatively still for about 200-500 milliseconds) separated by rapid jumps, called saccades, which average 3°-5° in distance (measured in degrees of visual angle), last 20 to 40 milliseconds, and during which no information useful for scene perception can be acquired. Fixations serve to project a small area of the visual field onto the fovea, an area of the eye with superior visual acuity (which corresponds to roughly twice the width of one's thumb at arm's length). In natural complex scenes such as supermarket shelves, eye fixations are necessary for object identification and their location is therefore a good indication of visual attention.

Eye movement studies have also shown that the “gist of the information” about a scene can be extracted pre-attentively and from peripheral vision during the initial fixation (Henderson and Hollingworth, 1999). People can identify the semantic category of the scene (e.g., a supermarket shelf), its spatial layout (e.g., there are four shelves) and the level of clutter during the first eye fixation. Greater levels of detail for a given object (e.g., brand name) require a fixation centered on that object. In applied eye movement studies, the first fixation on an object is known as “noting” and the second as “reexamination”. Noting is therefore based on a combination of prior (“out-of-store”) knowledge and of the (“in-store”) low-level visual characteristics of the objects in the scene gathered from prior fixations on other objects. In contrast, reexamination is more influenced by the informativeness of the object for the task at hand (e.g., brand preferences, if the goal is consideration or choice) (Chandon et al, 2009).

Finally, Pieters and Wedel's (2007) extensive review of the eye movement literature concludes that people are mostly experiencing smooth, uninterrupted vision and that they are not aware of their own eye fixations. This suggests that recall of attention is essentially the same as recall of brand names in terms of the underlying cognitive process. This is why in our framework we placed recall with consideration and choice among the measures of brand evaluation and not among the measures of visual attention.

2.3.4 Fields of use

With the help of eye tracking market researchers can have effective and relevant results in several fields. It is useful at in-store researches to incite sales, to create the most effective shelf structure or examine consumer behavior. Its main advantage is, when we speak about consumer behavior, that the researcher could follow the customer through its way in the shop. Creating the most efficient package for the product is also easier if tested with an eye-tracker. It is also good for editing, testing and optimizing printed media. Non printed media is again a field in researches can employ eye tracking. It is an important tool for web designers to develop the best websites for the users. As it is written by Kaminska and Foulsham (2013) eye tracking is almost exclusively used for web surveys nowadays.

However, in-store researches started to emerge since the introduction of mobile eye tracking glasses. This method allows researchers to examine the following issues. Study the interplay between bottom-up salience, and top-down expectations in guiding attention. Examine eye movements using other marketing stimuli besides print ads. Test different attention metrics and to investigate the relationship between attention and downstream marketing effects such as purchases (Wedel and Pieters, 2007).

It is also useful to select the appropriate shelf position. Chandon et al (2009) wrote about the topic of shelf position in its article. Positioning brands on the top shelf and near the center of a shelf improves both attention and evaluation, but positioning them on the middle shelves helps attention without improving evaluation. Positioning them on the left or right-hand side of the shelf makes no difference to either attention or evaluation.

2.3.5 Ways of recording the eye

There are three common ways to record eye movements (Duchowski, 2003). The first is the so called EOG, the elector-oculography based, which measures electric potential differences around the eye. As Mohamed et al (2007) wrote, this technique is rather troublesome though, and is not well-suited for every-day use, since it requires the close contact of electrodes to the user. In an earlier research in 1992, Paul Green wrote down the process of EOG technique. In brief, there is a front-to-back voltage difference across the eyeball; the cornea being more positive by about .40 to 1.0 mV. As the eyeball rotates, the electrical dipole rotates with it. To sense eye position, three surface electrodes are placed around the eye socket, one above, one below, and one on the temple, though sometimes a fourth electrode is centrally placed on the

forehead. As the eyeball rotates, the voltage differentials measured change. The recorded potentials are fairly small, in the range of 15-200 mV with nominal sensitivities of the order of 4 mV per degree of eye movement. However, it was already clear in 1992 that this method responds slowly and not always in an extremely accurate way.

The second way is the SCL, or scleral contact lens based method. It measures the eye movement relative to head position, using a wire coil in a contact lens inserted in the eye (Duchowski, 2003).

The last method, mentioned by Duchowski, is the VIROG that's meaning is video based infrared oculography. This method, termed infrared eye tracking is the most popular for eye tracking in market research. If the research uses the VIROG method than starting the eye tracking research needs a few seconds calibration time. The camera lights the pupil with an infrared ray that is not seeable for the human eye. Then it records the vector between the reflection point on the cornea and the center of the pupil with the help of image analyzing sensors. Further trigonometric calculations make the eye movements visible, identify both fixations and saccades and show them graphically available.

2.3.6 Types of devices

Eye tracking devices have two main types. The more commonly used is, when the camera is under a monitor, or it can also be built into the monitor, which is useful for investigating things on the screen. It consists of two cameras viewing the eye movements and computer software that processes the collected data. It is commonly called as a remote eye tracking system. The camera lens, mounted besides or under the monitor, is focused upon the user's eye, tracking the pupil, most often with an infrared source (Nielsen and Yssing, 2004).



2.5. SMI Red 500

Because the subject and the camera are not in a physical contact it is more natural and comfortable for the participant. As the infrared light is not perceivable the situation is the same for the participant as a normal personal computer use situation. The latest devices also allow the subjects to move their head, but in given distances, this is called the “tracking box”, and it also makes the

research more comfortable. The big advantage of these methods is that it allows automatic, fast and reliable statistical analysis with the correct software. Usually, this software is also useful for graphical or numerical presentation of the data possessed.

Examples for remote eye tracking devices from the two biggest developers, Tobii (tobii.com) or SMI (smivision.com), can be the Tobii X2-60, or the TX300 (picture 2.4) from the same producer, or Senso Motoric Instruments' (SMI) RED series, the RED or RED500 (picture 2.5). The Tobii X2-60 has a 60Hz sampling rate, a 50x36 centimeters freedom for head movement and it has an immediate tracking recovery. It can be used up to a 25" screen and it can be connected with an USB 2.0 cable. It is smaller than the TX300, but it is portable and provides better opportunity to make a research at the clients' place or at the participants' home for example. The TX300 has higher sampling rate with 300Hz and also has immediate tracking recovery. As it works with 300Hz it is a more powerful device and enables researchers to gain more punctual and detailed data. However it has a lower "tracking box" (the size of it is 37x17 centimeters according to the official site) and is more difficult to transport to the place of measurement. Its maximum gaze angle is 35 degrees. Its screen unit is 23" large and has a screen ratio of 16:9. SMI's remote eye tracking devices can be found with sampling rates from 60Hz (RED) to 500Hz (RED500). These allow a free head movement of 40x20 centimeters and it has a less than three second automatic calibration type.



2.6. Tobii Glasses



2.7. SMI Eye Tracking Glasses 2.0

The other version is the eye tracking glasses, which is the device that can be used to test offline services. This mobile version's big advantage is that the participants are free to move during the examination. This device also consists of two cameras, one catching the field of view and the other viewing the participant's eye movements. Since subjects are free to move with this device almost everything can be examined with this method. However it could also be a drawback if the device is uncomfortable for the participant than it is not a natural research opportunity. Another disadvantage can be that because it is not fixed there is no opportunity for an automatic statistical analysis. These could be only made manually, which is a time consuming task and could also impact punctuality.

The examples for eye tracking glasses are also collected from the official websites of Tobii and SMI. Tobii eye tracking glasses consist of three main parts: the Tobii Glasses (picture 2.6), a Recording Assistant, what records the eye tracking data, and the IR markers, what is responsible for the communication with the glasses. The Tobii Glasses can be further divided into subparts. The camera captures what the respondent sees, the sensor communicates with the IR markers, the eye tracking sensor registers the reflection of the eye and there is also a microphone that can pick up comments from the participant. Interesting technical data can be the 30Hz data rate, the cameras recording rate, what is 56 degrees or the visual rate, 40 degrees. The camera is available both for photo and video recording. Data storage is resolved with a SD card. The SMI's mobile eye tracking solution consists of two main parts. It has the Eye Tracking Glasses 2.0 (picture 2.7) and a recording device, what can be the SMI-ETG Laptop or the SMI-ETG Recording Unit 2.0. The glasses work with 60 or 30Hz temporal resolution and they have 80 degree horizontal and 60 degree vertical gaze tracking range. As Tobii's glasses it also has integrated microphone and it could work well with contact lenses. It can communicate online and could process data through Ethernet or UDP solutions. Since the beginning of 2013 it is also available with a smartphone recorder.

2.3.7 The possible outputs

An eye tracking research could lead to different outputs that are able to give a feedback on our results very effectively. The pictures and data in this part are from Attila Seres, project manager at ETResearch (etresearch.hu), a Hungarian company dealing with eye and emotion tracking. ETResearch examined three different posters about the same product to demonstrate the different outputs. The product and the ads are fictional and were created to illustrate different eye tracking outputs.

Heat maps show which areas attracted the attention of the examined clients. The dominant parts are marked with green (lowest), yellow (larger attention) and red (the most dominant). In the first picture the attention is almost divided equally between the model's face, the product, the brand and the product name, but the last one is the most significant. In this case the



2.8. The examined advertisements



2.9. Heat maps

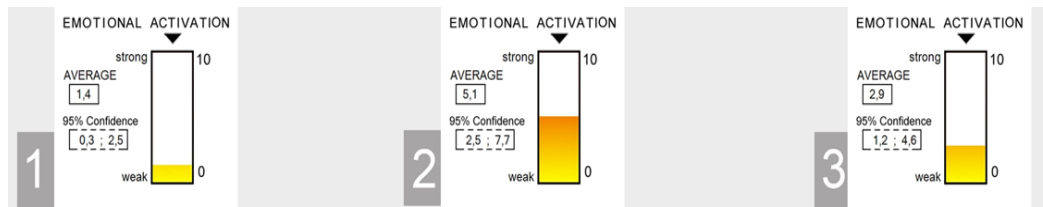
graphics led the eye through the picture highlighting all important parts. On the second picture the product is larger than on the other pictures. Therefore it attracted more gaze than the other parts. It is a useful technique to put the product in the middle, because people tend to start gazing from the middle of a picture. The third solution is similar to the first, but putting the name and brand under the product generated fewer looks to the text.

Gaze opacity maps show the participant's different statistics from the highlighted areas. The pictures above show the order of finding the lighter parts. On the first picture the product's



2.10. Gaze opacity maps

finding time is 2.6 seconds that is too long in real life. Products have only about one second to attract attention and interest. It has a better position on the next picture, because all of the participants gazed through the product and 55% of them also returned for a second check. However the other parts hardly received any attention. On the last picture the product is in a good position again, but the face of the model gets a lot of views. It could distract attention from the main point of the advertisement.



2.11. Emotional activation

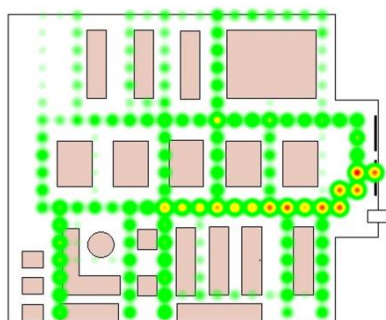
The emotional activation can also be checked with the help of an eye tracker. It shows how much the ad was able to grab attention, generate interest and the level of emotional attachment. This method has a 10 point scale, where 5 is a good level of commitment, between 2 and 4 it is normal and under 2 it is a low result. Checking deviation is also possible. If it is low the participants have a unified judgment on the picture and if it is high than judgment is unambiguous. Considering these we can say that the first picture has clearly low level of commitment. The second got a good result, the third an average one, but their deviation is high, so these could be interesting for ones, but uninteresting for others.

There are also other types of analysis that the eye tracking software can create. On the first picture there are gaze statistics that allow us to investigate any part of the ad not only the highlighted ones. This could lead to more punctual comparison of the parts of advertisements. The second picture is a reading analysis that makes possible to study written parts of ads. It shows what percent and how thoroughgoing the participants read the text. It can be particularly useful, when comparing different posters with the same texts.



2.12. Reading analysis

In-store researches require different types of outputs. It is worth to examine the typical directions of the customers, because these could lead to valuable information about them. Besides the ways of customers, the direction of the gaze can also be studied with eye tracking. It is possible to predict the number of customers, who meet the product in the shop, from



2.13. Movement density

which direction they are coming usually and which parts of the shelves attract the most attention. Comparing these results can lead to more effective product placement in the store.

A heat map is also useful at in-store researches. Based on the looks of the customers it shows what are the most attracting

points, or most interesting products on a selected part of the shelves.

In picture number 2.15 two different subjects' eye movement can be seen. The size of the circles depends on the focus time on the given point. The circle is larger if this time is longer. Numbers within the circles represent the order of detection.



2.14. Heat map

It is also possible to examine given products or product groups. It makes possible to compare our product with our competitors' products.



2.15. Eye movements

From eye tracking recordings it is possible to examine not only eye movements, but customer behavior and motivation also. Considering these factors could lead to rethinking product placing and making it more efficient to generate more attention to our product.

2.3.8 Limitations

The biggest problems about eye tracking are still the costs. As Nielsen and Yssing pointed out the cost of acquiring, learning to operate and the maintenance of an eye tracking system has to be considered. Prices range from just around 18.000 Euro to 100.000 euro for a complete eye tracking system.

“Tracking box” can also be a problem, because whether it is a head mounted system or a remote eye tracking system, the user is required to maintain relatively stable head position. Head movements during tests require recalibration, and users have difficulties in keeping their head still, hence it is recommended that calibrations are conducted multiple times during a test session, even “recalibration every few minutes” (Nielsen, 2004).

Shapiro et al. (1999) mentions two other drawbacks of the method. First, subjects can direct attentional resources to information not in focal view. Thus, lack of focal attention need not indicate lack of conscious ad processing. Second, eye tracking equipment is cumbersome and may create atypical viewing behavior. Its' use is also time consuming. Because subjects must be run one at a time, it minimizes efficiency in the conduct of experiments.

2.4 Advertising effectiveness

Effectiveness is an economic term that is measured with the rates and comparison of inputs and results (Mihaiu et al. 2010). Therefore advertising effectiveness means the result and the effect of a unit ad expense. Effective ads deliver the message the advertiser intended and consumers respond to as the advertiser hoped they would (Wells, 2014). Corvi (2010) describes it as the extent to which advertising generates a certain desired effect. So ad effectiveness is the return or the profit growth from the money spent on the advertisement.

Ad effectiveness is an existing concept, but it is difficult to measure. It can happen in some cases that we are unable to measure its' effect, but it does not mean that it has not got any impact. However it can also happen that there is a direct connection between the ad input and the response of the market. This direct effect suggests that the results of communication and ads can be proved, so it can reach its' impact completely. To get the correct results the communication action has to be evaluated among the target group. Clients also want to be sure about the representativeness of this evaluation. Therefore it is really important to create a measurement method that is able to give the correct feedback. Measurement is also important, because it allows clients to create a more effective budget for the ad. It not only shows the result whether the ad reached the expected result, but also protects clients from expensive mistakes.

One, and maybe the most widely used, method for avoiding these costly mistakes in advertising is testing. It can be classified into three groups based on the application time. The first method is pre-testing that can increase the potential success of the ad, or detects the occurring errors in the ad, what prevents the message to reach the customer. It is common at this stage that almost finished ads are tested before the launch. It is useful, because the possible changes can be still implemented easily. The next step is in-use testing. It is important to examine the ads effect after the launch of the campaign. With this method the results of pre-testing can be compared to the actual results. This method's main point is to control the effect of the ad continuously and correct the possible errors. It is also a possible

form of in-use testing to run the campaign in selected markets before it is introduced to the whole market. The latest part of testing is the post-testing, what is the measurement of effects from the finished project. Generally it is more costly and time consuming than the pre-testing. However it is run in real life market conditions, what is not general in the case of pre-testing. It has two main fields, the effect of communication and the effect on sales. In the first one the effects and changes on awareness and on attitude are examined. If the effect on sales is investigated that means the changes in sales volume is being tracked.

Eye tracking is a useful tool for measuring advertising effectiveness, because instead of asking people to recall their reactions or describe their cognitive engagement, eye tracking lets researchers see it through different types of outputs. It minimizes recall errors and the social desirability effect, and reveals information that conventional research methods normally miss (Velazquez and Pasch, 2014).

2.5 Regulations

In Hungary advertisements are regulated mainly by the new media law created in 2010 and the ‘Magyar Reklámetikai Kódex’ that is a collection of ethics and norms for the Hungarian ad industry. The media law has a scope on every form of media in Hungary. It also repealed the previous regulations on radio and television, the law on press and the laws about national news-agencies. As a result, the new media law has an effect not only on Hungarian media, but also on service providers, who are based in Hungary, or on foreign producers, who are servicing within the country. The law is supervised and executed by the ‘Nemzeti Média- és Hírközlési Hatóság’ that can suspend or cancel the rights of the media providers. About advertising it states that ads cannot offend human dignity, cannot contain any negative discrimination based on gender, origin, nationality, religion, physical or mental disability and also cannot harm national symbols. It is also forbidden to create ads that address children to buy a product or service, or encourages them to convince their parents on buying activity.

The ‘Magyar Reklámetikai Kódex’ is an agreement renewed in 2009. Its main goal is to give a collection of norms for the participants of the Hungarian advertising market. It was signed by 26 of the major players of this market. It is based on the Commission on Marketing and Advertising created by the International Chamber of Commerce. In the case of this study a relevant example for the ethical regulations in the agreement can be that the actors in alcoholic drink advertisements have to be older than 25 years and they actually also have to look older. This is important, because it protects children under 18 years old from consuming

alcohol. These types of ads also cannot show pregnant women and cannot refer to objects, or behavior those can attract children. These ethical guidelines are important, because if the players respect it that can create responsible commerce and communication.

2.6 Display advertising

In the eye tracking research we examine different advertising campaign's pictures those were published mainly in the form of display ads and some of them were also available in printed form. Display advertising is the use of the Internet as an advertising medium where promotional messages appear on other websites and/or search engine results pages. According to Kireyev et al. (2013) firms are motivated to spend more of their marketing budget online as consumers increasingly use online media to find information. Worldwide digital advertising spending in 2012 was \$103 billion, or about 20% of total money spent on advertising, and is expected to increase to \$163 billion, or 25% of total advertising spend, by the end of 2016. In 2012, almost half of all digital ad dollars worldwide were spent on paid search, and 38% were used for display ads. The biggest advantages of display advertising are that it can effectively target the audience, or it can be integrated with online social media, and it is also relatively cost effective. Targeting customers means that the ads are targeted according to online preferences. The ads are displayed taking into account any keywords people searched in the past and the type of websites they generally visit. Display ads can improve online social media marketing activity. Users can share them on their profiles, tweet them, or post them as status updates on Facebook. Finally, it is cost effective because it is relatively cheap compared to other media and with the spreading of the Internet it can reach more and more people.

It is important to mention here that pictures or display ads do not represent the effectiveness of an advertising campaign, because it is affected by many different factors like a good offer, or effective communication at other media channels. In this thesis we try to concentrate on the effectiveness of the selected pictures, we try to identify how the participants actually percept it, what parts of it were effective, or unnecessary, and how it performs when comparing to other display ads.

2.7 Awards in Hungary

Effectiveness, rules, creativity and the implementation of goals are usually the most important factors, when deciding about advertisement awards. In Hungary the two most well-known, local awards rewarding advertisements and also display ads are the ‘Arany Penge’ and the ‘Effie’.

The ‘Arany Penge’ is a Hungarian award created to acknowledge results in the creative industry. It was created in 1999 and since then the ‘Magyarországi Kommunikációs Ügynökségek Szövetsége’, what is the federation of Hungarian communication agencies, allocates it in every year.

The Effie is an award that is one of the most significant rewards around the world in marketing and communication subject. It was established in 1968 by the New York American Marketing Association and it is also handed out in every year. Its goal is to award effective campaigns that reached the required results in the given market conditions. Effie rewards not only creativity, but also the goals and the result of the campaign. It has national programs in 40 countries that also include Hungary. The award is given by a national jury that considers different factors like the reversal of the market trend, the change of market share, the change of sales, the change in knowledge about the brand or even the number of Facebook likes or online clicks.

The advertisement that we chose for this research have won both of these awards. This led to our hypothesis that the examined ad is effective. In the research part we will expand this statement and examine it with an eye tracking approach.

3. RESEARCH DESIGN

3.1 The chosen ad

The chosen campaign that's ads we will examine in this paper has won both of the above mentioned awards in the previous years. The campaign is called 'Aranypéntek 2 – Lalinál nem, de máshol igen!' and was created for the brand Arany Ászok by the Hungarian advertising agency Human Telex.

Arany Ászok is a Hungarian beer manufactured by the Dreher Sörgyárak Zrt. brewery in Budapest. As it was introduced in 1928 it is one of the oldest beers in Hungary today. Despite the development was suspended in the socialist era, the brand was revived in 1989, after a 40 year break. Because it has won several international awards it is considered to be a good quality beer. Besides the original Pilsen type drink, it is also available in non-alcoholic, semi-dark, lemon and grapefruit flavored versions.

The agency that created the ad is Human Telex, what is an advertising agency in Hungary. It was established in 1989, and since then it has become one of the leading players in the Hungarian market. The company defines its main goal as creating experience for consumers and success for clients with high level of motivation and also with creative solutions. First it was well known for below the line ad solutions, but nowadays it offers a variety of integrated services. It is in partnership with many of the market leading companies in different national markets for example: McDonald's, Unilever, Nivea, MOL, or Red Bull.

The Aranypéntek campaign has become the winner of Effie's the years' most successful promotion category in 2013 for the second year in a row. Not only its effectiveness was rewarded, it also won an Arany Penge in 2013 that is an award acknowledging creativity of advertisements. Some other Hungarian awards had been also won by the campaign like Trade Marketing Klub's reward or the Lollipop, what is another award for creativity. The ads concept is based on the movie Üvegtigris. It means the story, the scenes, and the characters appearing in the ads are similar to the original ones in the movie. First the campaign was introduced in 2011 and last years' edition is the second phase. The campaign's goal was to increase the consumption of draught beer in pubs, thus a mug of beer was priced as a glass of it on every Friday. This is why the action is called Aranypéntek, because Friday means péntek in Hungarian. Technically that means people could buy 0.5 liters of draught beer at the price of a 0.3 liter glass. According to Human Telex the results of the campaign were particularly

good. The effect of the ads created a 41% sales volume increase in 2011 and another 24% increase in 2012. During the second phase, the Aranypéntek 2 campaign, the awareness of the program increased from 42% to 60% among beer consumers.

3.2 Goals of the research

The original goal of the research was to explore and show the methodological advantages, and performance of the eye tracking technology. To reach this we selected pictures of display advertisements, because we can easily demonstrate the eye tracking methodology on these. With this we arrived to the other goal of the research that is to determine whether an award winning Hungarian advertisement is able to effectively reach customers, and how it competes with different rivals in the form of printed or display ad. So the main question was whether the brand, the information and the emotions effectively reach the consumers unconscious mind and also how these factors develop at other brands' ads.

Therefore, one of the most common pictures from Arany Ászok's Aranypéntek 2 campaign was selected and examined with an eye tracking approach. Other images were also selected to allow us to compare how the effects of them differ from the effects of the Arany Ászok ad. These pictures are from Dreher and Soproni, to represent the Hungarian rivals and from Kőbányai to test it against smaller national competitors. We also choose international examples to test, which are Heineken, Tuborg, Kozel, and also a brand that has lower awareness in Hungary, called Primus. We wanted to examine, what effect a famous brand name has on effectiveness, and compared to this, how less well known brands perform.

To check the examined pictures, you can go to the appendices part at the end of this paper. It can be useful, because it gives easier understanding to the research part.

3.3 Features of the sample

We planned that the examined sample will consist of minimum 20 university students, mainly from the University of Pécs, who are around 20 to 23 years old. The required lowest age was 18, because in Hungary regulations prescribe that these kinds of ads should not target people under that age. This peer group is worth to be examined because of the high involvement rate. Therefore we considered them as one of the most exposed age group to display ads, who are also significant beer consumers. It has to be stated that this is a convenience sample, because we selected volunteers who were available and easy to access. Consequently, it can happen that the sample might not represent the population as a whole.

3.4 Technical details

The research will be done with the help of Tobii's X2-60 device that is a so called remote or stable eye tracking system. It has two big advantages over eye tracking glasses. The first is that the subject and the camera are not in a physical contact, so it is more natural and comfortable for the participant. The other benefit is that the infrared light, what it uses to track the eye's motions, is not perceivable, so the situation is the same for the participant as a normal personal computer use situation. We also used Tobii's Tobii Studio software to create the project that will be shown to the respondents, and we will also use this program to analyze the eye tracking data. To get access to these products we turned to the help of Nóra Vezekényi, who is the area manager of Tobii in Hungary.

A key condition for the selected pictures was to be at most 1920x1200 pixels large, because it is the largest size the analyzing software can handle. The resolution of the laptop's monitor, what we will use for the test, also had to be considered, because the software does not suits pictures automatically to the screen.

3.5 Process of measurement

At the research, the participants task will be to watch a monitor, where the project will be run, try to concentrate on the advertisements and remember as much information as they can. With this we want to gain cross sectional eye tracking data from them. Before the examination the participants will be undertaken to a short calibration process. This process is important to ensure the gaze vector and gaze fixation position of students is on the host of computer screen



(Bates et al., 2005). After this the project will run. It will consist of 8 pictures that will be shown for 3 seconds each. This time is enough for the eye to percept the information, and it is also a good average of the time that our eye spends on a display ad generally. Between the pictures a short, 3 second, gap will be held to avoid the eye from fatigue. It will be solved with simple grey slides, called inter-slides. It is important, because it would make the comparison of the first ad and the last more clean, if we take the tiredness of the eye out of the equation. So the length of the examination with calibration for one participant should not be longer than 3 minutes.

We also created a pre- and a post-survey, which are common at eye tracking research to gain data from participants that we cannot gain with the eye tracking method. The pre-questionnaire will be asked before the calibration process and will focus on factors like demographical data, and the frequency of beer consumption. The participants will get the post-questionnaire after they leave the examination room, and its main topic is, which ads can the participants remember and how impulsive the examined ads were.

3.6 Data processing and analysis

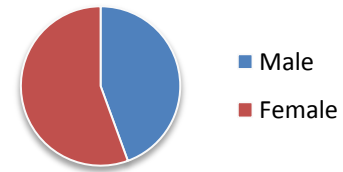
As it is mentioned above the eye tracking data will be analyzed with the Tobii Studio program. With the help of this program we will be able to create Gaze Plot Maps and Heat Maps. These are useful tools to visualize our findings. Besides these we will analyze the dataset with different eye tracking statistical metrics to create a deeper analysis from the dataset.

In order to calculate the eye movement metrics, we first have to define Areas of Interest (AOIs) in our media. The different metrics are then calculated in relation to these AOIs. The statistics that we will use are the Fixation Count that is the overall number of fixations, the Time to First Fixation that is a useful measure when a specific search target exists, or the Fixation Duration, because longer fixations (and perhaps even more so, longer gazes) are generally believed to be an indication of a participant's difficulty extracting information from a display (Jacob and Karn, 2003).

4. RESULTS

4.1 The sample

27 university students applied for the eye tracking measurement, creating a sample size that provides punctual results in this type of research. The questionnaires are statistically not representative, but they make a good auxiliary to better understand the eye tracking data. From the pre-questionnaire we could find out that 15 of them were female and 12 were male. The average age of the respondents was 21.37, the youngest participant was 19 years old and there was a 26 years old girl, who is the oldest member of the sample. None of them participated in an eye tracking research before, so at the beginning of the test we told them what their task is and how this research method works.



4.1. The sample

4.2 Pre- and post-questionnaire

We asked them in the pre-questionnaire how often they visit pubs. They had to choose from a six point scale, where one is never and six is very often. It resulted in an average score of 3.56, so we can say that, besides 5 people who answered 1 or 2, the majority goes to pubs regularly. Therefore they can be considered as relevant people in the case of beer ads. In this part of the research we would also like to get to know, which ones are the respondents' favorite beer brands that they can recall from advertisements. Heineken was the most mentioned brand with 7 allusions, and Soproni came in second with 5 mentions, becoming the most recalled Hungarian brand.

In the post-questionnaire the participants had to recall the ads that they remember. Soproni got the highest number of recalls, 18 people were able to name it after the measurement. The second place was divided between Heineken and Arany Ászok with 16 mentions. These three pictures are outstanding from the others, because the fourth on this list is Dreher and Tuborg with only 11 mentions. It is interesting to note that Borsodi, what is also a Hungarian beer brand, also received 3 recalls, despite it was not even shown in the presentation. If we consider the rate of recalls it is not surprising that Heineken and Soproni were considered as the most popular ads from the mentioned ones (both had 6 mentions). However, only 3 respondents stated that they liked Arany Ászok the best.

We also wanted to know in this part that how incentive the ads for beer consumption were and whether their information level satisfied the respondents. The participants had to weight their

favorite recalled ads on a six-point scale, where one was the worst and six was the best score. The average score of the ‘incentive’ question was 3.8 and 4.2 for the information level. We wanted to compare these scores to the scores of Arany Ászok and it was revealed that the favorite advertisements are more incentive for drinking a beer (Arany Ászok average score: 3.5). They are also more informative, because the examined Hungarian brand only received a score of 3.78 here.

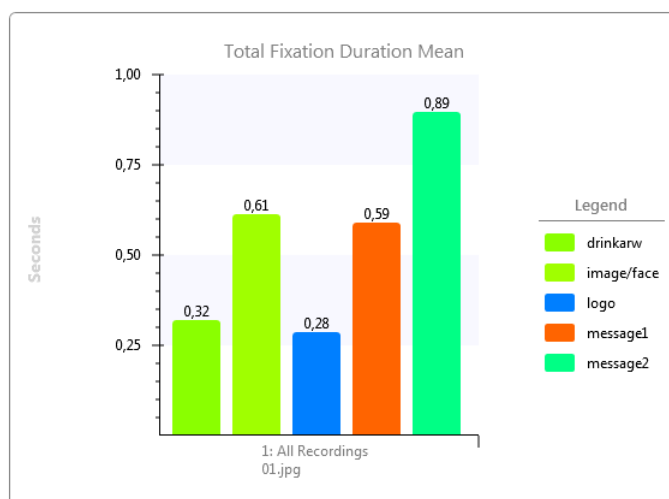


4.2. Arany Ászok heat map

4.3 Eye tracking results

As it was stated above the analysis of eye tracking data was made with the help of Tobii Studio that is the software developed for this task. We created different Areas of Interest groups to analyze and compare the data on the pictures. We differentiated the ‘logo’, the ‘image’, what can be the product or the face or faces of models and the ‘message’ AOIs on every picture. ‘Slogan’ and ‘drinkawr’ AOIs were also created where it was possible, but these parts were not present on every picture. We put ‘drinkawr’ AOIs on pictures that included warnings for children or notifications about the importance of responsible drinking. The pictures with AOIs can be seen in the appendix part of the thesis.

On the Arany Ászok picture we created 5 different AOIs: the ‘logo’, the ‘image’, the ‘drinkawr’ and two messages. ‘Message1’ is about the Arany Ászok campaign and



4.3. Arany Ászok fixation duration

‘Message2’ is about the Facebook page of the brand. The image about Imre Csuja, who is a Hungarian actor, and the two messages were fixated by almost everyone, 26 participants looked at them. From these parts, the Facebook message was the most successful, one respondent fixated on it 4.46 times on average. The Arany Ászok logo got only 11 fixations, but since the Arany Ászok logo was viewed by

almost everyone the picture could be linked to the brand easily. The warning for children at the bottom of the picture got only 1 fixation, so it was the worst performing part of the ad.

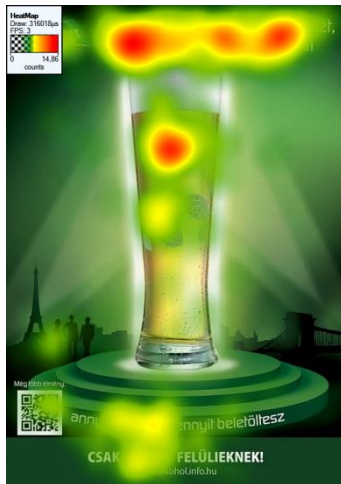
Another metric that can be useful in eye tracking measurement is the time to first fixation. It shows the time between the start of the stimuli and the point when the participant fixates on the AOI for the first time. The image was the best part from this perspective, because it took 0.42 seconds to find this AOI. The two messages were quite similar in this metric with 0.99 ('message1') and 0.92 ('message2').

Eye tracking experts generally say that people need to fixate a point for about 0.3 seconds to percept it and around 0.6 seconds to become aware of it. To examine this we used the total fixation duration metric in the software. As you can see on picture number 4.3 the 'logo' AOI was fixated under 0.3 seconds, therefore it is not sure whether it reached the participants. However the Aranyépíték message was viewed for 0.59 seconds on average, so this part was definitely perceived. The face of the actor performed slightly better in this analysis and with the result of 0.61 seconds, so it was understood by the respondents. The other message got significantly higher duration with 0.89 seconds, but it is a relatively longer text, therefore it should be fixated longer to understand.

To sum up, we could say that the Arany Ászok ad was a relatively well constructed picture from an eye tracking viewpoint. If we check the gaze-plot map of the ad (picture 4.4), we can see from the saccades that it led the eye through every important part of the picture, and the amount of information was perceptible for the participants. The face of Imre Csúja got relatively high number of fixations, and because he is an important character of the Aranyépíték campaign, it makes the picture more understandable. It is also a good element, because faces generate more emotions in general, and as a result they increase attachment to the brand. As both of the two messages were fixated by the majority of the participants for a relatively long time, we could say that the messages reached the respondents. This gives an answer to the main question of this thesis, what was about the effectiveness of the advertisement. Because the important parts reached the mind of the students, we



4.4. Arany Ászok gaze plot



4.5. Dreher heat map

can say that this ad is effective. However we also wanted to know how good these results are, so we compared these to other advertisements.

First of all we show the main interesting results from the other advertisements. In the Dreher picture the image of the product was visualized really well, because it was fixated by all the respondents for 0.82 second on average. This shows that if somebody wants to emphasize something it should put it in the middle in a relatively big size and it will attract the eye automatically. It is worth to mention that the logo, in the upper

left corner, got only 8 fixations. However it can be seen also on the product, so it should be clear for the participants that this ad is about Dreher. The message was fixated by 23 students, and for 0.9 seconds, so the majority of them read it and got what it would like to say. It is interesting that this was the only ad where the drinking awareness part got more than 10 fixations ($n=11$). However it is also true that this was the largest and most well positioned 'drinkawr' AOI.

The Soproni picture also got relatively good results, because every important part was fixated for more than 0.3 seconds. There were not many details, so the main AOIs could be easily found by the participants. The message in the upper left corner was fixated for more than one second on average. Therefore we could assume that students read it. This picture also led the eye through the main parts, if we check the average finding times we can see that they gazed in a product, message and logo order.

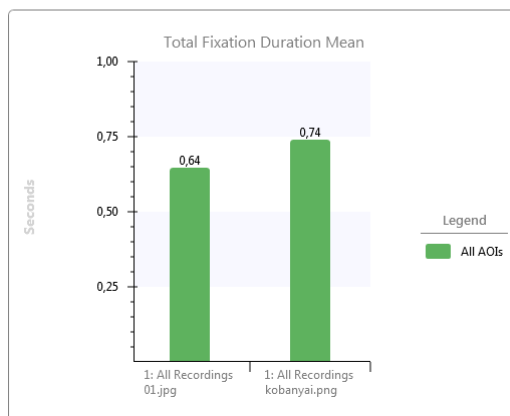
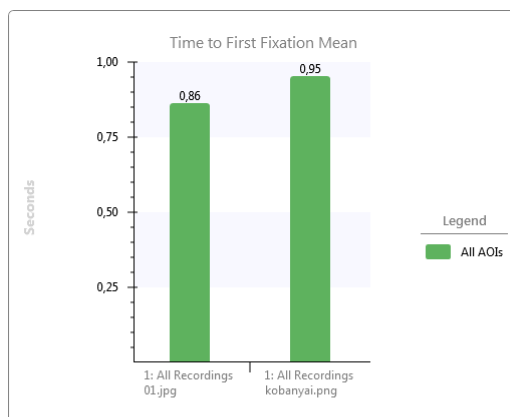
The next ad, Primus, is relatively unknown in Hungary and this could be a reason why it was only recalled four times in the post-questionnaire, despite a lot of respondents mentioned the



4.6. Primus gaze opacity

‘ad on the sea’, or the ‘shipwrecking ad’. The eye tracking method shows another reason behind this. As you can see on the gaze opacity map (picture 4.6) the high amount of details divide the attention.

If we see the statistics, we can see that only half of the respondents fixated on the message and the product. Despite these were checked for about 0.6 seconds, it was still not enough for a brand with low awareness among the sample to remain in the participants’ memory. These results show that if a relatively unknown brand wants to enter a market, it has to develop its advertisement very carefully to create an effective advertisement.



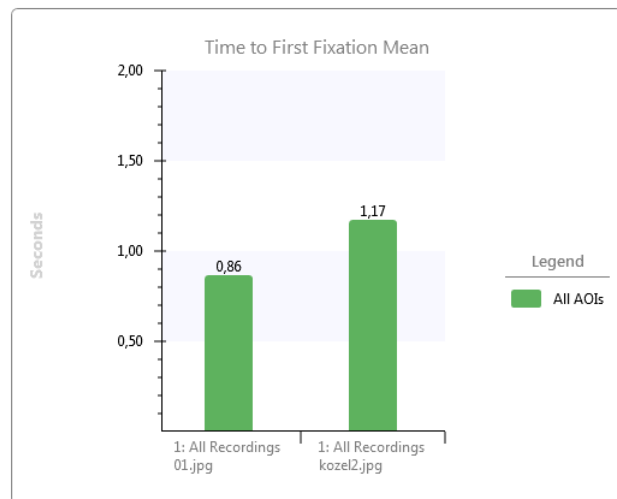
4.7. Arany Ászok vs. Kőbányai

Heineken used a very simple display ad to advertise its drought beer prices in the Balaton Sound Festival. This simplicity resulted in good eye tracking result, because everyone fixated on the message for 1.34 seconds and 26 students checked the logo for 0.76 seconds, so both parts were effective. These parts were also quick to find, on average it took 0.42 seconds to locate the logo and 0.75 second for the message AOI. Therefore the 3 seconds until the ad was shown had to be enough for everyone to understand the main point of this advertisement.

The next ad is similar to the Arany Ászok picture, because it was made by the same agency to advertise a similar campaign. Kőbányai is advertising its products with a Hungarian rock singer, Feró Nagy. As he is familiar among

students it is not surprising that all of them fixated on his face. We can see from the time to first fixation metric that this fixation was almost immediate, because it took 0.29 second on average to find this AOI. It came up once again that putting the brand logo more than once on the picture can be a good strategy, because the ‘logo’ AOI in the upper left corner got only 11 fixations. However if we consider that the logo is also available on the shirt of the character and on the product, it is very likely that it reached the majority of participants.

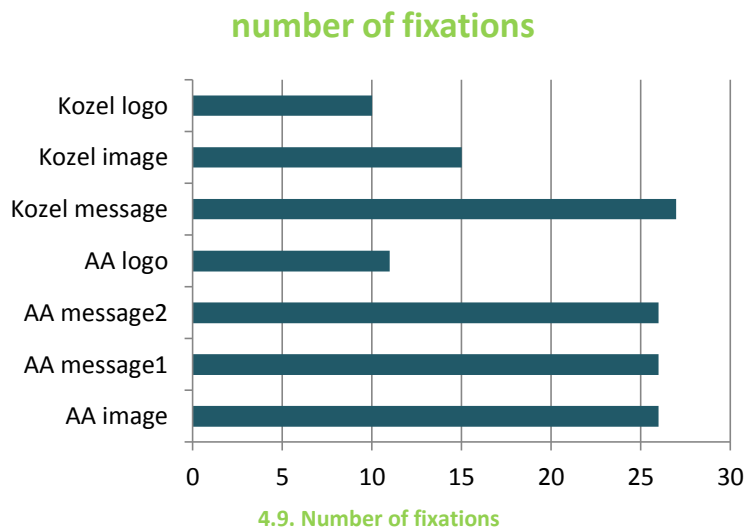
Kozel can be an example for the case, when too much information splits attention. Despite the main message was fixated by everyone there are no other parts, what was checked at least by half of the students. The product and the logo did not receive enough attention to reach the participants' mind. Therefore the message of the picture cannot be linked to the brand and as a result none of the students could recall Kozel in the post-questionnaire.



4.8. Arany Ászok vs. Kozel

The last picture that we examined is from Tuborg. The product in this picture is so emphasized that it is not disturbed by the high amount of characters in the background. This product AOI was fixated by everyone for 0.8 seconds (average=1.6) so it was understandable for everyone. The details in the background stole attention from the slogan at the bottom of the picture. It was only fixated by 18 students, but if the others could connect the background figures to the message it could still be effective.

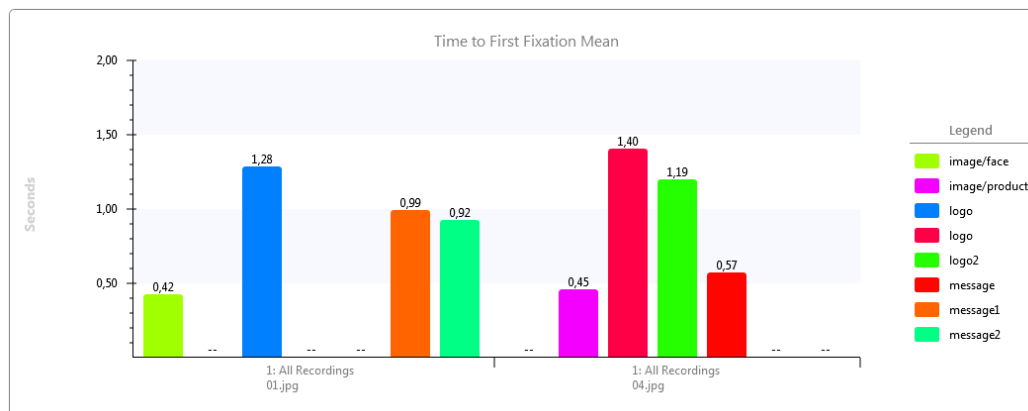
Comparing the results of the different pictures to the Arany Ászok picture we can determine some other interesting results. The Arany Ászok and the Kőbányai ads were both created by the same advertising agency, Human Telex. They both advertise similar campaigns those are the Aranypéntek and the Négyután. They are not only similar in content, but also in structure. The eye tracking results also show significant similarities. The famous faces reached the mind of all the participants in both pictures, and they were also fixated for more than 0.6 seconds. There is a slight difference between the results of the messages. Both messages on the Arany Ászok advertisement reached 26 students, but the message on the other picture got fixations by only 23 of them. If we sum up the fixations on all AOIs per picture we can see (graph number 4.7) that the differences are not very significant in this case. AOIs were slightly easier to find on the Arany Ászok picture, but the Kőbányai ad's AOIs were fixated longer. As both durations are higher than 0.6 seconds, both ads can be considered effective. The Dreher advertisement was also created by this agency and it can also be an effective ad. However it has a background that steal some attention from the important parts as you can see on the heat-map above (picture 4.5). If we analyze this region it reveals that 5 people fixated on this



unnecessary part, but for only 0.29 seconds (standard deviation = 0.09) that means it is not sure they are aware of it.

The Kozel picture used a similar approach to the previous two ads putting a lot of information on the picture. However it was not as successful in leading the eye as

those. After everyone fixated on the main message the other parts could not reach significant results, as it is stated above no one recalled this ad in the post-questionnaire. In graph number 4.9 the



numbers of fixations on AOIs are shown. If we compare the time to first fixation metric on all AOIs it can be seen that it takes longer to find the first AOI on the Kozel ad (1.17 seconds) in general. If we consider that one picture was shown for 3 seconds in the test, 1.17 seconds is too much time to find the first AOI. This comparison is a good example for similar ad types working well and another that does not reach the expected results. It can be also true for the Tuborg ad, but it compensated this effect with a large product picture that made it clear, which brand is the advertisement about.

Soproni is a different type of ad, because it does not contain so much information as the Kozel, or Arany Ászok pictures. Its simplicity generated relatively good results, because all parts were perceived by the students. The only significant difference compared to the Arany Ászok ad was in the logo AOIs. The two logo AOIs on the picture were fixated for 0.44 and

0.52 seconds, so they did not reach 0.6 seconds. However, if we consider that Soproni is a well-known brand for the sample, we can state that it still reached the participants mind. The post-questionnaire also shows this, because it was the most recalled brand, 18 people could remember the Soproni ad. If we look at chart number 4.10 we can compare the time the sample needed to fixate on different AOIs on the Soproni (04.jpg) and Arany Ászok (01.jpg) ads. We can see that the most catching parts were



4.11. Heineken heat map

the face and the product, both could be found under 0.5 seconds.

All parts were found in less than 1.5 seconds on average, so we

could say that every important part was well positioned, and were easy to find for the sample.

Heineken used the same approach to the ad with only a few amount of information on its picture and it also reached relatively good results. Both the questionnaire and the eye tracking metrics show that this ad reached the sample. As you can see on the heat-map (picture 4.11) the brand logo and the price offer magnetized fixations. They were also easy to find, because it took 0.42 second to check out the logo and 0.75 to find the offer. This 0.42 seconds is a

really good result, participants almost immediately find the brand logo. As we mentioned above, the price was viewed for 1.34 second that is also an outstanding result and makes it clear that the main message of this picture got to the examined students. A question about the price would be interesting in the post-questionnaire to examine what percent of the respondents could recall it.

	image	logo	message
Arany Ászok			
Dreher			
Soproni			
Heineken			
Kőbányai			
Kozel			
Tuborg			
Primus			

4.12 AOI summary

In the next table we would like to summarize whether the different parts of the ads reached the sample's

minds. We included AOIs those are present in every media (image, logo and message). Cells are green when more than 75% of the sample fixated on the given AOI for more than 0.6 seconds. If these conditions are not fulfilled cells are being signed with red.

It is common that advertisers use faces to generate more attention, emotion, and it is also a useful tool to lead the eye on the ad. Therefore we checked how faces influence the examined beer ads. We examined the Arany Ászok, the Kőbányai and the Primus ads those contain faces on the pictures. From the time to first fixation metric we can say that faces were always the first AOI that the participants found. It took 0.29 second to find it on the Kőbányai, 0.42 second on the Arany Ászok and 0.74 on the Primus ad. As a result we can say that faces on ads are useful to get the attention of people. However, we also wanted to determine, whether it is useful if the advertiser has a message on the picture that it wants to deliver to its customers. We used gaze plot maps to examine how the respondents view the ads. After analyzing the gaze directions of these three advertisements we can see that 52% of the respondents checked the message after the face on the Arany Ászok picture. This result was even better on the Kőbányai picture, because it led the eye even more effectively onto the message. 85% of the participants gazed in the direction of the message after checking the face of the model. A typical gaze order can be seen on picture number 4.13. At the Primus picture, we used a different approach. We wanted to know if there is a difference between words next to and words further from the faces of the models. We divided the message on the picture's upper right side into two parts and the closer part got significantly higher fixations than the other. 17 participants fixated on it, but only 7 of them checked the further part. The duration of these fixations also show a difference, the first part was checked for 0.85 seconds and the second was only for 0.32, so it is more possible that the respondents read the words in the first part than they did it in the second.



4.13. Kőbányai gaze order

5. CONCLUSION

To sum up our results, we can say that the Arany Ászok ad has to be considered as an effective advertisement, because its' two main messages and the brand also reached the examined sample. For further examination it would be interesting to compare different versions of this ad. The possible trial versions would contain the same information, but would be visualized in a different manner. With this test we could examine, whether the agency could create an even more effective version, and they could chose the one that fits the goals the best.

The Arany Ászok picture could also cope relatively well with its two main rivals Heineken and Soproni. It has to be stated that these ads used a different type of ad with less information on the picture. Despite this if we compare the eye tracking results they do not differ significantly from each other. With this we also revealed that creating a simpler ad could be an effective strategy, because high detail level could split attention. However a picture with more information can be also successful, if it can lead the eye through the important parts of the ad. From these results we can say that the two best strategies, when creating a display advertisement, are to keep it simple or to lead the eye.

The other pictures' main points were also perceived by the respondents, but they could not reach the recall numbers of the previous three advertisements. On these pictures we could find problematic parts too, like the too much information on the Kozel ad, or the effacement of the brand on the Primus ad. The case of Primus showed also that a brand with low awareness have to design its advertisement very carefully before entering a new market. They have to lead people to fixate onto the brand name or logo, because it is vital when it comes to connecting the advertisement to a brand.

We can also strengthen that it is worth to use model's faces on advertisements. The three ads that we examined and contained faces attracted the eye, and were fixated by almost everyone. It also helped the message to get to the respondents by leading the gaze from the face onto the message at the pictures.

It could be also interesting to examine, why the drinking awareness parts were not fixated by the participants. It could be part of another, future eye tracking research topic. If it can produce useful results it could show how to place these on ads to effectively reach consumers.

Another thing that would be useful to consider before further research is the type or the goal of the ad. In this research we compared advertisement with different goal, but it is more common to separate them based on this. If we consider that a print advertisement's goal can be to increase sales, to get attention, or to increase brand awareness, we can see that a research like this can be even more useful from a marketing research viewpoint.

6. REFERENCES:

Bates, R., Istance, H., Oosthuizen, L., and Majaranta, P. (2005) Survey of De-Facto Standards in Eye Tracking *Laporan*

Chandon, P., Hutchinson, J.W., Bradlow, E.T. and Young, S.H. (2009) Does In-Store Marketing Work? Effects of the Number and Position of Shelf Facing on Brand Attention and Evaluation at the Point of Purchase *Journal of Marketing: November 2009, Vol. 73, No. 6, pp. 1-17.*

Corvi, E. and Bonera, M. (2010) The effectiveness of advertising: a literature review *10th Global Conference on Business & Economics ISBN : 978-0-9830452-1-2*

Detering, S., Khaled, R. and Nacke, L.E. (2011) Gamification: Toward a Definition *CHI 2011 Workshop Paper*

Duchowski, A. (2007) Eye Tracking Methodology: Theory and Practice *Springer ISBN: 978-1-84628-808-7*

Graves, P. (2010) Consumerology: The Market Research Myth, the Truth about Consumers and the Psychology of Shopping *Nicholas Brealey Publishing, 2010 pg. 216*

Green, P. (1992) Review of Eye Fixation Recoding Methods and Equipment *IVHS Technical Report #92-20*

Greenbook Research (2013) Research Industry Trends Report Winter 2013
<http://www.issuu.com/researchshare/docs/grit-winter-2013> acquired: February 7th, 2014

Greenbook Research (2012) Research Industry Trends Report Spring 2012
<http://issuu.com/researchshare/docs/grit-spring-2012-full-report> acquired: February 7th, 2014

Häusel, H.G. (2008) Titkok a vevők fejében *Lánchíd tudástár ISBN: 978-963-06-5564-4*

Henderson, John M. and Andrew Hollingworth (1999) High-level Scene Perception *Annual Review of Psychology, 50, 243-71.*

Jacob, R. and Karn, K.S. (2003) Eye tracking in human-computer interaction and usability research: Ready to deliver the promises *The Mind's eye: Cognitive The Mind's Eye: Cognitive and Applied Aspects of Eye Movement Research (2003), pp. 573-603*

- Kaminska, O. and Foulsham, T. (2013) Real-world Eye-tracking in Face-to-face, Web and SAQ Modes *ISER Working Paper Series 2013-07*
- Kireyev, P., Pauwels, K., Gupta, S. (2013) Do Display Ads Influence Search? Attribution and Dynamics in Online Advertising *Harvard Business School Working Paper 13-070*
- Leggett, D. (2010) A brief history of eye-tracking *Design Research Articles*
- Malhotra, K., Peterson, M. (2001) Marketing research in the new millennium: Emerging issues and trends *Marketing Intelligence & Planning; 2001; 19, 4; ABI/INFORM Global pg. 216*
- Mihaiu, DM., Opreana, A. and Cristescu, MP. (2010) Efficiency, Effectiveness and Performance of the Public Sector *Romanian Journal of Economic Forecasting*
- Milekic, S. (2003) The More You Look the More You Get: Intention-based Interface using Gaze-tracking *Selected papers from an international conference, pp 57-72, Archives and Museum Informatics, Pittsburgh*
- Mohamed, A.O., Da Silva, M.P. and Courboulay, V. (2007) A history of eye gaze tracking *Hyper Articles en Ligne*
- Morin, C. (2011) Neuromarketing: The New Science of Consumer Behavior *Springer Science + Business Media, LLC 2011*
- Nielsen, J. (2004) Capturing Thoughts, Capturing Minds? From Think Aloud to Participatory Analysis *Working Paper of Copenhagen Business School*
- Nielsen, J. and Yssing, C. (2004) What Kind of Information does an HCI expert want? -on concurrent usability testing *Working Paper of Copenhagen Business School*
- Pieters, R. and Wedel, M. (2007) Informativeness of Eye Movements for Visual Marketing: Six Cornerstones in Visual Marketing: From Attention to Action, *Michel Wedel and Rik Pieters, eds.: Lawrence Erlbaum, 43-72.*
- Shapiro, S., MacInnis, D.J., Heckler, S.E. and Perez, A.M. (1999) An experimental method for studying unconscious perception in a marketing context *Psychology & Marketing; Sep 1999; 16, 6; ABI/INFORM Global pg. 459*

Velazquez, C.E., Pasch, K.E. (2014) Attention to Food and Beverage Advertisements as Measured by Eye-Tracking Technology and the Food Preferences and Choices of Youth *Journal of the Academy of Nutrition and Dietetics* 114, 578–582

Wells, WD. (2014) Measuring Advertising Effectiveness *Psychology Press ISBN: 1317779517*

Technical data and pictures:

Tobii X2-60: <http://www.tobii.com/en/eye-tracking-research/global/products/hardware/tobii-x2-60-eye-tracker/> (acquired: December 28th, 2013)

Tobii TX300: <http://www.tobii.com/en/eye-tracking-research/global/products/hardware/tobii-tx300-eye-tracker/> (acquired: December 28th, 2013)

SMI RED250 or 500: <http://www.smivision.com/en/gaze-and-eye-tracking-systems/products/red-red250-red-500.html> (acquired: December 28th, 2013)

Tobii Glassess: <http://www.tobii.com/en/eye-tracking-research/global/products/hardware/tobii-glasses-eye-tracker/> (acquired: December 28th, 2013)

SMI Eye Tracking Glasses 2.0: http://www.eyetracking-glasses.com/fileadmin/user_upload/documents/smi_etg20_flyer.pdf (acquired: December 28th, 2013)

Picture 2.4:

http://www.tobii.com/ImageVaultFiles/id_732/cf_50/Tobii_Image_TX300_D2_Thmb.png (acquired: December 28th, 2013)

Picture 2.5: http://www.smivision.com/uploads/tx_templavoila/red500_overview.jpg (acquired: December 28th, 2013)

Picture 2.6:

http://www.tobii.com/ImageVaultFiles/id_726/cf_50/Tobii_Image_Glasses_D2_Thmb.png (acquired: December 28th, 2013)

Picture 2.7: http://www.eyetracking-glasses.com/fileadmin/user_upload/product/product_smieyetracking_glasses20.jpg (acquired: December 28th, 2013)

Data and pictures (from number 2.8 to number 2.15) of outputs are from Attila Seres, ETResearch (attila.seres@etresearch.hu or www.etresearch.hu) (acquired: December 28th, 2013)

Pictures 2.1 and 2.2 are from the GRIT Report 2013 (<http://www.issuu.com/researchshare/docs/grit-winter-2013>, page 22) and 2012 (<http://issuu.com/researchshare/docs/grit-spring-2012-full-report>, page 16), (acquired: February 7th, 2014)

Data about the brand Arany Ászok: http://www.dreher.t.hu/portal/main.php?heading_id=14 (acquired: March 5th, 2014)

Data about Human Telex agency: <http://www.humantelex.hu/rolunk> (acquired: March 5th, 2014)

Magyar Reklámetikai Kódex
<http://www.mrsz.hu/download.php?oid=T6255f341a0e3056177582cb3baab79c;aid=T521503c160231561b7294e5a0fc7e95> (acquired: March 5th, 2014)

The Hungarian media law <http://net.jogtar.hu/jr/gen/getdoc.cgi?docid=A1000185.TV> (acquired: March 5th, 2014)

7. APPENDICIES

7.1 The examined advertisements



The collage consists of six distinct advertisements, each with a unique color scheme and layout:

- Arany Aszok:** Features a woman's face and a Facebook link. Text includes "ARANY ASZOK", "AZ ELISMERÉS NAPJA", "Minden út a Facebookra vezet. Csikánók! Csatlakozzatok!", and "WWW.FACEBOOK.COM /ARANYASZOK.HU".
- Heineken:** Features a glass of beer. Text includes "Heineken", "0,4 csapolt 450 Ft", "0,5 doboz 650 Ft", and "CSAK 18 ÉVESEN ELJUTHEKNEKI".
- Kofola:** Features a bottle of Kofola. Text includes "An award winning Czech beer on Old Street? You bet!", "Kofola", and "Roberto, Marco and Mari".
- Négyután:** Features a man sitting on a chair. Text includes "A munkának vége, frissülj fel végre!", "Mára vége a melónak! Dőlj hátra Te is és élvezd a Négyutánt!", and "www.negyutan.hu".
- Tuborg:** Features a bottle of Tuborg beer. Text includes "TUBORG", "Live unpeashed", and "TUBORG".
- Primus:** Features a group of people on a boat. Text includes "The water's what Piggies", "THE BOAT OF PRIMUS IS YOUR BOAT", and "PRIMUS".