NEUROMARKETING IN RETAIL: STATUS QUO, BEST-PRACTICE EXAMPLES AND CRITICAL APPRAISAL

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Abstract

Neuromarketing is already relatively advanced when it comes to researching the principle effect of marketing in the brain. What is often still missing, however, is the transfer of these findings into practice. The reason for this is that research has so far primarily pursued the question of `why?´. For practice, however, the question of `how?´ is much more relevant. This article attempts to answer the latter question, i.e. to bridge the gap between research and practice in the field of retail marketing. Is there a buy button in the consumer's brain? And if so, how can it be activated? Neuromarketing is a young discipline at the interface of cognitive science, neuroscience and market research. Due to technological progress, neuromarketing can provide important insights for retail, especially insights to explain consumer behaviour. By looking into the customer's brain, retail companies can address their customers in a more targeted manner and thus gain an advantage over competitors. Especially the influence of emotions and the unconscious play a major role in the purchase decision of consumers. Using the limbic map, customers can be clustered into types based on the characteristics of their emotional systems, for which specific marketing measures can be derived. Best-practice examples from the retail sector show that a targeted approach to specific shopping types in retail can lead to success.

Keywords: *neuromarketing, consumer behaviour, brain research, limbic system, shopping*

INTRODUCTION

Since time immemorial, manufacturers and retailers of products have been asking themselves what influences customers' purchasing decisions (Konrad, 2013). Emotions in particular play a major role, as no decision is made without emotions (Kenning, Plassmann & Ahlert, 2007). Not to be neglected in the purchase decision is the unconscious perception, because most decisions are made unconsciously. The influence of the unconscious is particularly important in the influence of advertising on the consumer (Scheier & Held, 2018; 2012). In order to examine the influences of emotions and unconscious perception, it has to be considered where these are anchored: in the human brain. For this reason, modern market research uses the methods of neuroscience to make processes in the brain visible (Nufer, 2020; Nufer & Sauer, 2015). However, research on neuromarketing is still comparatively in its infancy and in many areas has so far been more of a basic character (Kenning, 2016).

In this article, the basics of neuromarketing are presented and the status quo of innovative market research using neurophysiological methods is presented. It illustrates which emotion systems exist in humans and how customers differ in their personalities. The focus of this article is to answer the research question of how neuroscientific findings can be implemented in retail marketing. Therefore, various best-practice examples from retail practice are presented and discussed. Finally, the opportunities and limitations of neuromarketing are summarised.

DEFINITIONS

Neuroscience

The term neuroscience is understood to mean "a complex scientific discipline that brings together and integratively interprets all investigations into the structure and function of nervous systems" (Spektrum, 2021). Neuroscience attempts to decipher the functioning of the human brain through modern scientific methods. With the help of such methods, neuroscience has been able to gain numerous insights into the human brain in recent years that are of great importance for marketing (e.g. Dooley, 2013; Bühler, Häusel & Nufer, 2013; Bielefeld, 2012).

Neuroeconomics

For a long time, science was dominated by the assumption that people make rational and fully conscious decisions (Wells & Martin, 2017). In the meantime, however, this picture has been shaken, as studies have shown that a person's decision-making is strongly influenced by situational information and social preferences (e.g. Krampe et al., 2018; Fuchs, 2015; Bittner & Schwarz, 2015; Reimann & Weber, 2011). For this reason, the influences on people that affect them when making economic decisions, such as purchasing decisions, were investigated. Neuroscience, i.e. research into the human brain, is of particular importance here. If one combines the two scientific fields of economics and neuroscience, one speaks of neuroeconomics. Neuroeconomics is the "description and explanation of human behaviour in economic decision-making situations with the methodological support of neuroscience" (Reimann & Weber, 2011).

Neuromarketing

Neuromarketing is a subfield of neuroeconomics. When defining neuromarketing, a distinction can be made between a narrow and an extended definition. The narrow definition describes neuromarketing as the "use of apparative methods of brain research for marketing purposes" (Häusel, 2019a). According to the extended definition, neuromarketing is understood as a discipline that makes use of "apparative methods and findings of brain research for marketing purposes" (Häusel, 2019a). For example, existing marketing theories are analysed and confirmed or refuted through the use of imaging methods. Neuroscience can make an important contribution, particularly with regard to the analysis of customers' purchasing decisions, and help to better understand the customer (Yoon et al., 2012; Nufer & Wallmeier, 2010).

INNOVATIVE MARKET RESEARCH WITH NEUROPHYSIOLOGICAL METHODS

Technological progress in brain research offers new options for market research: Neuromarketing uses imaging scientific methods to make the activities of the human brain visible and measurable. These are electrophysiological methods (e.g. EEG, MEG) on the one hand and metabolic methods (e.g. PET, fMRI, fNIRS) on the other (Kenning, 2016; Häusel, 2019c).

Electroencephalography

Electroencephalography (EEG) uses electrodes to measure voltage fluctuations on the surface of the brain. This allows direct conclusions to be drawn about brain activity. It is possible to determine exactly in which order areas of the brain are activated. However, the high temporal precision is at the expense of spatial resolution, as activity can only be measured from the top of the skull.

Magnetoencephalography

Magnetoencephalography (MEG) measures the magnetic activity of the brain. Sensors are attached to the subject's head that record magnetic signals from the brain. These signals are generated by electrical currents that occur when nerve cells are active. The advantage of MEG is that it can show brain activity in real time and in three dimensions. It can also map deeper brain structures that are important for unconscious and emotional decisions, among other things.

Positron emission tomography

Positron emission tomography (PET) is a nuclear medical method that can be used to examine metabolic processes. The method is not without controversy because healthy test persons have to ingest a weakly radioactive contrast medium. Detectors can be used to determine where increased activity occurs in the brain. Images are calculated by computer from the measured data, on which the activated areas can be distinguished from the less active ones. The method allows a very good spatial resolution.

Functional magnetic resonance imaging

With functional magnetic resonance imaging (fMRI) it is also possible to visualise activated brain structures. This is achieved by measuring metabolic activities in the brain and analysing the oxygen content in the blood. Active brain regions need more oxygen than

inactive ones. The active brain areas then light up in colour during imaging. This makes it possible to find out which brain regions are active, for example, while watching a commercial.

Functional near-infrared spectroscopy

Functional near-infrared spectroscopy (fNIRS) is a further development of fMRI. The measurements are based on the fact that the red blood pigment haemoglobin, which is the main oxygen transporter in the body, changes its colour with the oxygen content. Thus, the haemoglobin or blood concentration can be determined based on the translucency of the tissue and the oxygen content can be determined based on the colour. The measurements are non-invasive and painless. Near-infrared light is harmless in the intensities used. The technology has developed considerably in recent years, so that today reliable, quantitative measurements and imaging are possible.

EXPLANATION OF CONSUMER BEHAVIOUR WITH INSIGHTS FROM NEUROMARKETING

Limbic system

The most important factors influencing human behaviour and decision-making are emotions and the unconscious. Approximately 70-80% of decisions are made unconsciously (Koller, 2016). Biologically, emotions are described as the inner drives of humans that influence their behaviour in order to ensure survival.

All emotions have certain characteristics: They often express themselves as feelings (e.g. anger or joy), they are usually accompanied by a certain facial expression, they trigger cognitive and motor reactions in the body (e.g. flight). Emotion systems consist of a reward and a punishment system and emotions can have different intensities (Häusel, 2019b; 2011).
But how are emotions processed in the brain? Science assumes that emotions are processed in the limbic system. The main components of the limbic system are the amygdala (emotional evaluation of objects), the hypocampus (emotional learning centre), the hypothalamus (execution of reactions) and the nucleus accumbens (activates `want to have´ actions).

Limbic Map

According to Häusel's limbic approach (2019b), the human emotion system consists of three subsystems: The balance system (safety, risk avoidance), the dominance system (assertiveness, power) and the stimulant system (adventure). These are complemented by other systems such as attachment, caring, sexuality, etc. The three major systems of balance, dominance and stimulant are interrelated. Dominance and stimulant are very much oriented towards risk, while the balance system tries to avoid it.
The interaction of the systems is graphically illustrated by the limbic map (Figure 1). In addition to the main systems, it also shows their mixtures. For example, the mixture of dominance and balance represents discipline and control. Furthermore, values are also integrated into the limbic map (e.g. diligence or creativity), since values are also emotionally charged.

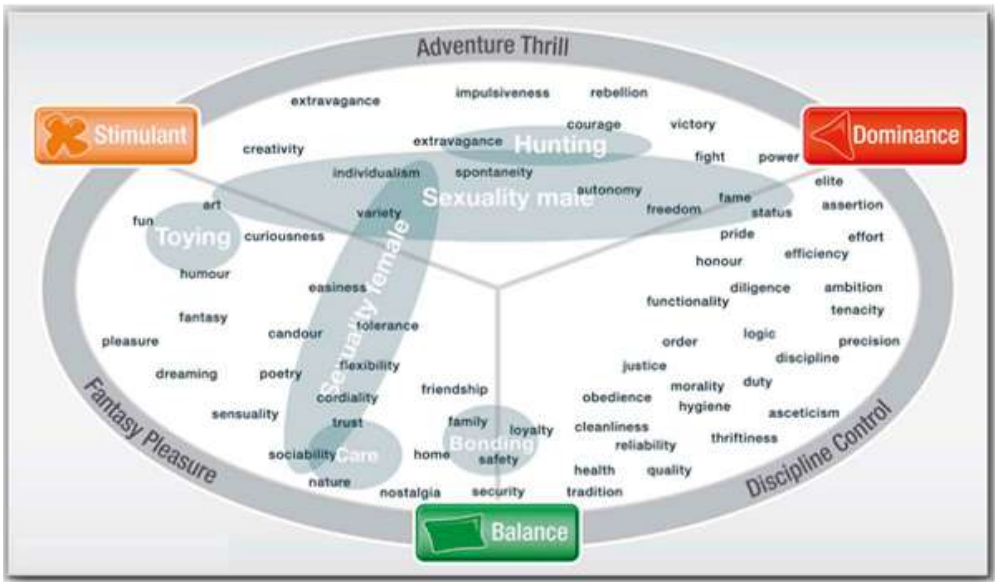

Figure 1: Limbic Map (Adopted from: Häusel, 2019d; used with permission)

Limbic Types

Motives play a central role in making purchasing decisions. Motives are demands or expectations that consumers have of a product. These expectations result from the current state of our emotional system. A distinction is made between ego motives (personal perspective) and social motives (societal perspective) (Häusel, 2011).
Not only motives but also personality dimensions can be derived from the limbic approach. The reason for the different personalities of people are the different characteristics of the three main systems (dominance etc.) and their submodules. Since the characteristics are individual for each person, the limbic approach distinguishes types to describe consumers (Häusel, 2019b; 2011):

- Harmonizer: High social and family orientation; lower upward and status orientation, desire for security.
- Candid: Openness to new things, feeling good, tolerance, gentle enjoyment.
- Hedonist: Active search for new things, high individualism, high spontaneity.
- Adventurer: High willingness to take risks, low impulse control.
- Performer: High achievement orientation, ambition, high status orientation.
- Disciplined: High sense of duty, low consumerism, love of detail.
- Traditionalist: Low future orientation, desire for order and security.

Figure 2 shows the distribution of the limbic types in Germany.

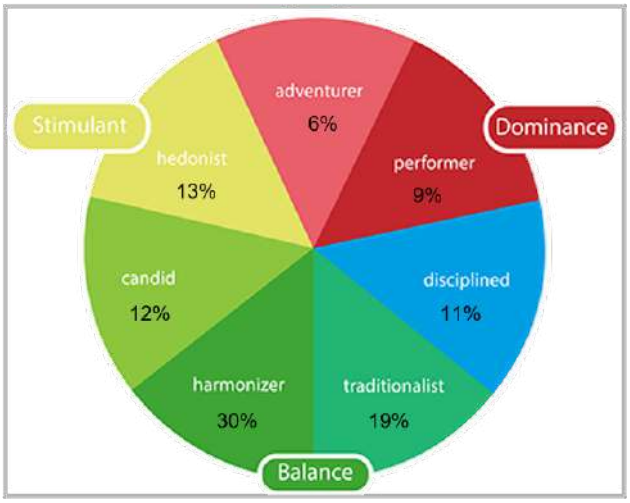

Figure 2: Distribution of Limbic Types in Germany
(Adopted from: Häusel, 2011; used with permission)

BEST-PRACTICE EXAMPLES FOR EMOTIONAL SHOPPING WORLDS IN RETAILING

With the help of the limbic map, different emotional shopping worlds can be differentiated in retail: controlled shopping, efficient & power shopping, inspirational shopping, experiential shopping and exclusive shopping.

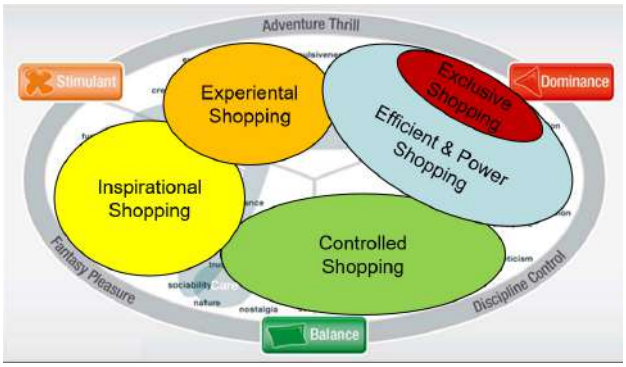

Figure 3: Consumers´ Shopping Worlds

In Figure 3, the different shopping worlds are positioned in the limbic map. They are characterised in more detail below. For this purpose, a selected case study from retail marketing is presented, analysed and critically evaluated for each type.

Controlled Shopping: Aldi Süd

Controlled shopping belongs to the system of balance. When shopping, customers with a high degree of the balance system want to feel secure and avoid stress and risk.
Aldi Süd fulfils these expectations in many areas, from shop layout to pricing. This is also implied in the corporate philosophy, which includes a focus on the essentials as well as a simple, clear and consistent implementation of concepts. It is reflected in numerous areas of the company. Even from the outside, an Aldi Süd shop appears clean, tidy and functional. The same applies to the shop layout (Figure 4): The shelves are not too high, the aisles are relatively wide and the customer guidance is simple and structured (Aldi Süd, 2021a).

Figure 4: Aldi Süd shop layout
(Source: Aldi Süd, 2021b)

Since the balance system is afraid of too much choice, Aldi Süd's comparatively overseeable assortment is perfectly suited to it. Since the controlled shopper also tries to avoid risk, the high product quality at Aldi Süd also plays an important role.
It should be critically noted that Aldi Süd, for example, is increasingly distancing itself from its roots as a hard discounter through the constant expansion of its assortment (e.g. inclusion of brand-name articles) and thus diluting the principles of controlled shopping.

Efficient & Power Shopping: Media Markt

In contrast to the manageable and pleasant shopping of controlled shopping, efficient & power shopping, which is assigned to the dominance system, is about getting as many choices as possible for a small price with a small expenditure of time.
No retailer fulfils these expectations better than Media Markt with its aggressive and price-oriented advertising. The architecture of a shop already shows which goals are being pursued (Figure 5). The focus is on a sales area that is as large as possible but still functional. The colours red and black used here represent the aggressive price policy (Media Markt, 2021a).

Figure 5: Exterior view of a Media Markt store
(Source: Media Markt, 2021b)

The target group of Media Markt attaches great importance to a huge selection, which is implemented by Media Markt through an assortment of over 45,000 articles. Since Media Markt customers are mostly hedonists and adventurers, they want a large selection at low prices. Media Markt therefore often entices them with eye-catching and seemingly unbeatable offers.
The advertising campaign `Media Markt versus Saturn – who is better?´ fits the dominance system. However, it is not immediately comprehensible why the parent company Metro is thus counteracting its proven multi-brand strategy (many consumers previously considered the subsidiaries Media Markt and Saturn to be fierce competitors).

Inspirational Shopping: Depot

In the limbic map, inspirational shoppers are classified between stimulant and balance, which corresponds to the values of fantasy and pleasure.
The retail chain Depot sells decoration and furnishing items. Depot is about creating an experience for the customer and stimulating their imagination. An appealing presentation of the goods (Figure 6) is intended to awaken the customer's desire to embellish his home with articles from Depot (Gries Deco Company, 2021a).

Figure 6: Presentation of goods at Depot
(Source: Gries Deco Company, 2021b)

The entire presentation of goods is structured according to theme worlds, which are adapted seasonally. All products are presented as a complete arrangement in order to show the customer the decoration possibilities directly.
The implementation of this idea of product presentation is complex and cost-intensive, since the seasonal adaptation of the theme worlds does not only concern individual articles, but complete arrangements up to large parts of the entire sales floor.

Experiential Shopping: Globetrotter

The typical experiential shopper is highly stimulated and attaches great importance to adventure and thrill.
Globetrotter is a retail chain for outdoor products that allows customers to try out sports accessories directly in the shop (Figure 7). This does not only mean testing running shoes on a treadmill, but also, for example, a diving suit in its own pool or a ski suit in its own cold chamber (Globetrotter, 2021a).

Figure 7: Cold chamber at Globetrotter
(Source: Globetrotter, 2021b)

Globetrotter offers these possibilities to its customers in its flagship stores, e.g. in Hamburg or Cologne. Everything is geared towards the customer's experience in order to convince them of the products' features in the live stations.
It should be critically noted that this interactive, experience-oriented concept can be implemented excellently in selected flagship stores, but threatens to reach its limits with a nationwide roll-out.

Exclusive Shopping: Wempe

The fifth shopping world is exclusive shopping. Its customers have a high degree of the dominance system and a high need for status symbols and a demonstration of power.
This shopping world is particularly well represented by the Wempe jewellery chain. The family-owned company places particular emphasis on solidity, exclusivity and continuity. The characteristics of exclusive shopping are high-quality products and exclusive shop designs (Figure 8) (Wempe, 2021a).

Figure 8: Store design at Wempe
(Source: Wempe, 2021b)

Also important is an excellent location. For this reason, Wempe shops are only found in the most expensive and best shopping streets of the major metropolises. Inside the shop, emphasis is placed on high-quality furnishings with expensive materials. These are supposed to create the atmosphere for an exclusive consultation.
Exclusivity can be conveyed in particular through scarcity and authenticity. Although Wempe's concept can be expanded internationally, it seems less suitable for national market penetration (i.e. outside the large metropolises and most expensive shopping miles).

CRITICAL APPRAISAL

Neuromarketing is an innovative instrument for market research and forms a valuable basis for the design of marketing. The reason for this is, among other things, the possibility of making processes in the customer's brain visible, which take place, for example, during a purchase decision, and of aligning marketing strategies to this. Especially in stationary trade, it is becoming increasingly important to stand out from the competition and to create an emotional added value for the customer. This is possible in many areas of marketing: from the architecture and store design to the assortment, the presentation of goods, the product quality, the price strategy, the staff and their advice, and the corresponding communication measures. The findings of neuroscience complement the methods of market research and marketing. For example, neuromarketing can be used to segment customers into target groups based on their emotional systems, which can then be addressed by targeted marketing measures.
However, the effort and high costs associated with neuroscientific methods must be viewed critically. The purchase of a brain scanner alone costs millions. Added to this are maintenance costs of usually more than 200,000 Euros per year. This leads to an hourly rate of over 1,000 Euros per hour of operation of a brain scanner (Wells & Martin, 2017; Raab, Gernsheimer & Schindler, 2009). This expense is enormous and not profitable for many companies. Another disadvantage of using imaging methods in market research is the fact that although it is possible to see which areas of the brain are active, it is not clear how they are connected or influence each other. Neither can exact thoughts of a person be recorded. Not least from a moral point of view, the view into the customer's brain is to be critically questioned, as customers become more and more transparent in this way and the fear of manipulation increases.

CONCLUSION

In summary, important insights for marketing can be gained through the use of neuroscientific methods in market research. Especially the influence of emotions and the unconscious play a major role in the purchase decision of consumers. Using the limbic map, buyers can be clustered into types based on the characteristics of their emotional systems, for each of which specific marketing measures can be derived. The best-practice examples presented from retail marketing have shown that a targeted approach to specific shopping types with an implementation in all company and marketing areas leads to success. Neuromarketing will continue to gain importance for retail in the future and help to understand the customer even better (Rittinger, 2016; Nufer &

Kronenberg, 2014). Particularly in the case of imaging procedures, all potentials are far from exhausted and there is still room for further technological innovations.
Neuroscience is already relatively advanced when it comes to researching the principle effects of marketing in the brain. This applies in particular to the description and explanation of consumer behaviour. However, what is often still missing is the transfer of these findings into marketing practice. The reason could be that research has so far primarily pursued the question of `why?´. For marketing practice, however, the question of `how?´ is much more relevant (Kenning, 2016). This article has attempted to answer the question of `how?´, i.e. to build a bridge from research to practice, using retail marketing as an example. This approach can also be applied to companies outside the retail sector.

REFERENCES

Aldi Süd (2021a). Über uns. Retrieved from https://www.aldi-sued.de/de/unternehmen/ueber-uns.html (accessed 27 December 2021)

Aldi Süd (2021b). Filiale der Zukunft. Retrieved from https://ixtenso.de/media/story/30617/widehome.jpg (accessed 27 December 2021)

Bielefeld, K.W. (2012). Consumer Neuroscience: Neurowissenschaftliche Grundlagen für den Markenerfolg. Wiesbaden: Springer Gabler

Bittner, G. & Schwarz, E. (2015). Emotion Selling: Messbar mehr verkaufen durch neue Erkenntnisse der Neurokommunikation (2nd ed.). Wiesbaden: Springer Gabler

Bühler, A., Häusel, H.-G. & Nufer, G. (2013). Neuromarketing im Sport. In G. Nufer & A. Bühler (Eds.), Marketing im Sport: Grundlagen und Trends des modernen Sportmarketing (3rd ed.). Berlin: Erich Schmidt Verlag, 417-444

Dooley, R. (2013). Brainfluence: 100 Ideen, wie Sie mit Neuromarketing Konsumenten überzeugen können. Offenbach: Gabal

Fuchs, W. T. (2015). Warum das Gehirn Geschichten liebt: Mit Storytelling Menschen gewinnen und überzeugen (3rd ed.). Freiburg: Haufe

Globetrotter (2021a). Unternehmensportrait. Retrieved from https://www.globetrotter.de/ueber-globetrotter/portrait (accessed 27 December 2021)

Globetrotter (2021b). Kältekammer Globetrotter. Retrieved from https://learn.g2.com/hubfs/Pillar%20Pages/marketing/experiential%20marketing/experimental_marketing_europe.jpg (accessed 27 December 2021)

Gries Deco Company (2021a). Gries Deco Company GmbH. Retrieved from https://www.gries-deco-company.com/de/about-us (accessed 27 December 2021)

Gries Deco Company (2021b). Depot-Filiale. Retrieved from https://www.mythen-center.ch/cms/cache/0ade2ffd3c4601698b946510836707f3.jpg (accessed 27 December 2021)

Häusel, H.G. (2011). Die wissenschaftliche Fundierung des Limbic® Ansatzes. München: Gruppe Nymphenburg

Häusel, H.-G. (2019a). Einführung. In H.-G. Häusel (Ed.), Neuromarketing: Erkenntnisse der Hirnforschung für Markenführung, Werbung und Verkauf (4th ed.). München: Haufe, 9-16

Häusel, H.-G. (2019b). Limbic®: Das Navigationssystem für erfolgreiche emotionale Markenführung. In H.-G. Häusel (Ed.), Neuromarketing: Erkenntnisse der Hirnforschung für Markenführung, Werbung und Verkauf (4th ed.). München: Haufe, 47-64

Häusel, H.-G. (2019c). Methoden der Neuromarketing-Forschung. In H.-G. Häusel (Ed.): Neuromarketing: Erkenntnisse der Hirnforschung für Markenführung, Werbung und Verkauf (4th ed.). München: Haufe, 197-210

Häusel, H.-G. (2019d). Emotional Boosting: Die hohe Kunst der Kaufverführung (3rd ed.). München: Haufe.

Kenning, P. (2016): "Neuromarketing" und Consumer Neuroscience: Impulsgeber für das Marketing?, in M. Stumpf (Ed.): Die 10 wichtigsten Zukunftsthemen im Marketing. Freiburg: Haufe, 63-80

Kenning, P., Plassmann, H. & Ahlert, D. (2007). Consumer Neuroscience. Marketing ZFP – Journal of Research and Management, 29 (1), 56-72

Koller. M. (2016). Neuromarketing: Der Biologie des Konsums auf der Spur. Regal, April 6, 66

Konrad, J. (2013). Kaufknopf im Kopf. Lebensmittel Zeitung, November 1, 34-36.

Krampe, C., Strelow, E., Haas, A. & Kenning, P. (2018). The application of mobile fNIRS to "shopper neuroscience": first insights from a merchandising communication study. European Journal of Marketing, 52 (1/2), 244-259

Media Markt (2021a). Unternehmen. Retrieved from https://www.mediamarkt.de/de/about-us/company/about-company (accessed 27 December 2021)

Media Markt (2021b). Media Markt Ingolstadt. Retrieved from https://www.mediamarktsaturn.com/sites/default/files/content/media_items/assets/media-markt-ingolstadt_auenaufnahme-1_15090975468_o.jpg (accessed 27 December 2021)

Nufer, G. (2020). Neuromarketing: Grundlagen, Best-Practice-Beispiele aus dem Handel und kritische Würdigung. PraxisWissen Marketing – German Journal of Marketing, 5 (1), 53-68

Nufer, G. & Kronenberg, S. (2014). Chancen für nachhaltige Geschäftsmodelle im Lebensmittel-Onlinehandel. Reutlinger Diskussionsbeitrag zu Marketing & Management 2014 – 4. Reutlingen University: ESB Business School

Nufer, G. & Sauer, C. (2015). Neuromarketing im Handel. Reutlinger Diskussionsbeitrag zu Marketing & Management 2015 – 1. Reutlingen University: ESB Business School

Nufer, G. & Wallmeier, M. (2010). Neuromarketing. Reutlinger Diskussionsbeitrag zu Marketing & Management 2010 – 6. Reutlingen University: ESB Business School

Raab, G., Gernsheimer, O. & Schindler, M. (2009). Neuromarketing: Grundlagen – Erkenntnisse – Anwendungen (2nd ed). Wiesbaden: Gabler

Reimann, M. & Weber, B. (2011). Neuroökonomie: Eine Bestandsaufnahme. In M. Reimann & B. Weber (Eds.), Neuroökonomie: Grundlagen – Methoden – Anwendungen. Wiesbaden: Gabler, 3-9

Rittinger, S. (2016). Multi Channel Retailing: Mehrgleisiger Vertrieb des Handels. In M. Stumpf (Ed.), Die 10 wichtigsten Zukunftsthemen im Marketing. Freiburg: Haufe, 231-250

Scheier, C. & Held, D. (2012). Die Neuro-Logik erfolgreicher Markenkommunikation. In H.-G. Häusel (Ed.), Neuromarketing: Erkenntnisse der Hirnforschung für Markenführung, Werbung und Verkauf (2nd ed.). München: Haufe, 97-120

Scheier, C. & Held, D. (2018): Wie Werbung wirkt: Erkenntnisse des Neuromarketing (3rd ed.). Freiburg: Haufe

Spektrum (2021): Neurowissenschaft. Retrieved from http://www.spektrum.de/lexikon/neurowissenschaft/neurowissenschaft/8773 (accessed 27 December 2021)

Wells, V. & Martin, D. (2017). Research frontiers in cognitive, socio-cognitive, behavioural, social and applied psychology: implications for marketing theory and consumer research. Journal of Marketing Management, 33 (11/12), 873-877

Wempe (2021a). Über unser Unternehmen & unsere Werte. Retrieved from https://www.wempe.com/de-de/ueber-wempe/ (accessed 27 December 2021)

Wempe (2021b). Düsseldorf – Köngisallee. Retrieved from https://res.cloudinary.com/niessing-gmbh-co-kg/image/fetch/f_auto,q_auto:best/if_iw_gt_1680,c_scale,w_1680/https://images.prismic.io/niessingcom/bd6c577691a3f81a2dcdf643d485a1f0424f9867_haendlerseite_1050x788_wempe_dusseldorf.jpg?auto=compress_format (accessed 27 December 2021)

Yoon, C., Gonzalez, R., Bechara, A., Berns, G.S., Dagher, A.A., Dubé, L., Huettel, S.A., Kable, J.W., Liberzon, I., Plassmann, H., Smidts, A. & Spence, C. (2012). Decision neuroscience and consumer decision making. Mark Lett, 23 (2), 473-485