

ASPECTS REGARDING THE USE OF OXYTOCIN IN MARKETING

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Abstract

The main purpose of the marketing activity is to convince consumers to purchase a good or service or to adopt a certain behavior. Companies make significant investments in this marketing activity aimed at persuading people to take action.

We know on a scientific basis much of what lies behind consumer behavior. Mr. Kotler's black box is starting to become more and more transparent. Thus, current studies clearly support what marketers only suspected some time ago, namely that certain images or actions cause the human brain to release a series of hormones with different effects on the human body. Among these hormones, oxytocin stands out, called the happiness hormone or the love hormone due to its effect on people. Thus, through a marketing activity aimed at stimulating the release of this hormone in the human body, we can build trust in a product or brand, which will translate into a lasting relationship with consumers and, finally, into an effective marketing activity for the company.

Being in a permanent search for those secrets that ensure the success of marketing campaigns, marketing specialists must also understand the perspective of human psychology and physiology involved in carrying out a convincing activity. In this context, the following paper reveals important aspects regarding the necessity of understanding how oxytocin is influencing consumer behavior together with ways in which this hormone can be stimulated for the use of the company's marketing activity.

Keywords: consumer behavior, oxytocin, happiness hormone, consumer trust, strategic marketing.

1. Introduction

For the specialists in the field, the purchase process represents the central theme addressed in the activity of studying consumer behavior. In the process of making the purchase decision, the emphasis started to shift from satisfying physical needs to the need to signal identity and acquire social status. In this sense, science has demonstrated that the chemistry of the human body lies to a significant extent behind consumer behavior, purchase decisions being associated with a change in dopamine levels in certain brain regions, associated with the desire to obtain a good¹. However, another hormone that has been ignored so far by marketing specialists also contributes to the stimulation of dopamine release, namely - oxytocin.

Significant amounts of money are invested in planning effective marketing campaigns. And identifying those buttons that must be pressed to achieve maximum efficiency is desirable. Many of the marketing campaigns carried out have succeeded in achieving the desired changes in consumer attitudes. Unfortunately, however, a positive attitude does not always determine action. In order to increase the probability of taking an action, the acquired attitude must be strong. And a strong attitude is obtained through attention-grabbing campaigns, that stand out significantly from everything that exists around.

Empathy can be one of the buttons that can be pushed for determining action. In this case, emotionally involved individuals will want to alleviate their own suffering or satisfy their own need. In social marketing, for example, empathy can lead the consumer to satisfy the need to alleviate someone's suffering or the need to support a noble cause. As we mentioned before, at the basis of consumer behavior is the chemistry of the human body, so empathy can also be physiologically determined, oxytocin being associated with the feeling of empathy

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¹ P.Y. Lin, N.S. Grewal, C. Morin, W.D. Johnson, P.J. Zak, *Oxytocin Increases the Influence of Public Service Advertisements*, Plos One Journal, 27 February 2013, vol. 8, issue 2, <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0056934&type=printable> last time consulted on 10.02.2023.

in a number of studies². Also, oxytocin is the hormone that determines, in the women's segment in particular, the impulse and unplanned purchases. In addition, a high level of oxytocin is associated with a positive relationship with a certain brand that is materialized, among other things, in a high level of positive reviews about the brand³ if we were to list some of the results of the studies carried out to determine the effects of this hormone in specific marketing activities.

Taking everything into account, we can affirm that a marketing activity focused on stimulating the release of oxytocin in the human body represents one of the steps that can be taken in creating an emotional bond with a product or a brand⁴, a fact that will lead to consumer loyalty and, implicitly, to constant purchases, a defining objective for the company's success.

In this context, in the first section of the paper a detailed presentation of the oxytocin hormone and its effects on the human body will be made, followed by a presentation of the implications that this hormone has for the marketing activity of an organization in the next section. Next, the main actions that can be adopted in the marketing activity carried out by a company that wants to exploit these discoveries related to the happiness hormone will be presented, and at the end of the paper we will formulate a series of conclusions and limits of this documentary study.

2. Oxytocin - the happiness hormone

Oxytocin is a neuropeptide produced by the hypothalamus gland in the forebrain region. Oxytocin reaches several important areas of the central nervous system that are involved in the regulation of interactive social behaviors, fear, aggression, pain perception, calmness, well-being, and stress reactions.

According to medical studies, oxytocin can induce well-being by stimulating dopamine release, increase social interaction and decrease anxiety through actions in the amygdala - a key region in the brain's "fear" network⁵, decrease stress reactions through actions in the hypothalamic-pituitary-adrenal axis (HPA axis) and by decreasing noradrenergic release in the locus coeruleus (LC) and solitary tract nucleus. Also, oxytocin can decrease pain sensitivity by increasing opioidergic activity and modulates serotonergic activity⁶.

One of the effects of releasing this hormone into the body is the facilitation of connection between people, due to its role as a chemical messenger, playing an important part in forming trust and building relationships⁷. Oxytocin decreases individuals' risk aversion and favors a greater capacity to adapt to change⁸.

Oxytocin plays such an important role in social behavior that it has been called the "love hormone", „feel-good hormone”, the "cuddle hormone"⁹, the "moral molecule"¹⁰ and "liquid trust"¹¹. When oxytocin levels rise, people seem to become more altruistic, trusting, and generous.

² P.Y. Lin, N.S. Grewal, C. Morin, W.D. Johnson, P.J. Zak, *Oxytocin Increases the Influence of Public Service Advertisements*, Plos One Journal, 27 February 2013, vol. 8, issue 2, <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0056934&type=printable> last time consulted on 10.02.2023.

³ V. Agrawal, *Biomarketing: Human Body as the Marketing Engine*, SSRN Electronic Journal, February 2022, https://www.researchgate.net/publication/359503293_Biomarketing_Human_Body_As_Marketing_Engine last time consulted on 08.02.2023.

⁴ E. Rowley, *Feeling loved: What marketers need to know about oxytocin*, Psykked - where marketing meets psychology, November 9, 2021, <https://medium.com/psykkd/oxytocin-what-marketers-need-to-know-about-the-love-drug-34192dbfcc74> last time consulted on 07.02.2023.

⁵ J. Adetunji, *The dark side of the love drug - oxytocin linked to gloating, envy and aggression*, The Conversation UK, September 8, 2011, <https://theconversation.com/the-dark-side-of-the-love-drug-oxytocin-linked-to-gloating-envy-and-aggression-2781> last time consulted on 11.01.2023.

⁶ K. Uvnäs-Moberg, L. Handlin, M. Petersson, *Self-soothing behaviors with particular reference to oxytocin release induced by non-noxious sensory stimulation*, Frontiers in Psychology, January 12, 2015, vol. 5, <https://www.frontiersin.org/articles/10.3389/fpsyg.2014.01529/full> last time consulted on 19.12.2022.

⁷ A. Martin, *The Power of Content Chemistry: Release the Oxytocin!*, The Tilt, September 20, 2019, <https://www.thetilt.com/content/power-of-content-chemistry> last time consulted on 20.12.2022.

⁸ V. Agrawal, *Biomarketing: Human Body as the Marketing Engine*, SSRN Electronic Journal, February 2022, https://www.researchgate.net/publication/359503293_Biomarketing_Human_Body_As_Marketing_Engine last time consulted on 08.02.2023.

⁹ A.L. Penenberg, *Digital Oxytocin: How Trust Keeps Facebook, Twitter Humming*, Fast Company Magazine, July 18, 2011, <https://www.fastcompany.com/1767125/digital-oxytocin-how-trust-keeps-facebook-twitter-humming> last time consulted on 13.01.2023.

¹⁰ P.J. Zak, *Molecula Morală. Sursa iubirii și a prosperității*, Humanitas Publishing House, Bucharest, 2015.

¹¹ M. Mikolajczak, J.J. Gross, A. Lane, O. Corneille, P. de Timary, O. Luminet, *Oxytocin Makes People Trusting, Not Gullible*, Psychological Science, 2010, vol. 21, issue 8, pp. 1072-1074, https://www.researchgate.net/publication/45188550_Oxytocin_Makes_People_Trusting_Not_Gullible last time consulted on 01.02.2023.

Over time, a series of studies have been carried out in which the prosocial effect of oxytocin on people was analyzed. Thus, it was concluded that oxytocin¹²:

- determines a behavior characterized by trust, generosity and cooperation;
- increases the perception of trust, attractiveness, accessibility and attachment;
- supports social interactions (awareness, communication style, etc.).

There is also ample evidence that oxytocin's influence on human behavior is contextual, depending on the individual or the situation. Thus, oxytocin appears to increase trust in partners only when cues to mistrust are absent and increases the level of cooperation only when the partner is known¹³. On the other hand, many studies show that oxytocin can also have an antisocial effect, increasing feelings of envy, mistrust or insecurity.

In addition, following the studies carried out in this field, a conclusion could be formulated stating that the release of oxytocin in the body can be triggered in order to counterbalance the body's reaction to stress in three main ways¹⁴:

- oxytocin can be released in response to pleasant mental experiences. Such a state can be induced by seeing, hearing, smelling or thinking about a well-known and loved person, but it can also be determined by other pleasant situations;
 - oxytocin is also released in response to somatosensory nerve activation induced by touch, caress, warmth, and light pressure on the skin;
 - oxytocin can also be released by mental and sensory stimuli that are perceived as stressful. Oxytocin's role in these situations may be to moderate stress responses and facilitate adaptation.

Given the fact that nowadays effective marketing campaigns are not just about increasing sales at a certain point in time but are rather focusing on building relationships with consumers and solving their problems, we can rely on the use of oxytocin in order to develop sustainable relationships with consumers, based on trust and empathy.

3. The implications of oxytocin stimulation for the marketing activity

It is imperative that in the process of organizing and carrying out marketing activities in which significant sums of money are invested specialists should also be aware of the perspective of human psychology and physiology. Through each marketing action undertaken to support a brand, product or organization, we can aim to stimulate certain hormones in the human body (cortisol, serotonin, dopamine, oxytocin). Among these hormones, oxytocin contributes to building a sense of security and connection to the brand, product or company. This conclusion is supported by the results of the studies carried out in this field.

In this sense, the results of various studies support the conclusion regarding the existence of a correlation between oxytocin and empathy. Thus, following an experiment carried out in this field, the oxytocin level of the participants who watched an emotional clip of 100 seconds made for the collection of funds by St. Jude's Children Hospital saw a 47% increase¹⁵. In addition, the increase in the level of oxytocin in the human body determined behavioral changes associated with emotional involvement (recognition of other individuals' emotions, increase in charitable donations, etc.). Following this study, the conclusion regarding the existence of the correlation between the increased level of oxytocin and the empathy felt by the participants was formulated. When individuals empathize, oxytocin is released in their bodies, a situation that induces the feeling of trust, a key element in the long-term relationships we want to develop with consumers as well as in their loyalty.

¹² E. Rowley, *Feeling loved: What marketers need to know about oxytocin*, Psykked - where marketing meets psychology, November 9, 2021, <https://medium.com/psykkd/oxytocin-what-marketers-need-to-know-about-the-love-drug-34192dbfcc74> last time consulted on 07.02.2023.

¹³ M. Stallen, C.K.W. De Dreu, S. Shalvi, A. Smidts, A.G. Sanfey, *The Herding Hormone: Oxytocin Stimulates In-Group Conformity*, Psychological Science, 2012, vol. 23, issue 11 <https://journals.sagepub.com/doi/10.1177/0956797612446026> last time consulted on 25.01.2023.

¹⁴ K. Uvnäs-Moberg, L. Handlin, M. Petersson, *Self-soothing behaviors with particular reference to oxytocin release induced by non-noxious sensory stimulation*, Frontiers in Psychology, January 12, 2015, vol. 5, <https://www.frontiersin.org/articles/10.3389/fpsyg.2014.01529/full> last time consulted on 19.12.2022.

¹⁵ P.Y. Lin, N.S. Grewal, C. Morin, W.D. Johnson, P.J. Zak, *Oxytocin Increases the Influence of Public Service Advertisements*, Plos One Journal, 27 February 2013, vol. 8, issue 2, <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0056934&type=printable> last time consulted on 10.02.2023.

According to a study carried out by Furst *et al.* in 2015¹⁶, oxytocin facilitates the development of relationships between consumers and brands, in a similar way that it facilitates the relationships between people. In addition, the study concluded that exposure to certain brands can stimulate a higher level of oxytocin than that released by human interactions. Brands can stimulate a hormonal response that exceeds, in certain cases, the hormonal response that people have in relation to family and friends.

For stimulating the release of oxytocin in the human body, the existence of a social stimulus is a necessary condition. For example, simply asking for help in ordinary social interactions can represent such a stimulus. Also, in the process of stimulating the release of this hormone, the human brain fails to make a significant difference between the physical interactions of daily life and those viewed on a computer screen.

According to experts, among the activities that cause the brain to release oxytocin in the body are: watching an emotional video clip, trusting someone, physical touch, attending a wedding, petting a pet, moderate stress, holding one's own child, breastfeeding, sexual activity and even tweeting. At the same time, advertisements illustrating these kinds of activities can induce the release of oxytocin in the human body. In addition, the use of social interactions in commercial spaces or within promotional events¹⁷ is another way in which this objective can be achieved.

In the marketing activity aimed at stimulating the release of the oxytocin hormone in the human body, the fact that certain consumer segments will not react in the same way to the used stimuli must also be considered. It has been shown, for example, that oxytocin causes an increase in impulse purchases for the women's segment¹⁸. Thus, this segment can represent the target of communication activities in which the stimulation of the oxytocin hormone release is desired, taking into account the fact that, for the men's segment, another hormone, this time testosterone, inhibits the release of oxytocin.

Unfortunately, the interest in the field of oxytocin hormone stimulation and its implications strictly for the marketing activity has only just begun to manifest itself, so that studies carried out in this field are limited in number.

However, for the marketing field, several activities can already be defined that can be implemented in the campaigns aimed at eliciting an increased degree of attachment for a certain brand.

4. Marketing tactics used to stimulate the oxytocin hormone

As we previously mentioned, in order to achieve the marketing objectives aimed at creating a long-term relationship with consumers and their loyalty, certain systematic actions can be carried out that can determine the stimulation of the oxytocin hormone release in the human body, as follows:

- **Knowing the audience.** The only way in which we can reduce the degree of uncertainty in order to successfully implement an activity aimed at human physiology is a good knowledge of the targeted consumers' body chemistry. Also, among the elements that determine the stimulation of oxytocin release are consumer memories and the recognition of shared values. In this context, studying the audience is useful for determining childhood memories (for example, we can look for answers about what life was like for consumers when they were 10 years old)¹⁹ on the basis of which a series of experiments can be carried out in order to capitalize on them, later evolving from this point.

- **Telling a good story** causes the audience to feel trust and empathy towards the hero of the story. According to Joe Lazauskas, author of *The Storytelling Edge*²⁰, humans are programmed to listen to stories. Focusing on developing an interesting story that engages the audience can be far more successful than simply presenting boring facts and figures. When we are enchanted by a story, cortisol, dopamine and oxytocin are

¹⁶ A., Furst, J. Thron, D. Scheele, N. Marsh, R. Hurlmann, *The neuropeptide oxytocin modulates consumer brand relationships*, Scientific Reports, October 9, 2015, vol. 5, <https://www.nature.com/articles/srep14960> last time consulted on 05.02.2023.

¹⁷ P.Y. Lin, N.S. Grewal, C. Morin, W.D. Johnson, P.J. Zak, *Oxytocin Increases the Influence of Public Service Advertisements*, Plos One Journal, 27 February 2013, vol. 8, issue 2, <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0056934&type=printable> last time consulted on 10.02.2023.

¹⁸ J. Liu, M. Monakhov, P.S. Lai, R. Enstein, S.H. Chew, T. Tong, X. Zhang, *Does Oxytocin Increase Impulse Buying?*, in E - European Advances in Consumer Research vol. 10, 2013, eds. Gert Cornelissen, Elena Reutskaja, and Ana Valenzuela, Duluth, MN: Association for Consumer Research, pp 263-264, <https://www.acrwebsite.org/volumes/1014045/volumes/v10e/E-10> last time consulted on 21.01.2023.

¹⁹ K. Bost, *Chemical Reactions in the Brain in Relation to Marketing*, True North Social - digital marketing agency, <https://truenorthsocial.com/blog/chemical-reactions-in-the-brain-in-relation-to-marketing/> last time consulted on 22.01.2023.

²⁰ J. Crossfield, *The Neuroscience of Storytelling*, Content Marketing Institute, April 2019, <https://contentmarketinginstitute.com/cco-digital/april-2019/storytelling-neuroscience-joe-lazauskas/> last time consulted on 16.02.2023.

released in the body, depending on what is happening in that story. This is the reason why content marketing works so well.

Thus, the story that we want to communicate about the product or the organization should not be just a list of features. We can communicate all of this through a story that conveys the company's values or a story about what the field of interest will look like in the future. We will tell the story looking primarily from the consumer's perspective. Also, in the story we convey, we will not lose sight of its four key features: relatability, novelty, fluency and tension²¹. In fact, in one of the experiments carried out by the neuroeconomist Paul Zak, it was discovered that when plots are designed to build suspense in anticipation of a climax, the attention of the participants increases significantly, and an increase in the level of oxytocin is recorded immediately after the increase in the level of attention, peaking shortly after the stories reached their climax²².

As for the themes used in the stories we want to weave around the brands, the 12 archetypes created by Margaret Mark and Carol Pearson in order to carry out the branding activity can be of great use - the Purist, the Pioneer, the Entertainer, the Conqueror, The Magician, The Protector, The Seducer, The Imagineer, The Emperor, The Rebel, The Source, The Straight Shooter²³, which are based on the archetype theory postulated by Jung^{***}. Any of these archetypes can be used to create an engaging story around the brand.

In addition, in this context, the consumer stories so generously disseminated online in the form of reviews and various stories posted in dedicated blogs should also be mentioned. Digital word-of-mouth has a significant impact on the stories we want to tell in our marketing activity. On the other hand, visual storytelling - using visual elements to tell a company's story - is another opportunity to capitalize on people's innate preference for stories²⁴.

- **Sensory marketing.** Within the marketing activity of an organization, an aspect of utmost importance is currently the stimulation of the senses for the creation of the company's identity and the clear delimitation of its values with the strategic aim of creating brand awareness and a sustainable image of it. Sensory marketing can be done in such a way that it can significantly contribute to the release of oxytocin in the human body. Thus, a particularly important aspect in this context is touch, either that relating to objects and the environment, or that within interpersonal interactions.

Human interactions during exhibitions, conferences and in commercial spaces can contribute to stimulating the oxytocin hormone and establishing an emotional connection with consumers. To be remembered in this context is the fact that *active listening* is a basic principle for social interactions and building solid relationships. In addition, it is necessary for the organization to initiate activities in which the targeted community has the opportunity to get involved, which determines the creation of an emotional connection based on feelings of affinity and trust.

The results of previous studies led to the conclusion that tactile sensations can change the visual perception of a product in a positive or negative way²⁵. This conclusion confirms one of the basic rules in marketing activity, namely the one related to the fact that the customer must be encouraged to hold the product in his hands and to touch it, an aspect that will also determine the release of oxytocin in the consumers' body²⁶. As far as auditory stimulation is concerned, it is necessary that the voices used be as close to natural as possible (including synthesized ones).

²¹ J. Crossfield, *The Neuroscience of Storytelling*, Content Marketing Institute, April 2019, <https://contentmarketinginstitute.com/ccodigital/april-2019/storytelling-neuroscience-joe-lazauskas/> last time consulted on 16.02.2023.

²² P. Minnium, *The science of storytelling*, MarTech, August 10, 2018, <https://martech.org/the-science-of-storytelling/> last time consulted on 02.02.2023.

²³ M. Mark, C. Pearson, *The Hero and the Outlaw: Building Extraordinary Brands Through the Power of Archetypes*, McGraw-Hill Publishing, New York, 2002.

^{***} According to Jung's theory, archetypes are images or themes derived from the collective unconscious. Jung identified four major archetypes (Self, the Persona, the Shadow, and the Anima/Animus) but also believed that there was no limit to the number that may exist. Jung acknowledged that the four main archetypes can intermingle and give rise to 12 archetypal images: Ruler, Creator/artist, Sage, Innocent, Explorer, Rebel, Hero, Wizard, Jester, Everyman, Lover, Caregiver.

²⁴ E. Walter, J. Gioglio, *The Power of Visual Storytelling: How to Use Visuals, Videos, and Social Media to Market Your Brand*, McGraw Hill Education, 2014.

²⁵ M. Pagani, M. Racat, C.F. Hofacker, *Adding voice to the omnichannel and how that affects brand trust*, Journal of Interactive Marketing, 2019, vol. 48, pp. 89-105, <https://www.sciencedirect.com/science/article/abs/pii/S1094996819300726> last time consulted on 07.02.2023.

²⁶ A.E. Shehata, W. Alaswadi, *Can Sensory Marketing Factors Improve the Customers' Pleasure and Arousal in Egyptian Resort Hotels?*, Journal of Association of Arab Universities for Tourism and Hospitality, 2022, vol. 22, no. 2, pp. 111-131, https://jaauth.journals.ekb.eg/article_226093_05d199ebf75ecac893482e545e4fbeb4.pdf last time consulted on 15.01.2023.

- **Actual interaction within online communities** elicits a psychological response similar to real-world human interactions. In other words, online interactions in the form of shares, likes, comments cause the release of oxytocin in the brain, which determines the feeling of closeness and connection with others. In order to stimulate the release of oxytocin through the online environment, it is necessary to keep in mind that not all content leads to this result. Thus, interactive and social content has a higher chance of triggering the release of this hormone in the body compared to passive content²⁷.

- **Altruistic and selfless behavior** can stimulate the release of oxytocin in the human body. In this sense, companies can offer gifts or perform random acts of kindness, all of which determine a state of well-being for all those involved in that action.

- **Sales promotions actions.** According to studies carried out in the field²⁸, offering online shopping coupons stimulates the release of oxytocin in the body, these being processed by the brain as representing a physical gift and having a social load. This fact is surprising in the context where for a long time it was concluded that the release of oxytocin in the human body is stimulated only by physical social interactions.

All of the mentioned represent a series of tools that can be easily integrated into the marketing efforts of any company that is aware of their effect in order to achieve long-term objectives related to consumer loyalty and developing a sense of attachment to the brand.

5. Measuring the effectiveness of marketing activity aimed at stimulating oxytocin release

In order to measure the success achieved through a marketing activity focused on stimulating the oxytocin hormone, we will use the same indicators used to measure the success of the relational marketing efforts. In this sense, we will keep track of the shares, purchases or subscriptions made. But beyond these of great importance are consumers' preferences and motivations, their attitudes, the degree of attachment to the brand and the image formed about it.

In order to determine all these dimensions, any form of feedback that the consumer can provide is of utmost importance. *Surveys* can be an important method for determining various dimensions of consumer behavior. *Focus groups* also offer the possibility of obtaining important details regarding consumer reaction. In addition, *observing* consumer behavior is particularly relevant, *neuromarketing* being distinguished among the specific methods which allows the measurement of consumers' brain activity in order to determine the effects of the activity carried out. At the same time, *experiments* can be carried out in this field to reflect the effectiveness of different combinations of elements used to stimulate the release of the oxytocin hormone in consumers' bodies. In addition, it is useful to determine how the stimulation of oxytocin by means of the marketing activity that was carried out translates into actual actions of the targeted consumers.

6. Conclusions

Carrying out a marketing activity aimed at determining the release of oxytocin in the consumer's body is a step forward in building an emotional relationship with a product or brand.

There is little research carried out strictly in the field of marketing with an eye on the use of oxytocin hormone, which is why this article has an exploratory character, based on a variety of bibliographic references, taking into account that oxytocin is the object of numerous fields (medicine, economy, etc.). This aspect limits the generalization of this work at this time, but it does not diminish the interest for a field of research that has a great potential to provide solutions for marketing activity.

Also, the results of this exploratory research provide marketing practitioners with a practical way to use the oxytocin hormone to stimulate the emotional response and behavior of consumers.

²⁷ *Why Social Media and Content Can Be Addictive: The Science of "Happy Hormones"*, May 12 2022, Vanquish Media Group, <https://www.vanquishmediagroup.com/why-social-media-and-content-can-be-addictive-the-science-of-happy-hormones/> last time consulted on 27.01.2023.

²⁸ V. Alexander, S. Tripp, P.J. Zak, *Preliminary Evidence for the Neurophysiologic Effects of Online Coupons: Changes in Oxytocin, Stress, and Mood*, *Psychology & Marketing*, 2015, vol. 32, issue 9, pp. 977-986, <https://onlinelibrary.wiley.com/doi/abs/10.1002/mar.20831> last time consulted on 29.01.2023.

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