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Impact of New Technologies on Economic Behavior and Consumer Freedom of Choice: from Neuromarketing to Neuro-Rights

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Keywords

artificial intelligence,
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Abstract

Objective: to identify the possibilities for an adequate response of the existing legal regime to the various challenges posed to European law by artificial intelligence systems underlying neuromarketing techniques.

Methods: the study is based on the risk-oriented approach, formal-logical, formal-legal and comparative-legal methods, as well as on the method of legal forecasting, in order to identify the problems of legislation caused by the emerging technologies capable of recognizing human emotions and using them to control consumer behavior, and to propose ways to solve them.

Results: the conducted research provides a brief overview of the most widely used neuromarketing techniques used by algorithms and machine learning. These allow identifying points of cognitive and emotional vulnerability, collecting and processing data, and then building the most effective marketing techniques that push a consumer to choose a certain product or service. Ethical problems are analyzed which arise from the use of neuromarketing techniques in relation to some basic values such as individual independence, human dignity, and freedom of choice. The subtle line is shown between techniques that manipulate consumer behavior (manipulation technique) and those that, on the contrary, have a persuasive effect, which in itself does not make them illegal (persuasion technique). An overview of the existing legal framework is presented, as well as case law from both the European Court of Justice and national courts of member states with a particular focus on the Unfair Commercial Practices Directive, the EU General Regulation on the Protection of Personal Data (hard law), and codes of ethics (soft law).

Scientific novelty: the paper points out the transformation of traditional legal categories and important problem points of the existing regulation due to the growing recognition of the potential of neuromarketing as a tool capable of explaining and predicting consumer behavior, as well as influencing the economic behavior of the subjects of relations.

Practical significance: the obtained conclusions and proposals can be taken into account in improving the regulation of artificial intelligence in terms of its safety and reliability, increasing trust in the system, given the need to protect ethical principles and maintain fundamental values.

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Contents

Introduction

From the very beginning, the consumer has been regarded as a perfectly rational economic actor and, therefore, always capable of making the most efficient choice. In other words, according to classical economic theory, the consumer is identified with homo oeconomicus, i.e., a subject endowed with perfect rationality[1]. Not only that, but in accordance with 'behaviourism', the human mind is a 'black box' (Camerer et al., 2005) and, consequently, its behaviour is the manifest result of environmental stimuli. From this it follows that those cognitive processes, not being observable from the outside, are unknowable and, therefore, cannot be studied[2].

1 For an in-depth look at the evolution of consumerism see (Bauman, 2010; Alpa & Catricala, 2016; Fabris, 2003).

2 This theory was born in 1913 thanks to psychologist Jhon Watson of the University of Chicago who published the article 'as the Behaviorist Views It' in the journal Psychological Review. (Watson, 1994).

This neoclassical approach began to be challenged from the 1970s by a growing number of scientific studies that elaborated a new economic model based on the different assumption of human's 'bounded rationality'[3]. According to these authors, when the consumer makes a purchasing choice, his mind is influenced by various external contingent factors (such as, for example, the social and economic environment in which he finds himself at that given moment or his emotional state) and, above all, by the cognitive limits of the mind itself.

One of the most significant research in this context is that conducted by Daniel Kahneman because it demonstrated that human mind uses cognitive simplifications, called 'heuristics', that enable it to make economic choices with the least possible effort (of time and energy). However, precisely because consumers use such heuristics to optimize their decision-making time, they often fall into errors of reasoning and evaluation called 'cognitive biases'[4].

With these studies, a new construction of the human brain emerges, no longer considered as a unicum, but consisting of two systems that constantly interact (Kahneman, 2011; Shiv & Fedorikhin, 1999). The 'system 1', dedicated to the intuitive part, operates more quickly and stores information in the form of intuitions without making any mental effort to process it; on the contrary, 'system 2', which represents the more rational part, processes the acquired information with considerable effort. With particular reference to the purchasing decision-making process, there has been a shift from the idea that it is completely rational (consumers always choose the most efficient solution) to the so-called 'Messy Middle' theory[5]. According to this latter approach, the purchasing process consists of several confusing and chaotic phases, where individuals try to find product information but end up being overwhelmed by all the numerous possibilities available to them.

These discoveries gave rise to the new discipline of neuroeconomics, which looks to psychology and neuroscience to delve even deeper into consumer decision-making processes. In traditional models, the emotional aspect was of no importance and, indeed,

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3 The theory of bounded rationality was developed by Herbert Simon in 1978. For a more in-depth discussion (Viale, 2019; Damasio, 1994), according to which 'we are not thinking machines that feel, we are feeling machines that think', precisely to emphasize how the emotional part acts before the rational one and, therefore, 'the beginning of everything was emotion. Feeling is therefore not a passive process'. See also (Morin, 2011).

4 Tversky, & Kahneman (1974); Thaler (2000); Ceschi et al. (2012) carried out a study aimed at creating a taxonomy of cognitive biases. Specifically, they have categorized the main heuristics, including: the 'confirmation bias' or 'belief bias', whereby individuals are more inclined to consider information that confirms their preconceptions; 'framing', because human decision-making processes are influenced by the context, which represents the 'frame'; 'anchoring bias', which occurs when one relies on an already known value as a reference point to determine another value at an unknown quantity (price perception being a prime example) 'desire bias', because personal desires influence individuals' decisions; 'cost bias', in the sense that losses and costs are perceived to be greater than they really are; finally, 'choice bias', i. e. as the number of available options to choose from increases, the difficulty for the human mind to manage all the information and adopt a final choice increases.

5 Rennie, A., Protheroe, J., Charron, C., & Breatnach, G. (2020). Decoding Decisions: making sense of the messy middle. https://clck.ru/bmxnd

they considered human behaviour to be the result of a linear decision-making process aimed at maximizing individual utility. In neuroeconomics, on the other hand, the emotional dimension assumes fundamental importance, so much as to recognize that human behaviour is the result of automatic and unconscious cognitive processes that operate below the level of awareness (Winkielman & Berridge, 2003; Zajonc, 1980, 1998; Bechara & Damasio, 2005)[6].

1. The birth of neuromarketing and the new frontiers of Artificial Emotional Intelligence

These theories were, of course, the fertile ground for 'neuromarketing', a new field of research that developed in the 1990s and which aims to design more effective marketing advertising capable of influencing the purchasing behaviour of consumers through the study of their motivations and mental processes[7].

The rapidity of technological development has led to the construction of numerous techniques that may fall under this subject. This heterogeneity has resulted in the impossibility of arriving at a unique and definitive categorization and, so far, there are only a few vain attempts made by academics.

A first categorization looks at the stage of the consumer decision-making process where neuromarketing techniques fit in. Thus, a first group includes those technologies that study consumer behaviour prior to purchase, by means of tools that allow the identification of the intimate causes that drive them towards one choice rather than another. These include all those technologies that measure eye movement (i.e., eye-tracking), facial expressions and, in general, biometric values such as perspiration level or heart rate. On the other hand, a second group includes those techniques that examine consumer reactions following a purchase to further improve the ability of that product or advertisement to arouse positive emotions in the buyer. For that purpose, the most used are electroencephalography (henceforth EEG)[8], functional magnetic resonance

6 On the impact of these technologies on the Italian system, cf. (Seminara, 2020).

7 There is currently no agreement on the founder of the term 'neuromarketing', but it is well established that it was first used by Professor Ale Smidts in one of his very famous paper published in 2002, where it was defined as 'the study of the cerebral mechanism to understand the consumer's behaviour in order to improve the marketing strategies'. Cf. (Smidts, 2002). Already in the following year, the first piece of neuromarketing research was conducted by Professor Read Montague, who asked a group of people to drink Pepsi and Coca Cola while they were scanned by a functional magnetic resonance imaging (fMRI) machine. However, the beginning of neuromarketing practical studies can be dated as early as around 1971, when Herbert E. Krugman, a researcher of General Electric, first measured spontaneous pupil dilatations in customers, thinking of them as an indicator of interest in people who were looking for products or watching advertisements. For a summary of the literature on the subject, cf. (Lee et al., 2018).

8 The electroencephalogram records the electrical activity of the brain using a helmet whose surface is entirely covered with small electrodes and placed over the subject's head. It is a non-invasive method that detects changes in the electrical flow of brain waves in response to the subject's exposure to different types of stimuli.

imaging (henceforth fMRI)[9] and magnetoencephalography (henceforth MEG)[10] which can guarantee a direct access to human brain activity.

A second classification subdivides neuromarketing practices according to the object of analysis (Verhulst et al., 2019). Based on this criterion, it can be identified three macrocategories: firstly, there are the neuroimaging tools that measure the activity of a specific area of the brain, and they include for example, EEG (because it calculates fluctuations in the brain's electrical activity) and fMRI (which measures changes in blood flow in the brain). Quite distinct are, instead, those instruments that do not measure brain activity directly, but indirectly, i.e., by deriving information on cognitive processes through an analysis of the responses of other parts of the body to certain marketing stimuli. Thus, into this second group it can be find eye-tracking, which measures position, eye movements and pupil dilation, and even cardiovascular techniques, where heart rate variability is used as an indicator to determine an individual's impulses. Then, there are some technologies for studying the biochemical components of the human body, such as hormones and neurotransmitters – testosterone, cortisol, or dopamine – released by the human body during an exposition to a marketing stimulus.

Finally, neuromarketing practices can be distinguished according to their ability to record signals of brain rather than neurological activity[11], thus identifying three groups. The first includes those neuroscientific tools that are concerned with recording the metabolic activity of the brain, which include fMRI, MEG and, finally, positron emission tomography (henceforth PET)[12]. Then there are those practices that record the electrical activity of the brain, among which the most widely used is EEG, which aims to provoke changes in the electrical activity of the brain by means of different visual and sound stimuli, to observe the correlation between the nature of the stimuli and the consequent areas of the brain that they activate. Finally, we have instruments that only indirectly record brain activity, because they look at the physical responses, such as electrocardiography (henceforth ECG), which measures and records the electrical activity of the heart by placing electrodes on the

9 Functional magnetic resonance imaging measures brain activity by looking at the blood flow and oxygenation of the encephalic districts considered. It has been observed that exposure to a marketing stimulus leads to an increase in the level of blood oxygenation in certain areas of the brain, thus leading to an alteration of the brain's electromagnetic field. For further discussion, cf. (Lim, 2018).

10 A non-invasive medical technique that records the electrical activity of the brain. Unlike the EEG, this measures the magnetic field generated by intracranial currents. Sensors called Superconducting quantum interference devices (SQUID) are used that are capable of measuring infinitesimal variations in the magnetic field, so that the sources of magnetic signals within the brain can be located with high precision.

11 This classification was proposed by M. D. Bercea (2012).

12 It is an invasive method for brain imaging and falls within the scope of so-called 'nuclear' medicine because it involves the injection inside the subject's body of a substance that releases positron particles. By means of this technique, after exposing the subject to a marketing stimulus, it is possible to measure the changes in glucose levels in his brain (his metabolic activity) caused by the radioactive substance itself.

subject's skin[13] and, above all, eye-tracking. The latter can detect, thanks to sensors, the activity and size of the pupils from which it is possible to draw useful information on how to direct the subject's attention.

Despite the strong diversity of the above-mentioned practices, it is quite evident the strength – and the danger – of AI applied to this sector which consists precisely in the former's ability to increase the precision with which companies can predict purchasing behaviour, so much that 'as studies confirm, despite their small sample sizes, they can provide a solid basis for market predictions of larger populations' (Royo-Vela & Varga, 2022; Ramirez et al., 2021).

A particular branch of AI that has recently been developed is known as 'Affective computing' or 'Artificial Emotional Intelligence' (henceforth AEI), which aspires, through the combination of different fields, including engineering, neuroscience, and behavioural psychology, to design machines capable not only of interpreting, but also of simulating human emotions and thus adapting their response in relation to the subject's state of mind.

Nowadays, many AEI software use eye-tracking and facial coding technologies because, as several studies have clearly shown, the face is the part of the human body with which we most express our thought[14].

In particular, eye-tracking can be placed on a mobile or stationary device, records the dilation and concentration of the pupils (considered indicators of the mental and cognitive operations of the central nervous system) as well as the trajectory made by the consumer's eye (an index of the activity of the autonomic nervous system, responsible for emotional reactions) when exposed to an advertisement. In this hypothesis, the eye's attention is captured on the basis of two types of factors: the first, the so-called 'bottom-up' factors capture the brain because they are salient, such as colors, images and brightness, and, for this reason, they are the ones that are grasped first; the second, on the other hand, called 'top-down', are the elements that evoke feelings, memories and emotions.

This technology, thus, records enormous quantities of data, both 'quantitative' (i. e., based on the analysis of numerical data such as the number or duration of fixations) and 'qualitative' (referring to the graphic visualization of the subject's visual behaviour, such as heat maps or gaze plots). It is precisely for this reason that eye-tracking and facial coding are mainly exploited by the world's biggest companies (Barnett & Cerf, 2015; Bellman et al.,

[13] The heart rate is influenced by two basic elements: the sympathetic nervous system, which causes feelings of arousal in the face of a marketing stimulus, and the parasympathetic nervous system, which, on the contrary, promotes relaxation and rest, thus generating a reduction in heart rate.

[14] For a further discussion on this technology, please refer to (Cherubino et al., 2019). Ekman and Friesen developed the Facial Action Coding System (FACS) to measure and classify human facial expressions. FACS is based on the identification of seven facial expressions of 'primary emotions', three 'universal feelings', a series of 'advanced emotions' and, finally, nineteen 'Action Units' (AUs). For a more detailed discussion on this topic, see (Ekman & Friesen, 1978; Ekman, 2004).

2016)[15], such as the case of 'Affectiva', a company specialized in the development of AEI that, through deep learning and computer vision technologies, analyses the facial expressions and emotions of the subject it interacts with[16].

In other words, this software – called 'Affidex' – aims to identify all the key facial points and then classify them within 'emotion classes'. It is mostly applied in the marketing sector because it is particularly useful to test consumers' emotional engagement with a certain advertisement. This means that facial coding, when applied with AI and video analysis, can measure the smallest reactions, even unconscious ones, to purchase and advertising stimuli. This technology then allows marketing agencies to focus their products campaigns on specific messages, to parameterize lights, sounds, images based on what is most interesting and engaging for consumers, even to the point of being able to predict what their emotional responses will be, starting 'only' from a single facial expression[17].

It is not surprising, then, that the development and application of technologies designed to understand and predict consumers' decision-making processes, purchasing habits and emotions inevitably bring with them particularly complex doubts and questions, because '[A]re we treating people like people with hopes and desires? Or are we treating them as things that we can manipulate based on our understanding of how brains work?' (Garvey, 2016)[18].

2. The possibilities of neuromarketing and its potential threat to fundamental values

The goal of marketing has always been to entice the consumer to buy a certain product by trying to capture their interest, such as the Camels cigarette advertisement broadcasted from 1936 to 1939, where it was said that 'for your Digestion's sake, smoke Camels'[19]. This case clearly confirms that not only neuromarketing, but even traditional techniques have

[15] McStay (2018). He says that: 'what is most notable about facial coding is the diversity and extent of its application. For example, over one-third of Fortune Global 500 companies use facial coding to test the effectiveness of their advertisements before they are launched' (Cerf et al., 2015; Alexander et al., 2015; Hedgcock et al., 2012; Mesly, 2016; Shiv et al., 2005).

[16] For an in-depth look at how the software works, see (McStay, 2018).

[17] (Arthmann & Li, 2017). The authors refer to Microsoft's Cognitive Services emotion recognition, which provides insights not only into what is available today, but wider ranging opportunities to harness both verbal and nonverbal communications through semantic analysis, analysis of tonality and more, as well as emotion recognition through video. https://clck.ru/37rq8m

[18] Where it is also stated that 'you don't need to be Kant to worry that some of the practices recommended by neuromarketers seem to treat a human being as an object, a thing to be studied and manipulated for financial gain, rather than a person with goals of her own, someone owed our respect'.

[19] This slogan had such massive effects on the population that some authors observed that 'the campaign created a population of consumers who may not have otherwise chosen to smoke tobacco and may have gone against their intuition of inherent beliefs, only choosing to smoke because of the Camel ad's persuasive influence'. Cf. (Clark, 2017; Thomas et al., 2017; Peeler, 1996).

always had the purpose of influencing consumers by exploiting their cognitive biases and weaknesses, so much so that, already in 1950 people began to speak of 'stealth marketing', defined as 'the point at which neuromarketing techniques reach critical effectiveness, and are used in such a way to manipulate consumer decisions without their knowledge or consent' (Murphy et al., 2008)[20]. This practice appeared in the United States when James Vicary admitted that he had increased food and beverage sales at the cinema by inserting subliminal messages in films to encourage consumers to drink Coca-Cola and eat popcorn (Vicary, 1951)[21].

It is evident then that persuasion is a natural component of the discipline itself; however, the problem arises in particular with some neuromarketing techniques when they attempt to go far beyond the mere persuasion of the individual. This is a fear that has traditionally always existed in the discipline and that various authors have repeatedly raised' (Cenizo, 2022)[22]. In particular, they see neuromarketing as a potential threat to fundamental human values because it allows weaknesses, insecurities and emotions to be exploited for purely commercial purposes (Lungu, 2016; Durante & Arsena, 2015; Durante et al., 2011; Saad & Stenstrom, 2012).

On the contrary, these concerns are considered excessive by those who point out that the current state of technology is not sufficiently advanced to justify ethical questions. Nor do they believe that neuromarketing can actually manipulate the human mind, because, according to them, exposing consumers to unconscious influences does not necessarily mean that they have no control over their purchasing choices[23].

However, what is certainly beyond doubt is the ability of neuromarketing to trigger the will to buy in consumers, so much that, thus, the real question is whether or not their choices can be considered still free, even if significantly influenced by physiological factors that they cannot control (Stanton et al., 2016)[24].

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20 For these authors, neuromarketing has the ability to persuade consumers 'to engage in a product-related activity they may not have otherwise chosen to do', (Clark, 2017). Others claimed that neuromarketing was unethical, (Lee et al., 2007).

21 For a critique of his study, (Karremans et al., 2006).

22 In the same sense Murphy and others (2008), 'Neuroethics of neuromarketing', 299, who argue that 'the fact that one must insert qualifiers such as "at the present time" provides ample reason to carefully consider the implications that such a development might have and the means by which it might be sensibly managed'.

23 Part of the literature excludes that the current degree of persuasion of neuroscientific practices is such that it can concretely threaten the manipulation of human behaviour. In this sense, (Stanton et al., 2016), whereby 'most of the new ethical dangers that are attributed to neuromarketing turn out to be unrealistic, because they assume that neuromarketing has powers that it cannot obtain in the near future'. Similar positions are also adopted by authors such as (Renvoise & Morin, 2007; Murphy et al., 2008).

24 Also (Wilson et al., 2008), acknowledge that 'when a consumer purchases a product based on a decision in which marketing stimuli unrelated to product characteristics cause affective neural systems to override cognitive processes, the final purchase outcome may not always be in the best interest of the consumer'.

Although many authors have written about manipulation, there is still no unanimously accepted definition[25]. Among them, particularly interesting for our analysis is the point of view of those who accept the theory of manipulation as 'hidden influence': a practice can be considered manipulative when it influences consumers intentionally and covertly, in a way they aren't conscious or in a way they couldn't easily become aware of when they try to understand what was impacting their decision-making process' (Susser et al., 2019). This means that the distinction between a purely persuasive practice and a manipulative one lies when it molds consumers' motivations in such a way as to deteriorate their ability to rationally manage their own motives, prompting them to make emotional associations between their own experience and the product. In this case, thus, the desire generated in the consumer's mind does not originate from an actual need, but from a stimulus which impacts on his individual autonomy because 'an agent acts autonomously if her action is caused by a motive acquired via the appropriate engagement of her capacity to rationally manage her own motives. Otherwise, she acts less than autonomously' (Cave, 2014)[26].

All this considered, neuromarketing can be a means of violating certain fundamental human values such as individual autonomy (Ulman et al., 2015; Stanton et al., 2016; Ariely & Berns, 2010; Murphy et al., 2008; Marcus, 2002), defined by R. Gillon as 'the capacity to think, decide and act on the basis of such thought and decision freely and independently' (Gillon, 1985). Precisely because neuromarketing prompts consumers to buy by stimulating their emotions rather than by providing them with accurate product information, it can impair their ability to identify and pursue their preferences (Fisher et al., 2010)[27]. In other words, the consumer's decision-making autonomy is affected because consumers are forced into preferences and decisions without full understanding, awareness, and consent[28].

This risk of harm is increased by those practices that exploit the vulnerabilities of specific groups of individuals considered extremely sensitive. In fact, several studies have shown that neuromarketing is able to push adolescents to start smoking and that individuals with compulsive buying disorders are particularly sensitive to messages that encourage them to buy on the web (Henriksen et al., 2010). Adolescents are also

25 Noggle who identifies three possible approaches to define the concept of manipulation. Noggle, R. (2017). The ethics of manipulation. https://clck.ru/37rwke. For an inside in the theories of manipulation, let us refer to (Barnhill, 2014; Wilkinson, 2012; Susser et al., 2019; Klenk, 2021; Wood, 2016).

26 Even more absolutely, (Garvey, 2016), states that 'any sort of persuasive method that moves us without giving us good reasons diminishes the power of reasons on us'. See also (Grant, 2011; Lewis, 2013).

27 Wilson et al. (2008) observe in this regard that 'to the extent these stimuli are unrelated to product characteristics, the result is an attempt to manipulate the consumer's purchase decision'. The authors state that 'neurotechnology enables marketers to refine persuasion attempts using noninformative or misinformative content, with the potential to trigger very positive affective responses in consumers'. Cf. also (Haggard, 2011).

28 (Dierichsweiler, 2014) and the literature referred to therein as (Wilson et al., 2008). Interesting is the point of view of (Sunstein, 2015), according to which where the subject wants to be manipulated, then his will must be respected.

particularly sensitive and manipulable: the uneven neurodevelopment of the brain systems involved in cognitive control and the over-reactivity of the so-called 'reward system' are all factors associated with an emotional hypersensitivity to rewarding stimuli, faces and social-emotional stimuli (Steinberg, 2017; van Hoorn et al., 2016; Casey et al., 2008; Galvan et al., 2006; Hare et al., 2008; Gogtay et al., 2004; Shaw et al., 2008). This can bring to the development of unhealthy habits which can persist even during the adult life (Bault & Rusconi, 2020).

Neuroethicists, in fact, are not concerned mostly about the possibility of neuromarketing being used to target particularly sensitive individuals, but especially about its ability to create new forms of vulnerability. Therefore, it seems preferable to adopt an evidence-based definition of consumer vulnerability in the sense that it is 'situational, meaning that a consumer can be vulnerable in one situation but not in others, and that some consumers may be more vulnerable than others'[29].

3. Protecting consumers from unreasonable influences of modern technologies on their economic behavior and freedom of choice

There are still some open questions that neuroethics has to address in order to prevent neuromarketing from becoming the instrument through which companies can circumvent consumer autonomy in all its various meanings and exploit the weaknesses and vulnerabilities of specific groups of subjects for commercial purposes.

The impossibility of resolving these questions depends above all on the fact that the rapid development of new technologies does not allow these fundamental values to be defined once and for all. So far, to solve this issue some bioethicists have proposed the creation of new neuro-rights 'specifically tailored on the characteristics of brain information and the new possibilities opened by mind-reading technologies' (Ienca & Andorno, 2017), such as the right to 'mental privacy'. In this way, it would be protected 'any bit or set of brain information about an individual recorded by a neurodevice and shared across the digital ecosystem', in an attempt to adequate law to new technologies (Ienca & Andorno, 2017)[30].

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[29] Consumer vulnerability across key markets in the European Union (European Commission, 2016) gives a definition of vulnerability distinguishing five conditions. European Commission, Consumers, Health, Agriculture and Food Executive Agency, Consumer vulnerability across key markets in the European Union – Executive summary. Publications Office. https://clck.ru/37rtX3. See also (Fineman, 2008), who speaks of vulnerability as an ontological condition of the human being.

[30] Other proposed rights are that of 'psychological continuity', which aims to preserve personal identity and the continuity of mental life from external alterations by third parties; the right to 'mental integrity', which, already guaranteed in Article 3 of the EU Charter of Fundamental Rights, should be expanded to also protect against illicit and harmful manipulations perpetuated through the use of neurotechnologies; and finally, that of 'cognitive freedom', which aims to protect the freedom to be able to make free decisions.

Proposals for new 'neuro-rights' are based on the conviction, increasingly shared in the literature, that the current regulatory framework is not sufficient to adequately cover those AI systems used by neuromarketing to influence human emotions and cognitive processes.

Neuromarketing falls with no doubt into the (broad) definition of commercial practices provided by the Directive 2005/29/EC[31]. Article 5 then provides the definition of 'unfairness'[32], establishing that a practice must be considered unfair and, therefore, prohibited when it is contrary to the rules of professional diligence and, above all, when it materially distorts or is likely to materially distort the economic behaviour with regard to the product of the average consumer whom it reaches or to whom it is addressed, or of the average member of the group when a commercial practice is directed to a particular group of consumers.

Alongside this general prohibition of unfair commercial practices there are then two macro-categories, represented respectively by misleading commercial practices[33] and aggressive commercial practices[34], as well as a 'black list' of practices considered unfair in any case without any possibility of providing proof to the contrary as to their unfairness.

It is clear from these provisions that the aim is to protect the consumer's freedom from undue conditioning, so much that it is now common ground that, when the directive speaks of commercial practices capable of 'distorting' his economic behaviour, it must be understood in a broad sense, i.e., including any form of appreciable alteration of the individual's awareness in making his commercial decision.

Neuromarketing, by exploiting the cognitive fallacies of consumers inducing them to engage in certain purchasing behaviour, falls well within the definition of those conditionings that surreptitiously alter consumer perception and understanding. Although no explicit reference is made to psychological conditioning that interferes with the consumer's freedom of decision-making, aggressive commercial practices also include conduct that by 'undue influence'[35] considerably restricts his freedom of choice or economic behaviour by inducing him to take a decision he would not otherwise have taken.

The European legislator's intent is, moreover, clearly limited to declaring unlawful only those practices that considerably interfere with the self-determination[36] with

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31 Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market. A commercial practice is 'any act, omission, course of conduct or representation, commercial communication including advertising and marketing, by a trader, directly connected with promotion, sale or supply of a product to consumers'.

32 Art. 2 of Directive 2005/29/EC. It has been observed that this legislation has an 'intersecting circles' structure. On this point, see (Fusi & Testa, 2006; Duivenvoorde, 2015).

33 Art. 6 and Art. 7 for misleading omissions.

34 Art. 8 of Directive of Unfair Commercial Practices.

35 It is defined in Article 2(j) of Directive 2005/29/EC as exploiting 'a position of power in relation to the consumer so as to apply pressure, even without using or threatening to use physical force, in a way which significantly limits the consumer's ability to make an informed decision'. Cf. (Strycharz & Duivenvoorde, 2021).

36 Cf. recital 6 of directive 2005/29/EC. For a comment (Abbamonte, 2007).

the consequence that those forms of psycho-emotional pressure, not capable of affecting the consumer's freedom of economic choice, are excluded from that prohibition.

However, precisely because the peculiarity of neuromarketing consists in the use of emotional factors to unconsciously direct the decision-making processes of economic agents, it is not easy for the consumer firstly to distinguish a legitimate practice from one that, instead, has exceeded that limit of 'undue conditioning' imposed by law[37].

Also, from an interpretative point of view, where the definition of undue influence talks about a practice that 'significantly' limits the consumer's ability to make an informed decision, it is not very clear, especially when speaking of sophisticated AEI tools, what is the limit beyond which it is reasonable to say that a practice has reached that level[38].

However, particular importance is also given in this field to soft law instruments and especially code of ethics, such as the 'Code of Ethics for the Application of Neuroscience in Business' drawn up in 2013 by the global trade association called the 'Neuromarketing Science and Business Association' and which lists a series of general principles that every company is called upon to respect if it intends to conduct consumer studies using neuromarketing techniques[39].

There is no doubt that codes of ethics are useful instruments of self-regulation with the precise aim of making companies responsible through their commitment to respect certain ethical principles; however, several authors have criticized their uselessness for two reasons.

On the one hand, in fact, codes of ethics would have little effectiveness because they are based on the principle of voluntary adherence and, therefore, would be without any binding value[40]; on the other hand, there would be the further consideration that companies, having the monetization of AI applications as their goal, are guided by an economic rather than an ethical logic (McNamara et al., 2018) because 'in business contexts, speed is everything in many cases' and thus 'the practice of development, implementation and use of AI applications has very often little to do with the values and principles postulated by ethics (Hagendorff, 2020).

Recognizing these challenges, the European Union passed the AI Act to ensure «global leadership in the development of safe, secure and ethical artificial intelligence»[41].

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37 It should be noted that in literature (Seminara, 2020) has proposed that the limit beyond which an advertisement can be sanctioned as aggressive would be identifiable in the so-called 'psychological shock'.

38 Cf. also (Strycharz & Duivenvoorde, 2021).

39 NMSBA. Code of Ethics. https://clck.ru/37rwiB. See also Probst, L., Frideres, L., Demetri, D., & Vomhof, B. (2014). Customer Experience. Neuro-marketing innovations. PwC Luxembourg. https://clck.ru/37rzBE

40 For criticism of the effectiveness of codes of ethics (Sacconi, 1991; Trevino & Nelson, 2006; Rossi, 2006, 2005).

41 EU Artificial intelligence Act. https://clck.ru/38x5h6

Neuromarketing practices based on AI systems falls within the broad definition of 'artificial intelligence system' provided by the AIA which, in fact, applies to any 'software that is developed with one or more the techniques and approaches listed in Annex I and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with'[42].

As is well known, the AIA adopts a 'risk-based approach', looking at the risk generated by the AI systems with respect to fundamental rights and freedoms. There are, then, those practices that generate an 'unacceptable risk' and are therefore prohibited[43]; the 'high-risk AI systems' that, instead, are permitted but only under specific conditions[44]; and, finally, those applications for which, presenting only a 'low or minimal risk', there are essentially transparency obligations[45].

Article 5(1) first prohibits two types of practices that are considered manipulative, namely an AI system that deploys subliminal techniques 'beyond a person's consciousness in order to materially distort a person's behaviour in a manner that causes or is likely to cause that person or another person physical or psychological harm' (lett. a) and 'that exploits any of the vulnerabilities of a specific group of persons due to their age, physical or mental disability, in order to materially distort the behaviour of a person pertaining to that group in a manner that causes or is likely to cause that person or another person physical or psychological harm' (lett. b)[46]. This rule then seems to apply exclusively to those AI systems that, by manipulating the behaviour of the persons concerned, cause (or are likely to cause) physical or psychological harm. This means that if the AI practice is manipulative, but not causally capable of causing physical or psychological harm, it will not in itself be considered a high-risk system within the meaning of Section 5 of the AIA[47].

As already noted, not every practice of neuromarketing can be said to be subliminal and manipulative per se because, otherwise, the entire discipline would be illegitimate. Therefore, are these systems considered by the AIA?

The further category to which reference is made is the one governed by Title III of the AIA and which includes those IA systems considered 'high risk' which are subject, for this

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42 Art. 3, para. 1, of the (European Commission, 2021). For a critique of the excessive generality of the definition of 'AI systems', see (Ebers et al., 2021).

43 Art. 5 of AIA.

44 Art. 6 of AIA and Annex III.

45 Article 52 of AIA. For an analysis on the Proposal see (Stuurman & Lachaud, 2022; Veale & Zuiderveen Borgesius, 2021; Ebers et al., 2021; Smuha et al., 2021; Sovrano et al., 2022; Ebers et al., 2021; Ebers, 2021; Hupont et al., 2022a)

46 Article 5(1)(c) and (d) then respectively prohibit social scoring systems used by public authorities and biometric identification systems used in public spaces for law enforcement purposes.

47 STOA. (2022). Regulatory divergences in the draft AI Act: Differences in public and private sector obligations. https://clck.ru/37ryK3

reason, to stringent mandatory requirements that suppliers must comply with right from the design phase[48].

In fact, the supplier is required to implement and document a risk management system to identify and analyze the possible risks arising from the use of the AI system and to adopt appropriate measures for their proper management[49] and to guarantee a qualitative level of dataset and data governance[50]. Moreover, the supplier must draw up and maintains detailed, complete and up-to-date technical documentation and ensures the verifiability and traceability of the processes used by the AI systems by providing instruments both for recording purposes and to allow adequate human supervision of their operation[51]. In other world, they must be designed and developed to ensure a high level of accuracy, robustness, and cybersecurity as well as transparency through the provision of clear, concise, and understandable instructions for use[52].

Neuromarketing techniques, however, do not seem to fall even within the cases of Article 6(1) of the AIA or even less so among those listed in Annex III (to which Article 6(2) refers) where, at most, paragraph 1 speaks of those systems used for the biometric identification and categorization of natural persons. However, since the purpose of neuromarketing is neither real-time nor a posteriori identification of a natural person, it does not seem to be possible to include such practices among high-risk AI systems[53].

Turning, instead, to AI systems deemed to be 'low risk', the Draft Regulation refers, in Article 52(2), to emotional recognition and biometric categorization systems[54]. However, since they are deemed to be low-risk systems, their implementation and application will be subject to transparency obligations which, however, do not appear to be sufficient with respect to the dangerousness of these practices because: '[T]hese systems are based on highly problematic evidence while nevertheless generating potentially highly detrimental output (in the form of decisions or behaviour)' resulting in 'chilling effects, exclusion and disrespect for individuals of groups that do not fit the categorisations that are taken for granted'[55].

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48 The obligations imposed on high-risk AI systems must then be subject to an ex-ante and post-market conformity check. (Mökander et al., 2022; Hupont et al, 2022b; Hof, 2022; Alì & Yu, 2021; Cooman, 2022).

49 Article 9 of AIA.

50 Article 10 of AIA.

51 Articles from 11 to 14 of AIA.

52 Article 13(1) states: 'high-risk AI systems shall be designed and developed in such a way to ensure that their operation is sufficiently transparent to enable users to interpret the system's output and use it appropriately'

53 Hildebrandt, M. (2021). Commentary on the Proposal for an EU AI Act of 21 April 2021.

54 Article 52 of AIA.

55 (Hildebrandt, 2021), comments: 'the current categorisation of emotion recognition and biometric categorisation as not necessarily high risk, whereas depending on use or context they may nevertheless qualify as high risk or even be prohibited, is confusing and unnecessarily complicated'. He concludes that '[I]f not prohibited, they should be added under point 1 in Annex III'.

Conclusions

In conclusion, the development of technologies capable of recognizing human emotions and exploiting them to guide consumer behaviour requires the presence of appropriate legislation to ensure a reliable system that respects fundamental values. Although the current regulatory framework, including above all the Unfair Commercial Practices Directive, undoubtedly provides effective protection for the consumer, there are nonetheless several problematic nodes that need more attention from the EU legislator and that stem from the impact of AI systems with traditional legal categories. In this sense, then, a further tool to help build a safe, reliable, and trustworthy system could be the AIA because 'against this background, the call for transparency rests on the need to look inside AI technology, in order to try to fully understand its logic and regulate its behaviour' (Alì & Yu, 2021). However, the current wording of the Proposal does not explicitly consider among high-risk systems those AI applications that are based on the collection, processing, and exploitation of cognitive and emotional information.

Instead, explicitly considering also such applications would avoid any risk of interpretative ambiguity, in order to effectively build 'an ecosystem of trust by proposing a legal framework for trustworthy AI' where 'people can trust that technology is used in a way that is safe and compliant with the law, including the respect of fundamental rights'[56].

References

Abbamonte, G. B. (2007). The Unfair Commercial Practices Directive and its General Prohibition. In S. Weatherill & U. Bernitz (Eds.), *The Regulation of Unfair Commercial Practices under EC Directive 2005/29: New Rules and New Techniques* (pp. 11–32). https://doi.org/10.5040/9781472560001.ch-002

Alexander, V., Tripp, S., & Zak, P. J. (2015). Preliminary evidence for the neurophysiologic effects of online coupons: Changes in oxytocin, stress, and mood. *Psychology & Marketing*, *32*(9), 977–986. https://doi.org/10.1002/mar.20831

Alì, G. S., & Yu, R. (2021). Artificial intelligence between transparency and secrecy: from the EC whitepaper to the AIA and beyond. *European Journal of Law and Technology*, *12*(3).

Alpa, G., & Catricala, A. (Eds.) (2016). *Diritto dei consumatori*. Il Mulino. (In Ital.).

Ariely, D., & Berns, G. S. (2010). Neuromarketing: the hope and hype of neuroimaging in business. *Nature Reviews Neuroscience*, *11*(4), 284–292. https://doi.org/10.1038/nrn2795

Barnett, S., & Cerf, M. (2015). Connecting on Movie Night? Neural Measures of Engagement Differ By Gender. *Advances in Consumer Research*, *43*, 314–318.

Barnhill, A. (2014). What Is Manipulation? In C. Coons & M. Weber (Eds.), *Manipulation: Theory and Practice* (pp. 51–72). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199338207.003.0003

Bault, N., & Rusconi, E. (2020). The Art of Influencing Consumer Choices: A Reflection on Recent Advances in Decision Neuroscience. *Frontiers in Psychology,* 10. https://doi.org/10.3389/fpsyg.2019.03009

Bauman, Z. (2010). *Consumo, dunque sono*. Roma-Bari: Laterza. (In Ital.).

Bechara, A., & Damasio, A. R. (2005). The somatic marker hypothesis: A neural theory of economic decision. *Games and Economic Behavior*, *52*(2), 336–372. https://doi.org/10.1016/j.geb.2004.06.010

Bellman, S., Nenycz-Thiel, M., Kennedy, R., Larguinat, L., McColl, B., & Varan, D. (2016). What Makes a Television Commercial Sell? Using Biometrics to Identify Successful Ads. *Journal of Advertising Research*, *57*(1), 53–66. https://doi.org/10.2501/jar-2016-051

[56] European Commission, 2021. https://clck.ru/37rtX3

Bercea, M. D. (2012). Anatomy of methodologies for measuring consumer behavior in neuromarketing research. In *Proceedings of the Lupcon Center for Business Research (LCBR) European Marketing Conference*. Ebermannstadt, Germany.

Camerer, C., Loewenstein, G., & Prelec, D. (2005). Neuroeconomics: How Neuroscience Can Inform Economics. *Journal of Economic Literature*, *43*(1), 9–64. https://doi.org/10.1257/0022051053737843

Casey, B. J., Getz, S., & Galvan, A. (2008). The adolescent brain. *Developmental Review*, *28*(1), 62–77. https://doi.org/10.1016/j.dr.2007.08.003

Cave, E. M. (2014). Unsavory Seduction and Manipulation. In C. Coons & M. Weber (Eds.), *Manipulation: Theory and Practice* (pp. 176–200). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199338207.003.0009

Cenizo, C. (2022). Neuromarketing: concept, historical evolution and challenges. *Icono 14*, *20*(1). https://doi.org/10.7195/ri14.v20i1.1784

Cerf, M., Greenleaf, E., Meyvis, T., & Morwitz, V. G. (2015). Using Single-Neuron Recording in Marketing: Opportunities, Challenges, and an Application to Fear Enhancement in Communications. *Journal of Marketing Research*, *52*(4), 530–545. https://doi.org/10.1509/jmr.13.0606

Ceschi, A., Sartori, R., Rubaltelli, E., & Weller, J. (2012). Un approccio empirico per una tassonomia dei bias cognitivi. In *1992–2012: Psicologia, Scienza, Società – Congresso Nazionale delle Sezioni dell'Associazione Italiana di Psicologia*. Chieti. 20-23 Settembre. 2012 (In Ital.).

Cherubino, P., Martinez-Levy, A. C., Caratù, M., Cartocci, G., Di Flumeri, G., Modica, E., Rossi, D., Mancini, M., & Trettel, A. (2019). Consumer Behaviour through the Eyes of Neurophysiological Measures: State-of-the-Art and Future Trends. *Computational Intelligence and Neuroscience*, 1–41. https://doi.org/10.1155/2019/1976847

Clark, K. R. (2017). Dealing with the Devils: The Responsibility of Neuromarketing Practitioners in Conducting Research for Ethically Questionable Client Agendas. In A. R. Thomas, N. Pop, A. Iorga, C. Ducu. (Eds.), *Ethics and Neuromarketing: Implications for Market Research and Business Practice* (pp. 147–156). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-45609-6_9

Damasio, A. (1994). *Descartes' Error: Emotion, Reason and the Human Brain*. New York: Avon book.

De Cooman, J. (2022). Humpty dumpty and high-risk AI systems: the ratione materiae dimension of the proposal for an EU artificial intelligence act. *Market and Competition Law Review*, *6*(1), 49. https://doi.org/10.34632/mclawreview.2022.11304

Dierichsweiler, K. L. A. (2014). Ethical Issues in Neuromarketing. *In 3rd tIBA Bachelor Thesis Conference, July 3rd, 2014* (pp. 1–14). Enschede, The Netherlands.

Duivenvoorde, B. B. (2015). *The Consumer Benchmarks in the Unfair Commercial Practices Directive*. Springer International Publishing. https://doi.org/10.1007/978-3-319-13924-1

Durante, K. M., & Arsena, A. R. (2015). Playing the Field: The Effect of Fertility on Women's Desire for Variety. *Journal of Consumer Research*, *41*(6), 1372–1391. https://doi.org/10.1086/679652

Durante, K. M., Griskevicius, V., Hill, S. E., Perilloux, C., & Li, N. P. (2011). Ovulation, Female Competition, and Product Choice: Hormonal Influences on Consumer Behavior. *Journal of Consumer Research*, *37*(6), 921–934. https://doi.org/10.1086/656575

Ebers, M. (2021). Standardizing AI – The Case of the European Commission's Proposal for an Artificial Intelligence Act. *The Cambridge Handbook of Artificial Intelligence: Global Perspectives on Law and Ethics*. http://doi.org/10.2139/ssrn.3900378

Ebers, M., Hoch, V. R. S., Rosenkranz, F., Ruschemeier, H., & Steinrötter, B. (2021). The European Commission's Proposal for an Artificial Intelligence Act – A Critical Assessment by Members of the Robotics and AI Law Society (RAILS). *J*, *4*(4), 589–603. https://doi.org/10.3390/j4040043

Ekman, P. (2004). *Emotions Revealed: Recognizing Faces and Feelings to Improve Communication and Emotional Life*. New York: Henry Holt and Company.

Ekman, P., & Friesen, W. V. (1978). Facial action coding system: a technique for the measurement of facial movement. Facial Action Coding System [dataset]. In *PsycTESTS Dataset. American Psychological Association (APA)*. https://doi.org/10.1037/t27734-000

Fabris, G., (2003). *Il nuovo consumatore: verso il postmoderno*. Franco Angeli. (In Ital.).

Fineman, M. A. (2008). The Vulnerable Subject: Anchoring Equality in the Human Condition. *Yale Journal of Law & Feminism*, *20*(1).

Fisher, C. E., Chin, L., & Klitzman, R. (2010). Defining Neuromarketing: Practices and Professional Challenges. *Harvard Review of Psychiatry*, *18*(4), 230–237. https://doi.org/10.3109/10673229.2010.496623

Fusi, M., & Testa P. (2006). *Diritto e pubblicità*. Milano: Lupetti. (In Ital.).

Galvan, A., Hare, T. A., Parra, C. E., Penn, J., Voss, H., Glover, G., & Casey, B. J. (2006). Earlier Development of the Accumbens Relative to Orbitofrontal Cortex Might Underlie Risk-Taking Behavior in Adolescents. *Journal of Neuroscience*, *26*(25), 6885–6892. https://doi.org/10.1523/jneurosci.1062-06.2006

Garvey, J. (2016). *The Persuaders: The Hidden Industry That Wants to Change Your Mind*. London: Icon Books, Limited.

Gillon, R. (1985). Autonomy and the principle of respect for autonomy. *BMJ*, *290*(6484), 1806–1808. https://doi.org/10.1136/bmj.290.6484.1806

Gogtay, N., Giedd, J. N., Lusk, L., Hayashi, K. M., Greenstein, D., Vaituzis, A. C., Nugent, T. F., Herman, D. H., Clasen, L. S., Toga, A. W., Rapoport, J. L., & Thompson, P. M. (2004). Dynamic mapping of human cortical development during childhood through early adulthood. *Proceedings of the National Academy of Sciences*, *101*(21), 8174–8179. https://doi.org/10.1073/pnas.0402680101

Grant, R. W. (2011). *Strings Attached: Untangling the Ethics of Incentives*. Princeton: Princeton University Press. https://doi.org/10.23943/princeton/9780691151601.001.0001

Hagendorff, T. (2020). The Ethics of AI Ethics: An Evaluation of Guidelines. *Minds and Machines*, *30*(1), 99–120. https://doi.org/10.1007/s11023-020-09517-8

Haggard, P. (2011). Neuroethics of Free Will. In J. Illes & B. J. Sahakian (Eds.), *Oxford Handbook of Neuroethics* (p. 219). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199570706.013.0058

Hare, T. A., O'Doherty, J., Camerer, C. F., Schultz, W., & Rangel, A. (2008). Dissociating the Role of the Orbitofrontal Cortex and the Striatum in the Computation of Goal Values and Prediction Errors. *The Journal of Neuroscience*, *28*(22), 5623–5630. https://doi.org/10.1523/jneurosci.1309-08.2008

Hedgcock, W. M., Vohs, K. D., & Rao, A. R. (2012). Reducing self-control depletion effects through enhanced sensitivity to implementation: Evidence from fMRI and behavioral studies. *Journal of Consumer Psychology*, *22*(4), 486–495. Portico. https://doi.org/10.1016/j.jcps.2012.05.008

Henriksen, L., Schleicher, N. C., Feighery, E. C., & Fortmann, S. P. (2010). A Longitudinal Study of Exposure to Retail Cigarette Advertising and Smoking Initiation. *Pediatrics*, *126*(2), 232–238. https://doi.org/10.1542/peds.2009-3021

Hof, M. J. (2022). *Human-AI teaming for Conformity Assessment of Welded Joints: A Human Factors Perspective*. University of Twente.

Hupont, I., Micheli, M., Delipetrev, B., Gómez, E., & Garrido, J. S. (2022a). Documenting High-Risk AI: A European Regulatory Perspective. *TechRxiv*. https://doi.org/10.36227/techrxiv.20291046

Hupont, I., Tolan, S., Gunes, H., & Gómez, E. (2022b). The landscape of facial processing applications in the context of the European AI Act and the development of trustworthy systems. *Scientific Reports*, *12*(1). https://doi.org/10.1038/s41598-022-14981-6

Ienca, M., & Andorno, R. (2017). Towards new human rights in the age of neuroscience and neurotechnology. *Life Sciences, Society and Policy*, *13*(1). https://doi.org/10.1186/s40504-017-0050-1

Kahneman, D. (2011). *Thinking, Fast and Slow.* N. Y.: Farrar, Straus and Giroux. https://doi.org/10.1007/s00362-013-0533-y

Karremans, J. C., Stroebe, W., & Claus, J. (2006). Beyond Vicary's fantasies: The impact of subliminal priming and brand choice. *Journal of Experimental Social Psychology*, *42*(6), 792–798. https://doi.org/10.1016/j.jesp.2005.12.002

Klenk, M. (2021). (Online) manipulation: sometimes hidden, always careless. *Review of Social Economy*, *80*(1), 85–105. https://doi.org/10.1080/00346764.2021.1894350

Lee, N., Broderick, A. J., & Chamberlain, L. (2007). What is 'neuromarketing'? A discussion and agenda for future research. *International Journal of Psychophysiology*, *63*(2), 199–204. https://doi.org/10.1016/j.ijpsycho.2006.03.007

Lee, N., Chamberlain, L., & Brandes, L. (2018). Welcome to the jungle! The neuromarketing literature through the eyes of a newcomer. *European Journal of Marketing*, *52*(1/2), 4–38. https://doi.org/10.1108/ejm-02-2017-0122

Lewis, D. (2013). *The Brain Sell: When Science Meets Shopping; How the new mind sciences and the persuasion industry are reading our thoughts, influencing our emotions, and stimulating us to shop*. London: Nicholas Brealey Publishing.

Lim, W. M. (2018). Demystifying neuromarketing. *Journal of Business Research*, *91*, 205–220. https://doi.org/10.1016/j.jbusres.2018.05.036

Lungu, N. (2016). The Limits and the Ethics of Consumer Profiling. In A. R. Thomas, N. Pop, A. Iorga & C. Ducu. (Eds.), *Ethics and Neuromarketing: Implications for Market Research and Business Practice* (pp. 157–169). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-45609-6_10

Marcus, S. J. (Ed.). (2002). *Neuroethics: Mapping the Field: Conference Proceedings, May 13–14, 2002, San Francisco, California*. N. Y.: Dana Press.

McNamara, A., Smith, J., & Murphy-Hill, E. (2018). Does ACM's code of ethics change ethical decision making in software development? In *Proceedings of the 2018 26th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering* (pp. 729–733). https://doi.org/10.1145/3236024.3264833

McStay, A. (2018). *Emotional AI: The Rise of Empathic Media*. SAGE Publications Ltd. https://doi.org/10.4135/9781526451293

Mesly, O. (2016). Prey positions as consumers' behavioural patterns: Exploratory evidence from an fMRI study. *Journal of Consumer Behaviour*, *16*(1), 51–62. https://doi.org/10.1002/cb.1602

Mökander, J., Axente, M., Casolari, F., & Floridi, L. (2022). Conformity Assessments and Post-market Monitoring: A Guide to the Role of Auditing in the Proposed European AI Regulation. *Minds and Machines*, *32*(2), 241–268. https://doi.org/10.1007/s11023-021-09577-4

Morin, C. (2011). Neuromarketing: The New Science of Consumer Behavior. *Society*, *48*(2), 131–135. https://doi.org/10.1007/s12115-010-9408-1

Murphy, E. R., Illes, J., & Reiner, P. B. (2008). Neuroethics of neuromarketing. *Journal of Consumer Behaviour*, *7*(4–5), 293–302. https://doi.org/10.1002/cb.252

Noggle, R. (2017). Manipulation, salience, and nudges. *Bioethics*, *32*(3), 164–170. https://doi.org/10.1111/bioe.12421

Peeler, C. L. (1996). *Cigarette testing and the Federal trade commission: a historical overview*. The FTC test method for determining tar, nicotine, and carbon monoxide yields of US cigarettes: report of the NCI Expert Committee.

Ramirez, M., Kaheh, S., & George, K. (2021). Neuromarketing Study Using Machine Learning for Predicting Purchase Decision. In *2021 IEEE 12th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON)* (pp. 0560–0564). https://doi.org/10.1109/uemcon53757.2021.9666539

Renvoise, P. & Morin, C. (2007). *Neuromarketing: Understanding the Buy Buttons in Your Customer's Brain*. HarperCollins Leadership.

Rossi, G. (2005). *Conuito morale per gli etici, economici, politici, di don Pio Rossi. Portata prima, seconda.* (In Ital.).

Rossi, G. (2006). *Il gioco delle regole* (Saggi Nuova serie, 2 Ed.). Adelphi. (In Ital.).

Royo-Vela, M., & Varga, Á. (2022). Unveiling Neuromarketing and Its Research Methodology. *Encyclopedia*, *2*(2), 729–751. https://doi.org/10.3390/encyclopedia2020051

Saad, G., & Stenstrom, E. (2012). Calories, beauty, and ovulation: The effects of the menstrual cycle on food and appearance-related consumption. *Journal of Consumer Psychology*, *22*(1), 102–113. https://doi.org/10.1016/j.jcps.2011.10.001

Sacconi, L. (1991). *Etica degli affari: individui, imprese e mercati nella prospettiva di un'etica razionale*. Milano: Saggiatore. (In Ital.).

Seminara, A. P. (2020). Libertà del consumatore e psicologia della pubblicità. *Contratto e impresa*, *1*(1), 493–526. (In Ital.).

Shaw, P., Kabani, N. J., Lerch, J. P., Eckstrand, K., Lenroot, R., Gogtay, N., Greenstein, D., Clasen, L., Evans, A., Rapoport, J. L., Giedd, J. N., & Wise, S. P. (2008). Neurodevelopmental Trajectories of the Human Cerebral Cortex. *The Journal of Neuroscience*, *28*(14), 3586–3594. https://doi.org/10.1523/jneurosci.5309-07.2008

Shiv, B., & Fedorikhin, A. (1999). Heart and Mind in Conflict: the Interplay of Affect and Cognition in Consumer Decision Making. *Journal of Consumer Research*, *26*(3), 278–292. https://doi.org/10.1086/209563

Shiv, B., Bechara, A., Levin, I., Alba, J. W., Bettman, J. R., Dube, L., Isen, A., Mellers, B., Smidts, A., Grant, S. J., & Mcgraw, A. P. (2005). Decision Neuroscience. *Marketing Letters*, *16*(3–4), 375–386. https://doi.org/10.1007/s11002-005-5899-8

Smidts, A. (2002). *Kijken in het brein: Over de mogelijkheden van neuromarketing*. Rotterdam: Erasmus University Rotterdam. (In Dutch).

Smuha, N. A., Ahmed-Rengers, E., Harkens, A., Li, W., MacLaren, J., Piselli, R., & Yeung, K. (2021). How the EU Can Achieve Legally Trustworthy AI: A Response to the European Commission's Proposal for an Artificial Intelligence Act. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3899991

Sovrano, F., Sapienza, S., Palmirani, M., & Vitali, F. (2022). Metrics, Explainability and the European AI Act Proposal. *J*, *5*(1), 126–138. https://doi.org/10.3390/j5010010

Stanton, S. J., Sinnott-Armstrong, W., & Huettel, S. A. (2016). Neuromarketing: Ethical Implications of its Use and Potential Misuse. *Journal of Business Ethics*, *144*(4), 799–811. https://doi.org/10.1007/s10551-016-3059-0

Steinberg, L. (2017). A social neuroscience perspective on adolescent risk-taking. In *Biosocial Theories of Crime* (pp. 435–463). Routledge https://doi.org/10.4324/9781315096278-19

Strycharz, J., & Duivenvoorde, B. (2021). The exploitation of vulnerability through personalised marketing communication: are consumers protected? *Internet Policy Review*, *10*(4). https://doi.org/10.14763/2021.4.1585

Stuurman, K., & Lachaud, E. (2022). Regulating AI. A label to complete the proposed Act on Artificial Intelligence. *Computer Law & Security Review*, *44*, 105657. https://doi.org/10.1016/j.clsr.2022.105657

Sunstein, C. R. (2015). Fifty Shades of Manipulation. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2565892

Susser, D., Roessler, B., & Nissenbaum, H. (2019). Technology, autonomy, and manipulation. *Internet Policy Review*, *8*(2). https://doi.org/10.14763/2019.2.1410

Thaler, R. H. (2000). From Homo Economicus to Homo Sapiens. *Journal of Economic Perspectives*, *14*(1), 133–141. https://doi.org/10.1257/jep.14.1.133

Thomas, A. R., Pop, N. A., Iorga, A. M., & Ducu, C. (Eds.). (2017). *Ethics and Neuromarketing: Implications for Market Research and Business Practice*. https://doi.org/10.1007/978-3-319-45609-6

Trevino, L. K., & Nelson, K. A. (2006). *Managing Business Ethics: Straight talk about how to do it right* (4th ed.). Wiley & Sons.

Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases. *Science*, *185*(4157), 1124–1131. https://doi.org/10.1126/science.185.4157.1124

Ulman, Y. I., Cakar, T., & Yildiz, G. (2015). Ethical Issues in Neuromarketing: "I Consume, Therefore I am!". *Science and Engineering Ethics*, *21*(5), 1271–1284. https://doi.org/10.1007/s11948-014-9581-5

van Hoorn, J., Fuligni, A. J., Crone, E. A., & Galván, A. (2016). Peer influence effects on risk-taking and prosocial decision-making in adolescence: insights from neuroimaging studies. *Current Opinion in Behavioral Sciences*, *10*, 59–64. https://doi.org/10.1016/j.cobeha.2016.05.007

Veale, M., & Zuiderveen Borgesius, F. (2021). Demystifying the Draft EU Artificial Intelligence Act – Analysing the good, the bad, and the unclear elements of the proposed approach. *Computer Law Review International*, *22*(4), 97–112. https://doi.org/10.9785/cri-2021-220402

Verhulst, N., De Keyser, A., Gustafsson, A., Shams, P., & Van Vaerenbergh, Y. (2019). Neuroscience in service research: an overview and discussion of its possibilities. *Journal of Service Management*, *30*(5), 621–649. https://doi.org/10.1108/josm-05-2019-0135

Viale, R. (2019). La razionalità limitata" embodied" alla base del cervello sociale ed economico. *Sistemi intelligenti*, *31*(1), 193–203. (In Ital.).

Vicary, J. M. (1951). How psychiatric methods can be applied to market research. *Printers' Ink*, *235*(6), 39–48.

Watson, J. B. (1994). Psychology as the behaviorist views it. *Psychological Review*, *101*(2), 248–253. https://doi.org/10.1037/0033-295x.101.2.248

Wilkinson, T. M. (2012). Nudging and Manipulation. *Political Studies*, *61*(2), 341–355. https://doi.org/10.1111/j.1467-9248.2012.00974.x

Wilson, R. M., Gaines, J., & Hill, R. P. (2008). Neuromarketing and Consumer Free Will. *Journal of Consumer Affairs*, *42*(3), 389–410. https://doi.org/10.1111/j.1745-6606.2008.00114.x

Winkielman, P., & Berridge, K. (2003). Irrational Wanting and Subrational Liking: How Rudimentary Motivational and Affective Processes Shape Preferences and Choices. *Political Psychology*, *24*(4), 657–680. https://doi.org/10.1046/j.1467-9221.2003.00346.x

Wood, A. (2016). Unjust Exploitation. *The Southern Journal of Philosophy*, *54*(S1), 92–108. https://doi.org/10.1111/sjp.12187

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, *35*(2), 151–175. https://doi.org/10.1037/0003-066x.35.2.151

Zajonc, R. B. (1998). Emotions. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (pp. 591–632). New York: McGraw-Hill.

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Влияние новых технологий на экономическое поведение и свободу выбора потребителя: от нейромаркетинга к нейроправам

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Ключевые слова

биотехнологии,
европейское право,
защита прав потребителей,
искусственный интеллект,
нейромаркетинг,
нейроправа,
нейроэтика,
свобода выбора,
право,
цифровые технологии

Аннотация

Цель: выявить возможности адекватного ответа существующего правового режима на различные вызовы, которые системы искусственного интеллекта, лежащие в основе методов нейромаркетинга, ставят перед европейским правом.

Методы: исследование основано на риск-ориентированном подходе, формально-логическом, формально-юридическом и сравнительно-правовом методах, а также на методе правового прогнозирования, позволяющих выявить проблемы законодательства, обусловленные развитием технологий, способных распознавать человеческие эмоции и использовать их для управления поведением потребителей, и предложить пути их решения.

Результаты: в проведенном исследовании представлен краткий обзор наиболее широко распространенных методов нейромаркетинга, используемых алгоритмами и машинным обучением, позволяющим выявить точки когнитивной и эмоциональной уязвимости, собрать и обработать данные, а затем выстроить наиболее эффективные маркетинговые приемы, подталкивающие потребителя к выбору определенного товара или услуги. Проанализированы этические проблемы, возникающие при использовании методов нейромаркетинга в отношении некоторых базовых ценностей, таких как индивидуальная независимость, человеческое достоинство и свобода выбора. Показана тонкая грань между приемами, манипулирующими поведением потребителя (метод манипуляции), и теми приемами, которые, напротив, оказывают убеждающее воздействие, что само по себе не делает их противозаконными (метод убеждения). Представлен обзор существующей правовой базы, а также прецедентного права как Европейского суда, так и национальных судов государств-участников, с особым упором на Директиву о недобросовестной коммерческой практике, Общий регламент ЕС по защите персональных данных (жесткое право) и этические кодексы (мягкое право).

Научная новизна: в работе отмечается трансформация традиционных правовых категорий и важные проблемные точки существующего регулирования, обусловленные ростом признания потенциала нейромаркетинга как инструмента, способного объяснить и спрогнозировать поведение потребителей, а также воздействовать на экономическое поведение субъектов отношений.

Практическая значимость: полученные выводы и предложения могут быть учтены при совершенствовании регулирования искусственного интеллекта в части его безопасности и надежности, повышения доверия к системе, с учетом обеспечения защиты этических принципов и сохранения фундаментальных человеческих ценностей.

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Список литературы

Abbamonte, G. B. (2007). The Unfair Commercial Practices Directive and its General Prohibition. In S. Weatherill & U. Bernitz (Eds.), *The Regulation of Unfair Commercial Practices under EC Directive 2005/29: New Rules and New Techniques* (pp. 11–32). https://doi.org/10.5040/9781472560001.ch-002

Alexander, V., Tripp, S., & Zak, P. J. (2015). Preliminary evidence for the neurophysiologic effects of online coupons: Changes in oxytocin, stress, and mood. *Psychology & Marketing*, *32*(9), 977–986. https://doi.org/10.1002/mar.20831

Alì, G. S., & Yu, R. (2021). Artificial intelligence between transparency and secrecy: from the EC whitepaper to the AIA and beyond. *European Journal of Law and Technology*, *12*(3).

Alpa, G., & Catricala, A. (Eds.) (2016). *Diritto dei consumatori*. Il Mulino. (In Ital.).

Ariely, D., & Berns, G. S. (2010). Neuromarketing: the hope and hype of neuroimaging in business. *Nature Reviews Neuroscience*, *11*(4), 284–292. https://doi.org/10.1038/nrn2795

Barnett, S., & Cerf, M. (2015). Connecting on Movie Night? Neural Measures of Engagement Differ By Gender. *Advances in Consumer Research*, *43*, 314–318.

Barnhill, A. (2014). What Is Manipulation? In C. Coons & M. Weber (Eds.), *Manipulation: Theory and Practice* (pp. 51–72). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199338207.003.0003

Bault, N., & Rusconi, E. (2020). The Art of Influencing Consumer Choices: A Reflection on Recent Advances in Decision Neuroscience. *Frontiers in Psychology,* 10. https://doi.org/10.3389/fpsyg.2019.03009

Bauman, Z. (2010). *Consumo, dunque sono*. Roma-Bari: Laterza. (In Ital.).

Bechara, A., & Damasio, A. R. (2005). The somatic marker hypothesis: A neural theory of economic decision. *Games and Economic Behavior*, *52*(2), 336–372. https://doi.org/10.1016/j.geb.2004.06.010

Bellman, S., Nenycz-Thiel, M., Kennedy, R., Larguinat, L., McColl, B., & Varan, D. (2016). What Makes a Television Commercial Sell? Using Biometrics to Identify Successful Ads. *Journal of Advertising Research*, *57*(1), 53–66. https://doi.org/10.2501/jar-2016-051

Bercea, M. D. (2012). Anatomy of methodologies for measuring consumer behavior in neuromarketing research. In *Proceedings of the Lupcon Center for Business Research (LCBR) European Marketing Conference*. Ebermannstadt, Germany.

Camerer, C., Loewenstein, G., & Prelec, D. (2005). Neuroeconomics: How Neuroscience Can Inform Economics. *Journal of Economic Literature*, *43*(1), 9–64. https://doi.org/10.1257/0022051053737843

Casey, B. J., Getz, S., & Galvan, A. (2008). The adolescent brain. *Developmental Review*, *28*(1), 62–77. https://doi.org/10.1016/j.dr.2007.08.003

Cave, E. M. (2014). Unsavory Seduction and Manipulation. In C. Coons & M. Weber (Eds.), *Manipulation: Theory and Practice* (pp. 176–200). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199338207.003.0009

Cenizo, C. (2022). Neuromarketing: concept, historical evolution and challenges. *Icono 14*, *20*(1). https://doi.org/10.7195/ri14.v20i1.1784

Cerf, M., Greenleaf, E., Meyvis, T., & Morwitz, V. G. (2015). Using Single-Neuron Recording in Marketing: Opportunities, Challenges, and an Application to Fear Enhancement in Communications. *Journal of Marketing Research*, *52*(4), 530–545. https://doi.org/10.1509/jmr.13.0606

Ceschi, A., Sartori, R., Rubaltelli, E., & Weller, J. (2012). Un approccio empirico per una tassonomia dei bias cognitivi. In *1992–2012: Psicologia, Scienza, Società – Congresso Nazionale delle Sezioni dell'Associazione Italiana di Psicologia.* Chieti. 20-23 Settembre. 2012 (In Ital.).

Cherubino, P., Martinez-Levy, A. C., Caratù, M., Cartocci, G., Di Flumeri, G., Modica, E., Rossi, D., Mancini, M., & Trettel, A. (2019). Consumer Behaviour through the Eyes of Neurophysiological Measures: State-of-the-Art and Future Trends. *Computational Intelligence and Neuroscience*, 1–41. https://doi.org/10.1155/2019/1976847

Clark, K. R. (2017). Dealing with the Devils: The Responsibility of Neuromarketing Practitioners in Conducting Research for Ethically Questionable Client Agendas. In A. R. Thomas, N. Pop, A. Iorga, C. Ducu. (Eds.), *Ethics and Neuromarketing: Implications for Market Research and Business Practice* (pp. 147–156). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-45609-6_9

Damasio, A. (1994). *Descartes' Error: Emotion, Reason and the Human Brain*. New York: Avon book.

De Cooman, J. (2022). Humpty dumpty and high-risk AI systems: the ratione materiae dimension of the proposal for an EU artificial intelligence act. *Market and Competition Law Review*, *6*(1), 49. https://doi.org/10.34632/mclawreview.2022.11304

Dierichsweiler, K. L. A. (2014). Ethical Issues in Neuromarketing. *In 3rd tIBA Bachelor Thesis Conference, July 3rd, 2014* (pp. 1–14). Enschede, The Netherlands.

Duivenvoorde, B. B. (2015). *The Consumer Benchmarks in the Unfair Commercial Practices Directive*. Springer International Publishing. https://doi.org/10.1007/978-3-319-13924-1

Durante, K. M., & Arsena, A. R. (2015). Playing the Field: The Effect of Fertility on Women's Desire for Variety. *Journal of Consumer Research*, *41*(6), 1372–1391. https://doi.org/10.1086/679652

Durante, K. M., Griskevicius, V., Hill, S. E., Perilloux, C., & Li, N. P. (2011). Ovulation, Female Competition, and Product Choice: Hormonal Influences on Consumer Behavior. *Journal of Consumer Research*, *37*(6), 921–934. https://doi.org/10.1086/656575

Ebers, M. (2021). Standardizing AI – The Case of the European Commission's Proposal for an Artificial Intelligence Act. *The Cambridge Handbook of Artificial Intelligence: Global Perspectives on Law and Ethics*. http://doi.org/10.2139/ssrn.3900378

Ebers, M., Hoch, V. R. S., Rosenkranz, F., Ruschemeier, H., & Steinrötter, B. (2021). The European Commission's Proposal for an Artificial Intelligence Act – A Critical Assessment by Members of the Robotics and AI Law Society (RAILS). *J*, *4*(4), 589–603. https://doi.org/10.3390/j4040043

Ekman, P. (2004). *Emotions Revealed: Recognizing Faces and Feelings to Improve Communication and Emotional Life*. New York: Henry Holt and Company.

Ekman, P., & Friesen, W. V. (1978). Facial action coding system: a technique for the measurement of facial movement. Facial Action Coding System [dataset]. In *PsycTESTS Dataset. American Psychological Association (APA)*. https://doi.org/10.1037/t27734-000

Fabris, G., (2003). *Il nuovo consumatore: verso il postmoderno*. Franco Angeli. (In Ital.).

Fineman, M. A. (2008). The Vulnerable Subject: Anchoring Equality in the Human Condition. *Yale Journal of Law & Feminism*, *20*(1).

Fisher, C. E., Chin, L., & Klitzman, R. (2010). Defining Neuromarketing: Practices and Professional Challenges. *Harvard Review of Psychiatry*, *18*(4), 230–237. https://doi.org/10.3109/10673229.2010.496623

Fusi, M., & Testa P. (2006). *Diritto e pubblicità*. Milano: Lupetti. (In Ital.).

Galvan, A., Hare, T. A., Parra, C. E., Penn, J., Voss, H., Glover, G., & Casey, B. J. (2006). Earlier Development of the Accumbens Relative to Orbitofrontal Cortex Might Underlie Risk-Taking Behavior in Adolescents. *Journal of Neuroscience*, *26*(25), 6885–6892. https://doi.org/10.1523/jneurosci.1062-06.2006

Garvey, J. (2016). *The Persuaders: The Hidden Industry That Wants to Change Your Mind*. London: Icon Books, Limited.

Gillon, R. (1985). Autonomy and the principle of respect for autonomy. *BMJ*, *290*(6484), 1806–1808. https://doi.org/10.1136/bmj.290.6484.1806

Gogtay, N., Giedd, J. N., Lusk, L., Hayashi, K. M., Greenstein, D., Vaituzis, A. C., Nugent, T. F., Herman, D. H., Clasen, L. S., Toga, A. W., Rapoport, J. L., & Thompson, P. M. (2004). Dynamic mapping of human cortical development during childhood through early adulthood. *Proceedings of the National Academy of Sciences*, *101*(21), 8174–8179. https://doi.org/10.1073/pnas.0402680101

Grant, R. W. (2011). *Strings Attached: Untangling the Ethics of Incentives*. Princeton: Princeton University Press. https://doi.org/10.23943/princeton/9780691151601.001.0001

Hagendorff, T. (2020). The Ethics of AI Ethics: An Evaluation of Guidelines. *Minds and Machines*, *30*(1), 99–120. https://doi.org/10.1007/s11023-020-09517-8

Haggard, P. (2011). Neuroethics of Free Will. In J. Illes & B. J. Sahakian (Eds.), *Oxford Handbook of Neuroethics* (p. 219). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199570706.013.0058

Hare, T. A., O'Doherty, J., Camerer, C. F., Schultz, W., & Rangel, A. (2008). Dissociating the Role of the Orbitofrontal Cortex and the Striatum in the Computation of Goal Values and Prediction Errors. *The Journal of Neuroscience*, *28*(22), 5623–5630. https://doi.org/10.1523/jneurosci.1309-08.2008

Hedgcock, W. M., Vohs, K. D., & Rao, A. R. (2012). Reducing self-control depletion effects through enhanced sensitivity to implementation: Evidence from fMRI and behavioral studies. *Journal of Consumer Psychology*, *22*(4), 486–495. Portico. https://doi.org/10.1016/j.jcps.2012.05.008

Henriksen, L., Schleicher, N. C., Feighery, E. C., & Fortmann, S. P. (2010). A Longitudinal Study of Exposure to Retail Cigarette Advertising and Smoking Initiation. *Pediatrics*, *126*(2), 232–238. https://doi.org/10.1542/peds.2009-3021

Hof, M. J. (2022). *Human-AI teaming for Conformity Assessment of Welded Joints: A Human Factors Perspective*. University of Twente.

Hupont, I., Micheli, M., Delipetrev, B., Gómez, E., & Garrido, J. S. (2022a). Documenting High-Risk AI: A European Regulatory Perspective. *TechRxiv*. https://doi.org/10.36227/techrxiv.20291046

Hupont, I., Tolan, S., Gunes, H., & Gómez, E. (2022b). The landscape of facial processing applications in the context of the European AI Act and the development of trustworthy systems. *Scientific Reports*, *12*(1). https://doi.org/10.1038/s41598-022-14981-6

Ienca, M., & Andorno, R. (2017). Towards new human rights in the age of neuroscience and neurotechnology. *Life Sciences, Society and Policy*, *13*(1). https://doi.org/10.1186/s40504-017-0050-1

Kahneman, D. (2011). *Thinking, Fast and Slow.* N. Y.: Farrar, Straus and Giroux. https://doi.org/10.1007/s00362-013-0533-y

Karremans, J. C., Stroebe, W., & Claus, J. (2006). Beyond Vicary's fantasies: The impact of subliminal priming and brand choice. *Journal of Experimental Social Psychology*, *42*(6), 792–798. https://doi.org/10.1016/j.jesp.2005.12.002

Klenk, M. (2021). (Online) manipulation: sometimes hidden, always careless. *Review of Social Economy*, *80*(1), 85–105. https://doi.org/10.1080/00346764.2021.1894350

Lee, N., Broderick, A. J., & Chamberlain, L. (2007). What is 'neuromarketing'? A discussion and agenda for future research. *International Journal of Psychophysiology*, *63*(2), 199–204. https://doi.org/10.1016/j.ijpsycho.2006.03.007

Lee, N., Chamberlain, L., & Brandes, L. (2018). Welcome to the jungle! The neuromarketing literature through the eyes of a newcomer. *European Journal of Marketing*, *52*(1/2), 4–38. https://doi.org/10.1108/ejm-02-2017-0122

Lewis, D. (2013). *The Brain Sell: When Science Meets Shopping; How the new mind sciences and the persuasion industry are reading our thoughts, influencing our emotions, and stimulating us to shop*. London: Nicholas Brealey Publishing.

Lim, W. M. (2018). Demystifying neuromarketing. *Journal of Business Research*, *91*, 205–220. https://doi.org/10.1016/j.jbusres.2018.05.036

Lungu, N. (2016). The Limits and the Ethics of Consumer Profiling. In A. R. Thomas, N. Pop, A. Iorga & C. Ducu. (Eds.), *Ethics and Neuromarketing: Implications for Market Research and Business Practice* (pp. 157–169). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-45609-6_10

Marcus, S. J. (Ed.). (2002). *Neuroethics: Mapping the Field: Conference Proceedings, May 13–14, 2002, San Francisco, California*. N. Y.: Dana Press.

McNamara, A., Smith, J., & Murphy-Hill, E. (2018). Does ACM's code of ethics change ethical decision making in software development? In *Proceedings of the 2018 26th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering* (pp. 729–733). https://doi.org/10.1145/3236024.3264833

McStay, A. (2018). *Emotional AI: The Rise of Empathic Media*. SAGE Publications Ltd. https://doi.org/10.4135/9781526451293

Mesly, O. (2016). Prey positions as consumers' behavioural patterns: Exploratory evidence from an fMRI study. *Journal of Consumer Behaviour*, *16*(1), 51–62. https://doi.org/10.1002/cb.1602

Mökander, J., Axente, M., Casolari, F., & Floridi, L. (2022). Conformity Assessments and Post-market Monitoring: A Guide to the Role of Auditing in the Proposed European AI Regulation. *Minds and Machines*, *32*(2), 241–268. https://doi.org/10.1007/s11023-021-09577-4

Morin, C. (2011). Neuromarketing: The New Science of Consumer Behavior. *Society*, *48*(2), 131–135. https://doi.org/10.1007/s12115-010-9408-1

Murphy, E. R., Illes, J., & Reiner, P. B. (2008). Neuroethics of neuromarketing. *Journal of Consumer Behaviour*, *7*(4–5), 293–302. https://doi.org/10.1002/cb.252

Noggle, R. (2017). Manipulation, salience, and nudges. *Bioethics*, *32*(3), 164–170. https://doi.org/10.1111/bioe.12421

Peeler, C. L. (1996). *Cigarette testing and the Federal trade commission: a historical overview*. The FTC test method for determining tar, nicotine, and carbon monoxide yields of US cigarettes: report of the NCI Expert Committee.

Ramirez, M., Kaheh, S., & George, K. (2021). Neuromarketing Study Using Machine Learning for Predicting Purchase Decision. In *2021 IEEE 12th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON)* (pp. 0560–0564). https://doi.org/10.1109/uemcon53757.2021.9666539

Renvoise, P. & Morin, C. (2007). *Neuromarketing: Understanding the Buy Buttons in Your Customer's Brain*. HarperCollins Leadership.

Rossi, G. (2005). *Conuito morale per gli etici, economici, politici, di don Pio Rossi. Portata prima, seconda.* (In Ital.).

Rossi, G. (2006). *Il gioco delle regole* (Saggi Nuova serie, 2 Ed.). Adelphi. (In Ital.).

Royo-Vela, M., & Varga, Á. (2022). Unveiling Neuromarketing and Its Research Methodology. *Encyclopedia*, *2*(2), 729–751. https://doi.org/10.3390/encyclopedia2020051

Saad, G., & Stenstrom, E. (2012). Calories, beauty, and ovulation: The effects of the menstrual cycle on food and appearance-related consumption. *Journal of Consumer Psychology*, *22*(1), 102–113. https://doi.org/10.1016/j.jcps.2011.10.001

Sacconi, L. (1991). *Etica degli affari: individui, imprese e mercati nella prospettiva di un'etica razionale.* Milano: Saggiatore. (In Ital.).

Seminara, A. P. (2020). Libertà del consumatore e psicologia della pubblicità. *Contratto e impresa*, *1*(1), 493–526. (In Ital.).

Shaw, P., Kabani, N. J., Lerch, J. P., Eckstrand, K., Lenroot, R., Gogtay, N., Greenstein, D., Clasen, L., Evans, A., Rapoport, J. L., Giedd, J. N., & Wise, S. P. (2008). Neurodevelopmental Trajectories of the Human Cerebral Cortex. *The Journal of Neuroscience*, *28*(14), 3586–3594. https://doi.org/10.1523/jneurosci.5309-07.2008

Shiv, B., & Fedorikhin, A. (1999). Heart and Mind in Conflict: the Interplay of Affect and Cognition in Consumer Decision Making. *Journal of Consumer Research*, *26*(3), 278–292. https://doi.org/10.1086/209563

Shiv, B., Bechara, A., Levin, I., Alba, J. W., Bettman, J. R., Dube, L., Isen, A., Mellers, B., Smidts, A., Grant, S. J., & Mcgraw, A. P. (2005). Decision Neuroscience. *Marketing Letters*, *16*(3–4), 375–386. https://doi.org/10.1007/s11002-005-5899-8

Smidts, A. (2002). *Kijken in het brein: Over de mogelijkheden van neuromarketing*. Rotterdam: Erasmus University Rotterdam. (In Dutch).

Smuha, N. A., Ahmed-Rengers, E., Harkens, A., Li, W., MacLaren, J., Piselli, R., & Yeung, K. (2021). How the EU Can Achieve Legally Trustworthy AI: A Response to the European Commission's Proposal for an Artificial Intelligence Act. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3899991

Sovrano, F., Sapienza, S., Palmirani, M., & Vitali, F. (2022). Metrics, Explainability and the European AI Act Proposal. *J*, *5*(1), 126–138. https://doi.org/10.3390/j5010010

Stanton, S. J., Sinnott-Armstrong, W., & Huettel, S. A. (2016). Neuromarketing: Ethical Implications of its Use and Potential Misuse. *Journal of Business Ethics*, *144*(4), 799–811. https://doi.org/10.1007/s10551-016-3059-0

Steinberg, L. (2017). A social neuroscience perspective on adolescent risk-taking. In *Biosocial Theories of Crime* (pp. 435–463). Routledge https://doi.org/10.4324/9781315096278-19

Strycharz, J., & Duivenvoorde, B. (2021). The exploitation of vulnerability through personalised marketing communication: are consumers protected? *Internet Policy Review*, *10*(4). https://doi.org/10.14763/2021.4.1585

Stuurman, K., & Lachaud, E. (2022). Regulating AI. A label to complete the proposed Act on Artificial Intelligence. *Computer Law & Security Review*, *44*, 105657. https://doi.org/10.1016/j.clsr.2022.105657

Sunstein, C. R. (2015). Fifty Shades of Manipulation. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2565892

Susser, D., Roessler, B., & Nissenbaum, H. (2019). Technology, autonomy, and manipulation. *Internet Policy Review*, *8*(2). https://doi.org/10.14763/2019.2.1410

Thaler, R. H. (2000). From Homo Economicus to Homo Sapiens. *Journal of Economic Perspectives*, *14*(1), 133–141. https://doi.org/10.1257/jep.14.1.133

Thomas, A. R., Pop, N. A., Iorga, A. M., & Ducu, C. (Eds.). (2017). *Ethics and Neuromarketing: Implications for Market Research and Business Practice*. https://doi.org/10.1007/978-3-319-45609-6

Trevino, L. K., & Nelson, K. A. (2006). *Managing Business Ethics: Straight talk about how to do it right* (4th ed.). Wiley & Sons.

Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases. *Science*, *185*(4157), 1124–1131. https://doi.org/10.1126/science.185.4157.1124

Ulman, Y. I., Cakar, T., & Yildiz, G. (2015). Ethical Issues in Neuromarketing: "I Consume, Therefore I am!". *Science and Engineering Ethics*, *21*(5), 1271–1284. https://doi.org/10.1007/s11948-014-9581-5

van Hoorn, J., Fuligni, A. J., Crone, E. A., & Galván, A. (2016). Peer influence effects on risk-taking and prosocial decision-making in adolescence: insights from neuroimaging studies. *Current Opinion in Behavioral Sciences*, *10*, 59–64. https://doi.org/10.1016/j.cobeha.2016.05.007

Veale, M., & Zuiderveen Borgesius, F. (2021). Demystifying the Draft EU Artificial Intelligence Act – Analysing the good, the bad, and the unclear elements of the proposed approach. *Computer Law Review International*, *22*(4), 97–112. https://doi.org/10.9785/cri-2021-220402

Verhulst, N., De Keyser, A., Gustafsson, A., Shams, P., & Van Vaerenbergh, Y. (2019). Neuroscience in service research: an overview and discussion of its possibilities. *Journal of Service Management*, *30*(5), 621–649. https://doi.org/10.1108/josm-05-2019-0135

Viale, R. (2019). La razionalità limitata" embodied" alla base del cervello sociale ed economico. *Sistemi intelligenti*, *31*(1), 193–203. (In Ital.).

Vicary, J. M. (1951). How psychiatric methods can be applied to market research. *Printers' Ink*, *235*(6), 39–48.

Watson, J. B. (1994). Psychology as the behaviorist views it. *Psychological Review*, *101*(2), 248–253. https://doi.org/10.1037/0033-295x.101.2.248

Wilkinson, T. M. (2012). Nudging and Manipulation. *Political Studies*, *61*(2), 341–355. https://doi.org/10.1111/j.1467-9248.2012.00974.x

Wilson, R. M., Gaines, J., & Hill, R. P. (2008). Neuromarketing and Consumer Free Will. *Journal of Consumer Affairs*, *42*(3), 389–410. https://doi.org/10.1111/j.1745-6606.2008.00114.x

Winkielman, P., & Berridge, K. (2003). Irrational Wanting and Subrational Liking: How Rudimentary Motivational and Affective Processes Shape Preferences and Choices. *Political Psychology*, *24*(4), 657–680. https://doi.org/10.1046/j.1467-9221.2003.00346.x

Wood, A. (2016). Unjust Exploitation. *The Southern Journal of Philosophy*, *54*(S1), 92–108. https://doi.org/10.1111/sjp.12187

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, *35*(2), 151–175. https://doi.org/10.1037/0003-066x.35.2.151

Zajonc, R. B. (1998). Emotions. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (pp. 591–632). New York: McGraw-Hill.

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