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Review

The contribution of neuroscience to consumer research: A conceptual framework and empirical review

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ABSTRACT

Following the development of advanced neuroimaging techniques, the growing interest in studying the brain's response to marketing stimuli resulted in the birth of consumer neuroscience within the field of neuroeconomics. However, marketing scholars have remained reluctant to adopt the techniques of neuroscience and there is still uncertainty about the capacity of neuroimaging data to provide useful findings about consumer psychology and behaviour. In order to clarify the current scope and contribution of consumer neuroscience, we first develop a semantic cluster analysis of the boundaries of the field, followed by a comprehensive empirical review from 34 selected studies. We propose a novel approach to classify findings and facilitate the assessment of evidence around the topics of decision-making, rewards, memory and emotions. Finally, we discuss the possible role of several brain mechanisms in the processing of marketing stimuli as well as obstacles to the integration of these findings with classical consumer behaviour theories. We conclude that the contribution of neuroimaging remains too limited to replace existing consumer research techniques and provide recommendations for future research.

Contents

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1. Introduction

The concept of applying neuroscientific techniques to the study of consumers' emotional and cognitive responses has sparked growing interest in recent years. In fact, the use of psychophysiological techniques is not new in consumer research since pupillary dilation and electrodermal response measures have been applied since the 1960s, later followed by eye-tracking and heart rate (Wang & Minor, 2008). Likewise, electroencephalography started to be used in marketing-related studies in the early 1970s (e.g. Krugman, 1971). The measurement of electrical brain waves has also focused on analysing the amplitude and peak latency of P300, a positive potential that is emitted by the brain when a significant or relevant stimulus is recognised, which can inform about cognitive responses such as working memory (Ma, Wang, Shu, & Dai, 2008).

However, these initial approaches have not been able to fully meet expectations due to methodological issues such as the difficulties to evaluate the valence of consumers' reactions (Kenning, Plassmann, & Ahlert, 2007). Therefore, it is not until further technology developments and the emergence of advanced imaging techniques that the application of neuroscience to the study of consumer behaviour took off. In particular, functional magnetic resonance imaging (see Section 3.1) has allowed the observation of the specific components of the brain's functional architecture activated in response to marketing stimuli (Erk, Spitzer, Wunderlich, Galley, & Walter, 2002). This resulted in the birth of a new interdisciplinary field commonly referred to as "consumer neuroscience". Professor Ale Smidts is known as the first to name the use of neuroscientific techniques by the marketing discipline in 2002. As opposed to the original term of "neuromarketing", the name of "consumer neuroscience" was qualified as more appropriate (Hubert, 2010) while "neuromarketing" was defined as the practical implementation of the knowledge brought by consumer neuroscience for managerial purposes (Hubert & Kenning, 2008). As a subfield of neuroeconomics, consumer neuroscience is "the study of the neural conditions and processes that underlie consumption, their psychological meaning, and their behavioural consequences" (Reimann, Schilke, Weber, Neuhaus, & Zaichkowsky, 2011, p. 610). By focusing on those brain mechanisms involved in consumers' decision-making processes, consumer neuroscience is part of the wide spectrum of research carried out within the broader field of decision neuroscience, which has generated a variety of issues and interests in recent years (Hansen, Kenning, & Plassmann, 2010; e.g. Jamison & Wegener, 2010; Moreira, Matsushita, & Da Silva, 2010; Ramsøy & Skov, 2010).

Several advantages of neuroimaging might explain its apparent attractiveness for applications in consumer research. Most importantly, neuroscientific methods can enable to identify the underlying processes responsible for the behaviour of interest, as similar behaviours may result from different psychological processes (Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003). In particular, neuroscience could help to understand the role of inner emotional responses, which may play an important part in the economic decision-making process as illustrated in Sanfey et al. (2003). In this aim, neuroscientific techniques provide *objective* physiological data, since subjects cannot or very little influence these measurements (Camerer, Loewenstein, & Prelec, 2005), as opposed to self-report respondents who may not accurately assess their preferences and decisions (Petty & Cacioppo, 1983) due to, for example, the tendency to provide socially accepted answers (Nighswonger & Martin, 1981). In addition, neuroimaging enables to *simultaneously* track consumers' neural responses at the same time as the marketing stimulus of interest is processed, thus eliminating the risk of recall bias commonly associated with self-report measures (Sudman & Bradburn, 1973). Altogether, this has raised an initial hope in the literature that neuroimaging data could help to explain what is happening inside the "black box" (Fugate, 2007), a classical notion that posits that consumers' minds remain unobservable to researchers (Engel, Kollat, & Blackwell, 1968; Howard & Sheth, 1969; Nicosia, 1966).

However, the future capacity of modern neuroimaging technologies to be more effective in answering this question than older psychophysiological approaches is still uncertain. Despite the growing number of empirical studies in recent years, there is continuing scepticism on whether neuroscience methods could indeed bring useful findings to consumer research and, in general, enable better predictions of economic behaviour (Addie, 2011; Camerer, 2007; Lee, Broderick, & Chamberlain, 2007). In parallel, the difficulty for economic and marketing scholars to adopt the specialised techniques and knowledge