

## Brain in Business: The Economics of Neuroscience

Zainal Ariffin AHMAD

*Business Research for Applied Innovations in  
Neurosciences (BRAIN) Lab, Graduate School of  
Business, Universiti Sains Malaysia,  
11800 Minden, Penang, Malaysia*



As a business educator, I am enthralled with the recent advancements by scientists who integrated neuroscience (the study of the anatomy and physiology of the brain) and psychology (the study of the human mind and human behaviour). Such convergence has given birth to a plethora of new interdisciplinary business fields with neuro-prefix such as neuroeconomics, neuromarketing, neuroaccounting, neurogovernance, neuroethics, and neuroleadership. Such an exotic union of science and the arts may provide better understanding of human nature and behaviour change. Imaging technologies such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) reveal unseen neural connections in the living human brain along with brain wave analysis technologies such as quantitative electroencephalography (QEEG). We can even theoretically link the brain (the physical organ) with the mind (the human consciousness that thinks, feels, acts, and perceives) through an advanced computer to analyse these connections. As economists and business people always strive for better, faster, cheaper means of production, and demand higher productivity from their employees through effective leadership and supervision, neuroscience is relied upon to provide answers to questions like:

- How can we leverage our brain in business?
- Capitalise/invest on the brain?
- Make the best decision?
- Find the productivity “hot buttons” in the brain?
- Encourage creative and ethical brain?

Such questions give rise to exciting symbiotic developments of business and neuroscience.

**Neuroeconomics** as an emerging discipline combines neuroscience, economics, and psychology; and uses research methods from cognitive neuroscience and experimental economics. It is “the application of neuroscientific methods to analyse and understand economically relevant behaviour” (1). such as evaluating

decisions, categorising risks and rewards, and interactions among economic agents. Neuroeconomics research draws on the convergence of three major trends. First, using fMRI we can measure brain activity associated with discrete cognitive events and study higher cognitive processes like decision making and reward evaluation. Second, by incorporating economic variables into electrophysiological experiments, we can encode motivationally relevant information through novel recognition of neurons at multiple levels of processing pathways. Third, neuroeconomics draws on behavioural economics to consider psychological variables into economic and decision-making models.

**Neuroaccounting** is a new way to scientifically view accounting and the brain’s central role in building economic institutions. The measure of brain activity during economic decision-making using neuroscientific methods can prove useful for evaluating the desirability of implementing new policies that run contrary to long-established accounting principles (2). Dickhaut et al. (3) reviewed neuroscientific evidence that suggest the emergence of modern accounting principles based on the mapping of brain function to the principles of modern accounting.

**Neuromarketing** is the application of neuroscientific methods to analyse and understand human behaviour in relation to markets and marketing exchanges. Applying neuroscience to marketing may form a basis for understanding how human beings create, store, recall, and relate to information such as brands in everyday life. Neuromarketers now use cognitive neuroscience in marketing research that bears implications for

understanding organisational behaviour in a social context (4), for example whether certain aspects of advertisements and marketing activities trigger negative effects such as overconsumption. Going beyond focus groups in traditional advertising methods, we can now use EEG to detect putative “branding moments” within TV commercials and apply brain imaging to discover the “buy button” (5). In notable research emerging from Stanford University, Carnegie Mellon University and the Massachusetts Institute of Technology, scientists are using fMRI to identify parts of the brain that influence buying decisions.

**Neuroethics** is the investigation of altruism in neuroeconomic research, which suggests that cooperation is linked to activation of reward areas (5). Investigations into such problems could in fact be among the most compelling within neuromarketing. As a new field, it has triggered heated debate and questioned the ethics behind neuromarketing in a 2004 editorial of *Nature Neuroscience*. Now that we have identified certain key regions of the brain that would be implicated in consumer preferences, it may be possible for marketers to “manipulate” their advertisements and target the brain areas that mediate reward processing. One example is the perennial war of the colas (Coca-Cola vs. Pepsi-Cola) whereby studies indicate that Coca-Cola had a more efficient advertising campaign (6). Similar studies were done on the attractiveness of cars or human faces, and how they trigger or activate these “pleasure centres” in the brain that drive social behaviour. As for the marketers themselves, the neuroethical question that arises is whether there is any difference between the brain activity of highly ethical and less ethical salespeople?

Neuroscience has the potential to influence corporate governance; the study of this phenomenon is **neurogovernance**. Neurogovernance is a growing field. In Germany, we now have the Institute for Corporate Governance (ICG Germany) (<http://web.dmz.uni-wh.de/icg/Forschung.html>). Further, since 2001, the Malaysian Code on Corporate Governance has been published by the Malaysian Institute of Corporate Governance (7). Neurogovernance seeks to explain behaviours of directors, auditors, or even those who breach corporate governance. The same explanations can be applied to managers, leaders, and other business people or other professions. For example at Emory, researchers asked 16 executives to respond to PowerPoint slides concerning moral quandaries, such as acting on privileged information, while inside an MRI machine. They found that managers

weighing ethical dilemmas use the part of their brain associated with early memories, which could mean moral thinking is formed early in life. (8).

Stepping away from economics and business sub-disciplines like marketing and accounting, a more recent development is **neuroleadership**, a term coined in 2006 by David Rock, a leadership consultant. Neuroleadership is the study of leadership through the lens of neuroscience and explores central elements of leadership, including: (a) self-awareness (b) awareness of others, (c) insight, (d) decision making, and (e) influencing (9). As a new field of study, neuroleadership brings neuroscientific knowledge into the area of leadership development, management training, education, consulting and coaching. Rock and his collaborator Jeffrey M. Schwartz, a research psychiatrist at the University of California at Los Angeles, apply broader themes from neuroscience to leadership that suggest mindful, focused attention on new management practices, rather than on old habits, can rewire the brain. Another way of applying neuroscience is mapping the individual managers’ brains. In “The Leadership Neuroscience Project”, Pierre A. Balthazard and David A. Waldman from the Arizona State University School of Global Management & Leadership work with neuroscientists to monitor the brains of 44 business leaders while they discussed scenarios such as layoffs. Balthazard seeks to identify brain patterns, and then train managers to replicate the patterns within their own brains (10).

At Universiti Sains Malaysia, we are interested in the study neuroleadership from the perspectives of transformational neuroleadership based on Bass (11) and Burns (12). Unlike transactional leadership, which focuses on exchange that motivates followers by providing rewards and benefits for productivity, transformational leaders make decision based on cognitive rewards, provide a climate of trust, and draw out followers’ higher order needs to perform beyond expectations. Transformational leaders inspire their followers to make decision that transcend self-interests. Can neuroimaging show how transformational versus transactional managers make decision (13)?

The symbiotic development of neuroscience in business is not without challenges. Of primary concern for business researchers in developing countries is the access to EEG and fMRI since these types of equipment are usually in the domain of neuroscientists from the medical faculty. One strategy to overcome this dilemma is

to use interdisciplinary research teams. Another challenge is that the design of experiments required by these projects, which may not agree well with the scientific methods in business—especially in the interpretation of data of the neuroimages for which business researchers have no expertise. Whereas business research and scientific research uphold high ethical standards, the use of neuroscientific methods involving human subjects raises strict ethical issues to which business researchers are unaccustomed. As an academic exercise, after conducting research, interdisciplinary issues arise about where to publish and who to supervise pseudo-science or pseudo-arts candidates.

In conclusion, I am moved by the simple argument by Renvoise and Morin (13) about brain and marketing that captured the essence of brain in business:

The new brain thinks. It processes rational data.

The middle brain feels. It processes emotions and gut feelings.

The old brain decides. It takes into account the input from the other two brains, but the old brain is the actual trigger of decision.

## Correspondence

Associate Professor Dr Zainal Ariffin Ahmad  
BSc (Northern Illinois), MBA, EdD  
Business Research for Applied Innovations in  
Neurosciences (BRAIN) Lab  
Graduate School of Business  
3rd Floor, Hamzah Sendut Library 2  
Universiti Sains Malaysia  
11800 Penang  
Malaysia  
Tel: +604-653 2605  
Fax: +604-653 2605  
Email: zaba@usm.my

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