

Neuromarketing in Food Retailing

Methods used in Neuromarketing

Chapter 4

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Introduction to neuromarketing methods

Neuromarketing research is based on a model that explains how people use their brain for understanding, explaining, and influencing the outside world. This model divides the brain operations into four basic activities:

- forming impressions,
- determining the meaning and value,
- reflecting and analysing, and
- speaking and acting.

Two fundamental differences in the nervous system are important for understanding the origin and the methods of particular neuromarketing measurements:

- **The first difference** between the CNS and PNS (or simply between the brain and body)
- **The second difference** in terms of neuromarketing measurements is that the motor commands made by the PNS may be communicated through the somatic nervous system (SNS) or the autonomic nervous system (ANS).

Introduction to neuromarketing methods

Neuromarketing measures			
Body measures		Brain measures	
Somatic (SNS) measures	Automatic (ANS) measures	Blood flow measures	Electrical measures
Facial expressions	Electrodermal activity (EDA)	Blood oxygenation (fMRI)	Electrical fields (EEG)
Facial muscle movements	Heart rate	Positron emissions (PET)	Magnetic fields (MEG)
Eye movements and fixations	Blood pressure		
Eye blinks and the startle reflex	Respiration		
Behavioral response times	Pupil dilation		

Methods of measuring brain signals

Neurological (neurometric) indicators (based on signals from the brain) are more complex, but also more accurate and detailed than biometric parameters.

When determining which research method to use, three factors are of primary importance:

- **temporal resolution** (frequency in time for measurements)
- **spatial resolution** (the ability to distinguish differently functioning brain parts)
- **invasiveness** (whether the measurement can be made without damage to or disruption of the brain or other body tissue).

Technologies which measure brain activity are often referred to as neuroimaging technologies, because they include images or pictures presenting brain activity.

Methods of measuring brain signals

Measurements can be divided into two main groups:

1. The measurement of blood flow: reflects the brain activity based on localizing the increased blood flow which is essential for the supply of energy (oxygen and glucose) for activated neurons:

- **Functional magnetic resonance imaging (fMRI):** The ability to gather large amount of information, create a picture of deep brain structures, recognize genuine emotions, no aggressive effects.
- **Positron Emission Tomography (PET):** Using PET scanner requires detailed logistical planning and brings also some technical problems related to the application of radioactive material and its short life. Similarly as fMRI, the PET examination method is very costly, which greatly limits the size of the survey sample and subsequent generalization of results.
- **Functional Transcranial Doppler (fTCD):** Can be used outside the laboratory and has a relatively low price.

Methods of measuring brain signals

2. Electrical measurement: directly captures the electrical and magnetic activity consisting of activated neurons:

Electroencephalography (EEG):

The advantages of this method are:

- not financially, spatially, and time demanding,
- massive support from scientific literature,
- providing results in real time,
- the availability of mobile versions.

Disadvantages of this method include:

- the possibility of measuring the electrical activity deep in the brain (subcortical brain activity) is absent,
- the need for specialized staff when interpreting the results.
- difference in the electrical conductivity of the surveyed subjects,
- irrationality of the assumptions that brain impulses arise only based on certain stimuli.

Methods of measuring brain signals

2. Electrical measurement: directly captures the electrical and magnetic activity consisting of activated neurons:

Magnetic encephalography (MEG):

The advantages include:

- fast and accurate recording of changes due to stimuli,
- the ability to gather large amount of information,
- excellent spatial resolution with millimetre accuracy.

Disadvantages of this method can be described as follows:

- financially, spatially, and operationally demanding,
- the need for professional service,
- signals of interest are very small compared to other methods.

Methods of measuring biometric signals

Biometrics is a universal concept that involves measurements of physiological responses of the body – not directly the brain – to the external stimuli that are perceived through the senses.

Biometric measurements can be divided into:

1. **Measurements of somatic functions:** they can be at least partially influenced:
 - **Facial expressions:** a whole range of emotional states is recognizable on the human face.
 - **Eye tracking:** measuring eye movements and dilated pupils when viewing the subject.
 - **Response time:** The rate of response time provides a simple and available way of testing the strength of association between different concepts.



Methods of measuring biometric signals

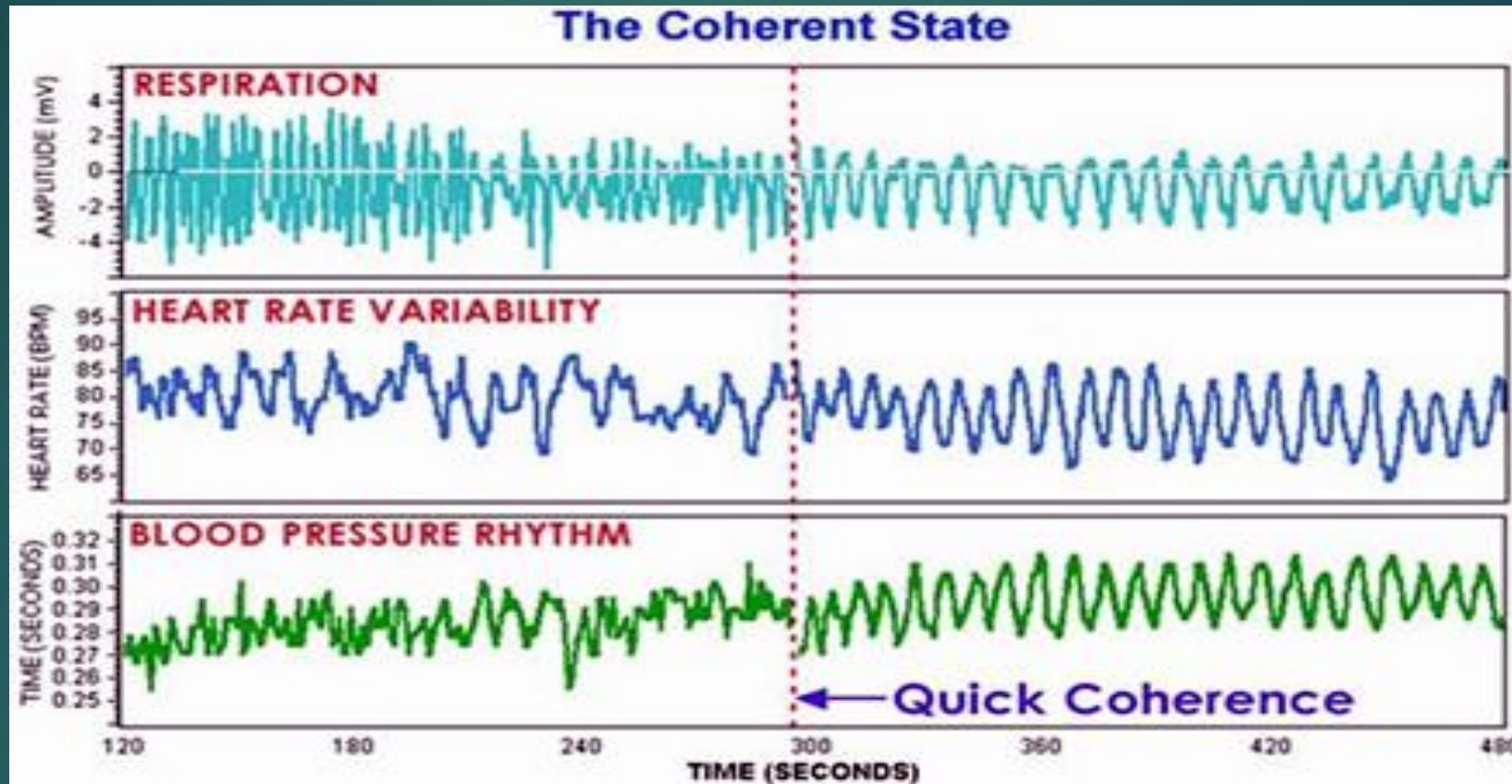
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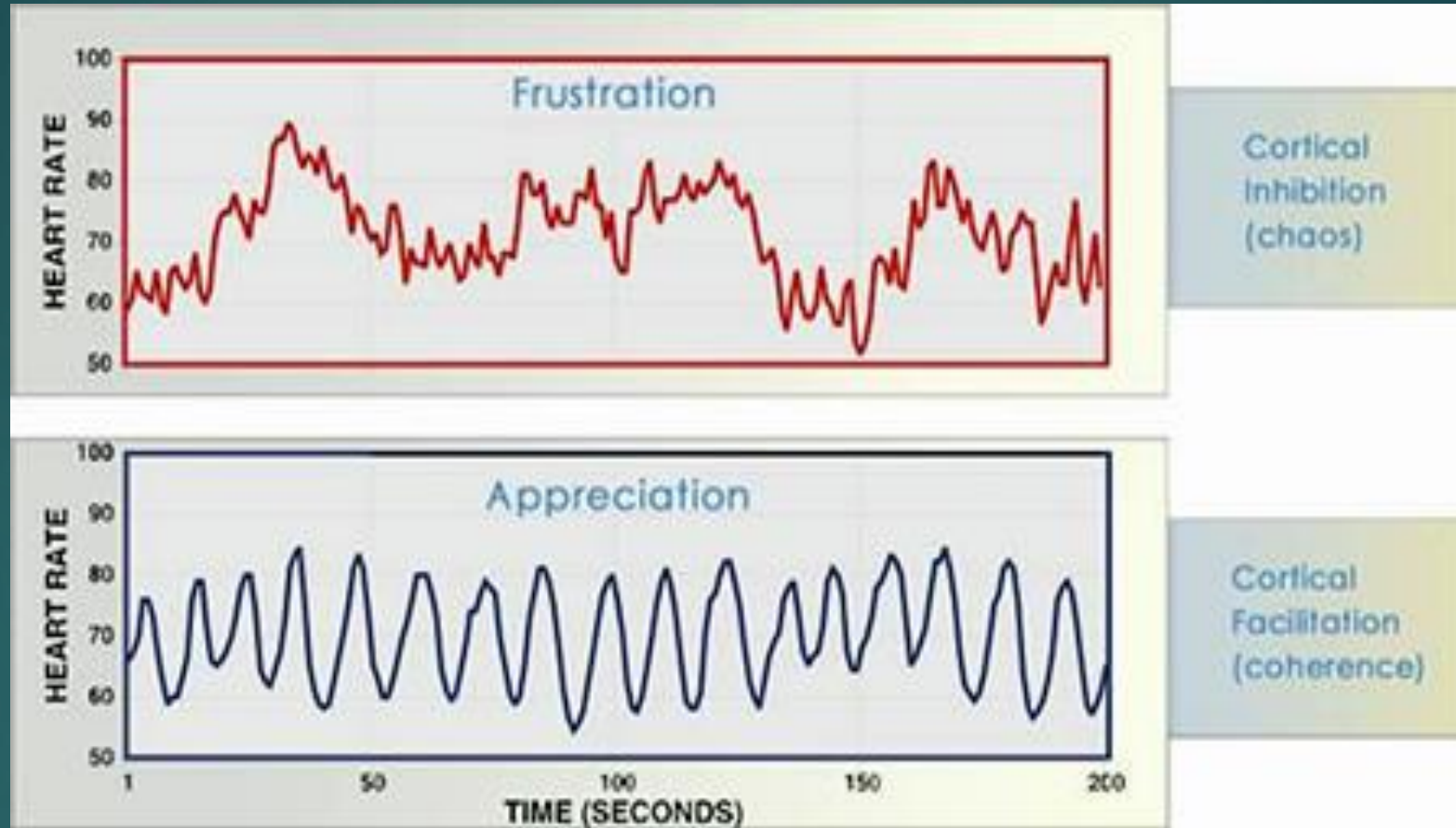
2. Measurements of autonomic functions: they cannot be influenced and happen automatically:

- **Electrodermal activity:** measuring changes in skin resistance due to sweating.
- **Breathing:** monitoring changes in breathing, respiratory rate, depth of inhalation, and exhalation.
- **Heart rate and blood pressure:** are other indicators of the onset of an emotion.
- **Dilated pupils (pupillary reflex):** eye pupil dilation and narrowing.

Examples of measuring biometric signals



Examples of measuring biometric signals



Combining multiple research methods

Mobile Eye Tracker (SMI)
and Mobile EEG (Emotiv)



Special shopping cart for
neuromarketing research



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Summary

In this chapter, we focused on the human nervous system in order to understand the human body producing signals subject to neuromarketing measurements better.

Neuromarketing involves advanced measures, many of which have been applied and modified for decades in medicine and academic research.

We also focused in detail on the signals obtained from the body (biometrics) and the brain (neuroimaging). We also described the various techniques which can be used.

The value of neuromarketing research is primarily a function of fulfilling three aspects:

- defining the right research question,
- identifying (selecting) correct measurements of consumer responses,
- designing the right test for the specific research question.

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