

## Mirror Neuron Morality and Empathetic Variation in Waste Management

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### Abstract

A short video clip can activate Mirror neuron morality (MNM) in social awareness of waste management. This study elaborated on human moral awareness and readiness in studying the MNM is represented in six brain locations (F3, F7, T3, C3, C4 and Cz). The brain wave frequency of alpha, beta, and theta from EEG was selected during participants watching the video and used these data to calculate the EI. It provides a comprehensive understanding of participant engagement behavior, consisting of cognitive empathy and vicarious learning. A short video clip is one of the intervention programs activating MNM. The evidence in this study showed that the mirror neurons could be activated by watching a short video including affective and somatic empathy scenes, with silent speech and human movement, which can effectively activate the MNM in terms of cognitive empathy and readiness to act.

**Keywords:** *Neuron Morality; Waste Management; Empathetic Variation*

### Introduction

People's behavior and experiences are generated by biological processes, primarily within their brains. Thus, the behavior and social process of human beings are related to a mirror neuron system. The mirror neuron mechanism is a pattern of mental response by observation, memory, emotional feeling, and association of the reasoning that makes the people understand the meaning of action and feelings of others. This process is based on action understanding, enabling the people to understand the intention behind the action, share their emotions and feelings, and imitate the active agent. Therefore, to develop moral behavior is to create both live and symbolic models to stimulate mirror neurons in people that drive them to imitate the good behaviors with empathy, which can be applied to individual and social awareness of waste management [1,2].

The mirror neuron system is engaged in the process of comprehending people's behaviors and intentions. It shows that the prefrontal, motor and sensory parts of the cortex all interact with mirror neuron morality (MNM) and where empathy is stored in people's brains. The interaction of these structures, monitored by electroencephalogram (EEG), may provide us with an intentional engagement of social awareness and responsibility in waste management [1]. To understand how MNM works and activates social awareness, this research study emphasizes cognitive empathy represented in six brain locations in the MNM. In addition, the engagement index (EI) was proposed in this study to provide a comprehensive understanding of participant behavior regarding engagement, cognitive empathy, and vicarious learning while watching the video clip due to the mirror neurons' morality activation.

### Objective of the Study

The objective of this research was to map the MNM in six case studies with different personality types, empathy scores and the immediate effects of mirror neuron activation while watching short films on self-engagement in the social awareness of waste management.

### Methodology

All participants wore an Emotive EPOC helmet for EEG measures while watching the video session and rested one minute before the first video session started. And the participants continued watching the first video until the end, and after that, they had to rest for one minute before starting the second video session. The EEG data of each participant measured during film sessions based on the international 10 - 20 method were recorded with a sampling rate of 100 Hz. The raw data from F3, F7, T3, C3, C4, and Cz represented the location of the mirror neuron [3]. The EI is calculated using alpha, beta, and theta of brain wave activities. An increment in beta activity is directly related to human task engagement. In contrast, an increment in alpha and theta activities reflects their relaxation, a low level of alertness, and a decrease in information processing [4,5].

### Results and Discussion

In table 1, the low EI showed higher than the other two cases at F3 while watching the MNM video clip. Although Case study 1 had the lowest EI but had the highest F3, which can help people linearly derive solutions using verbal or symbolic reasoning.

Case Study No	1	3	2
EI Watching MNM Script	0.79	0.9	1.35
C3: Sensorimotor Integration Right Body	0.89	0.74	0.91
C4: Sensorimotor Integration Left Body	0.85	1.25	0.82
Cz: Sensorimotor Integration Balance	0.64	0.68	0.67
F3: Motor Planning	0.82	0.69	0.79
F7: Verbal Expression	0.62	0.77	3.40
T3: Verbal Memory	0.94	1.28	1.49

**Table 1:** Level of engagement index for generation X.

In table 2, the EI showed adequate improvement of attention in the MNM video clip for all cases. The low empathy score case showed higher than the other two cases at T3 only.

Case Study No	6	5	4
EI - Watching MNM Silence	0.56	0.43	0.71
C3: Sensorimotor Integration Right Body	0.64	0.34	0.87
C4: Sensorimotor Integration Left Body	0.57	0.36	1.20
Cz: Sensorimotor Integration Balance	0.42	0.35	0.67
F3: Motor Planning	0.49	0.45	0.62
F7: Verbal Expression	0.53	0.71	0.39
T3: Verbal Memory	0.74	0.41	0.53

**Table 2:** QEEG data and analysis for generation Z.

This study showed that the EI after watching the MNM video clip positively impacted mirror neuron activation. In addition, participants learned from the experience of others by watching video clips without any interactions. This learning process, called vicarious learning, involves feeling, sensing, and empathizing with what people perform rather than hands-on instructions [6,7]. The vicarious learning process is represented in the parietal regions (C3, C4, and Cz) leading to knowledge translation [6,8,9].

### Conclusion

In conclusion, habitual activities such as brain exercise and practiced waste segregation at home could induce the mirror neurons activation of self-engagement starting from self-moral awareness via cognitive empathy (brain location: T3 to F7 to F3) [10] toward social responsibility [11], (2018), which is consisted of selfless behavior or altruism prompted by continuing on many vicarious learning cycles (brain location: C3-4 to Cz) as well as the feeling of compassion (brain location: F3 to Fp1) and wanting to act as self-moral readiness [12].

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