

Neuroanatomical Studies

Dysfunctional schema modes in individuals with frontal lobe lesion; multiple CASE study analysis



Sabir Zaman (PhD Scholar)^{a,*}, Kehkashan Arouj (Dr.) (Assistant Prof.)^b, Shahid Irfan (Dr.) (Assistant Prof.)^c

^a IIUI, Pakistan

^b Department of Psychology, International Islamic University Islamabad, Pakistan

^c Foundation University Islamabad, Pakistan

A B S T R A C T

Objectives: This study aimed to investigate the emotional, cognitive and behavioural responses of individuals with frontal lobe lesions. The study also sought to determine the coping and defence responses, as well as the executive functioning and higher-order mental activities, of individuals with frontal lobe lesions. All this was to be achieved through multiple case studies conducted at the Pakistan Institute of Medical Sciences, Islamabad.

Method: The dysfunctional and healthy modes of individuals with frontal lobe lesions were assessed using the Urdu version of the Schema Mode Inventory. In addition, the executive functioning and higher-order mental activities of individuals with frontal lobe lesions were examined using the Stroop Neuropsychological Screening Test (Stroop test).

Sample: The study sample comprised four patients with frontal lobe lesions, including both surgical and non-surgical lesions.

Results: The study results showed that all four patients with frontal lobe lesions (surgical and non-surgical) exhibited dysfunctional schema modes, for example, the child, maladaptive, and punitive parent modes. No difference was found between the surgical and non-surgical frontal lobe lesion patients. The results also showed that the patients with frontal lobe lesions achieved low scores on the Stroop test.

A schema mode consists of a cluster of schemas related to the cognitive, emotional, behavioural and neurobiological states, as well as the coping styles and responses, of an individual. Moreover, a schema is a psychological and cognitive construct that consists of an individual's beliefs about him/herself, the world and other people. A dysfunctional schema can occur when a number of maladaptive schemas are activated [1]. A functional schema provides help and guidance in terms of problem solving and decision making. At first, a schema mode is developed through partial or selective information, but with the passage of time and continuous experience, it becomes mature. Individuals have a number of different modes, and they may swing between them in a way that appears confusing to other people [2].

There are 14 different schema modes, which can be categorised into four main domains, namely the child, maladaptive coping, healthy, and dysfunctional parenting modes. The child modes consist of strong negative emotions and feelings related to vulnerability, for example, fear, sadness, hopelessness, anger and impulsivity. The maladaptive coping modes are responsible for reactions or responses intended to help an individual adjust to unmet emotional needs during childhood. The healthy modes are related to healthy relationships, pleasurable life activities, responsibilities, feelings of playfulness and joy, and a sense of

being loved. Finally, the dysfunctional parenting modes are related to internal criticism and hence reflect negative internal beliefs [1].

The frontal lobe is the part of the brain responsible for, among other things, motor and language development. The advanced functions of the frontal lobe include executive and higher-order functioning, such as decision making, planning, memory creation, sustained awareness, attentiveness and insight [3].

This study aimed to investigate the emotional, cognitive and behavioural responses of individuals with frontal lobe lesions. The study also sought to determine the coping and defence responses, as well as the executive functioning and higher-order mental activities, of individuals with frontal lobe lesions.

In the present study, we hypothesised that frontal lobe lesion patients would demonstrate maladaptive schema modes and decreased executive functioning. The findings of this study should prove helpful in terms of fostering a better understanding of the healthy and dysfunctional schema modes of frontal lobe lesion patients.

* Corresponding author.

E-mail addresses: Sabir.zaman@iiu.edu.pk (S. Zaman), Kehkashan.arouj@iiu.edu.pk (K. Arouj), shahid.irfan@fu.edu.pk (S. Irfan).

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1. Method

1.1. Instruments

The Schema Mode Inventory and the Stroop Test were employed.

1.1.1. Schema Mode Inventory (SMI)

A short version of the said inventory comprises four domains (child mode, maladaptive coping, maladaptive parent, and healthy adult), including 14 sub-schema modes. Furthermore, the SMI consists of 124 items measured on a six-point Likert scale ranging from “never to almost”, i.e., the reliable and valid instrument of the SMI Urdu Version for the proper assessment of schema modes [4].

1.1.2. Stroop neuropsychological screening

The Stroop Test (SNST) has been used for executive functioning and brain damage. Moreover, the Stroop Neuropsychological Screening Test (SNST) has been used for psychopathology, brain malfunctioning and cognitive functioning [5]. The Stroop Test includes two tasks, the color task and the color word task, wherein each word stimulus is design and printed with a four different ink color. There are 112 items of color words in each task.

1.2. Participant

The present study comprises multiple case studies pertaining to frontal lobe lesion, including incidents of both surgical and non-surgical frontal lobe lesions.

1.3. Procedure

Prior to the test administration, informed consent was secured from the subject. The short Urdu version of the SMI [4] was used, and the SNST was also administered. All the respondents were instructed to read all the items carefully, after which they were asked to respond to each item, without leaving any item blank.

1.4. Case 1

A 38-year-old man was admitted to the neurosurgery ward complaining of severe headache, nausea, vomiting and fits. His prior medical history revealed no trauma, injury or substance abuse. His family members reported that he was operated on for a brain lesion some two years previously, although he did not continue with treatment such as chemotherapy following the surgery, which resulted in recurrent multiple lesions in the frontal lobe region. The magnetic resonance imaging (MRI) and computed tomography (CT) scan results indicated a large visible lesion consisting of a cyst and significant edema in the right frontal region, which had also damaged some of the parietal lobe and the body of the corpus callosum bordering the inferior inter-hemispheric fissure. This patient underwent neurosurgical treatment (Fig. 1).

1.5. Case 2

A 40-year-old woman was admitted to the hospital after complaining of headache, dizziness, vomiting, seizure and temperature. She reported that the symptoms had persisted for the last two years. According to her medical records, she had no significant history of trauma or physical disability, although she did have a history of disease, namely typhoid, which she experienced five year earlier. She was fully aware of both the time and the place, and her Glasgow Coma Scale (GCS) score was 15/15. No abnormality was detected in her blood test results, although her MRI report showed a fine and clear cystic mass on the right frontal region suggestive of a meningioma. This patient underwent neurosurgical treatment through craniotomy for tumor (Fig. 2).

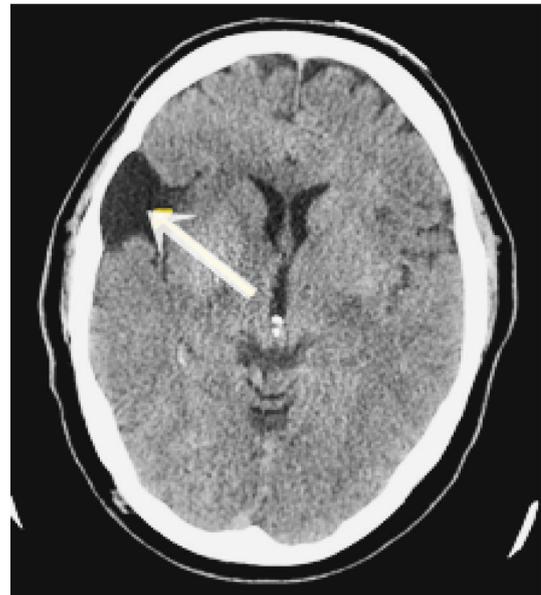


Fig. 1. Case 1 CT scan demonstrates cyst and edema in the right frontal lobe.



Fig. 2. Case 2 T2 weighted MRI demonstrates a lesion suggestive of meningioma with significant edema in the right frontal region.

1.6. Case 3

A 23-year-old male student was hospitalised as a result of a traumatic brain injury sustained on the road. He lost consciousness for a few seconds at the time of the injury. He reported experiencing headache, nausea and vomiting. He GCS score was 10/15. After three weeks of treatment, he was re-admitted to the hospital with the same complaints, including vomiting, nausea and headache. The psychometric testing applied when he was in a normal condition indicated a GCS score of 15/15. The CT scan results indicated an intraparenchymal contusion and hemorrhage in the left frontal lobe region and this patient was managed conservatively (Fig. 3).

1.7. Case 4

A 29-year-old man from a poor family reported falling down the stairs two weeks previously. He had a history of bleeding from the nose, and he was hospitalised after complaining of headache, high-grade fever, vomiting, nausea, blurred vision and chest pain. First aid and his initial treatment were provided in a primary care hospital, while he was



Fig. 3. Case 3 CT scan of traumatic brain injury with a left frontal intraparenchymal hemorrhage.

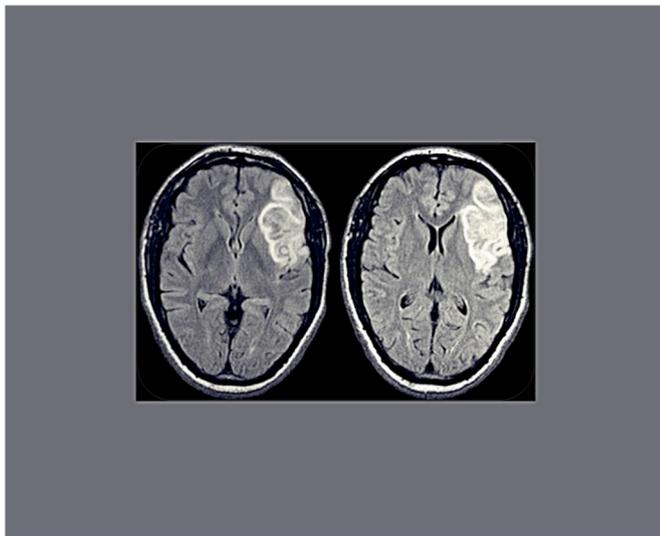


Fig. 4. Case 4 MRI Flair demonstrates a left frontotemporal lesion consistent with evolving edema.

referred to a secondary care hospital for advanced treatment. His data were collected during the treatment at the secondary care hospital. He was conscious and fully aware of the time, place and environment. His prior history and medical records showed no signs of brain tumor or significant psychological problems. His MRI report indicated the presence of a mass in the left frontal region, and he was monitored (Fig. 4, Table 1–3).

2. Discussion

The aim of the present study was to test the schema mode and executive functioning of frontal lobe lesion patients, on whom the SMI and Stroop test were administered. It was hypothesized that such patients scored significantly higher regarding all maladaptive modes such as child mode, maladaptive punitive parent modes and maladaptive

Table 1

Schema Mode Inventory (SMI) of the Case (1) and Case (2) non- Surgical lesion (38 year male right frontal lobe recurrent episode) (40 year female lesion in right frontal parietal region).

SMI	Healthy Control	Case1 Mean	Discrepancy	Case2 Mean	Discrepancy
V	1.47	2.1*	0.63	4.2*	2.73
AC	1.81	1.2(ns)	-0.61	4.1*	2.29
EC	1.20	1.0(ns)	-0.2	4.5*	3.3
IC	2.15	1.95(ns)	-0.2	4.0*	1.85
UC	2.27	2.46*	0.19	3.30*	1.03
HC	4.52	3.9(ns)	-0.62	4.2(ns)	-0.32
CS	2.51	10.9*	8.39	4.0*	1.49
DPT	1.59	2.45*	0.86	3.0*	1.41
DSS	1.93	6.0*	4.07	4.8*	2.9
SA	2.31	2.02(ns)	-0.29	2.8(ns)	0.49
BA	1.72	2.11*	0.39	2.60*	0.88
PP	1.47	1.7(ns)	0.23	4.6*	3.13
DP	3.06	5.3*	2.24	4.2*	1.14
HA	4.60	5.3*	0.7	3.6(ns)	1

ns = not significant.

Note: Vulnerable Child(VC), Angry Child (AC), Enraged Child (EC), Impulsive Child (IC), Undisciplined Child (UC), Happy Child (HP), Complaint Surrender (CS) Detached Protector (DPT), Detached Self Soother (DSS), Self-Aggrandize (SA), Bully and Attack (BA) Punitive Parent (PP), Demanding Parent (DP), Healthy Adult (HA).

* Shows significant.

Table 2

Schema Mode Inventory of the Case (3) and Case (4) Surgical Lesion (23 year male surgical lesion or contusion (bleed) on left frontal region) (29 year male lesion on the right frontal lobe).

SMI	Healthy Control	Case 3 Mean	Discrepancy	Case 4 Mean	Discrepancy
VC	1.47	3.3*	1.83	1.5	-0.42
AC	1.81	2.0*	0.19	3.3*	1.43
EC	1.20	2.7*	1.5	3.3*	2.1
IC	2.15	3.7*	1.55	3.43*	1.28
UC	2.27	3.6*	1.33	3.0*	0.73
HC	4.52	4.6(ns)	0.08	3.8(ns)	-0.72
CS	2.51	3.75*	1.24	3.0*	0.49
DP	1.59	3.35*	1.76	2.2*	0.61
DSS	1.93	3.33*	1.4	3.22*	1.29
SA	2.31	4.0*	1.69	3.5*	1.19
BA	1.72	3.22*	1.5	2.88*	1.16
PP	1.47	3.7*	2.33	2.4*	0.93
DP	3.06	4.5*	1.44	4.5*	1.44
HA	4.60	5.1*	0.5	4.4(ns)	-0.3

ns = not significant.

Note: Vulnerable Child(VC), Angry Child (AC), Enraged Child (EC), Impulsive Child (IC), Undisciplined Child (UC), Happy Child (HP), Complaint Surrender (CS) Detached Protector (DPT), Detached Self Soother (DSS), Self-Aggrandize (SA), Bully and Attack (BA) Punitive Parent (PP), Demanding Parent (DP), Healthy Adult (HA).

* Shows significant.

copying styles, whereas they received low scores in the Stroop test, which signifies low levels of executive functioning, concentration, decision-making, attention and perception.

Moreover, the current study revealed that frontal lobe lesion patients received high scores on the child mode, such as vulnerable child, undisciplined child and bully and attack, while they secured lower scores on the healthy and happy child mode, which denotes boring personality as well as helpless and hopeless experiences. Moreover, the frontal lobe lesion patients engaged in maladaptive coping style, such as bully attack, which bring the characteristics of antisocial and criminal and also damage people verbally, sexually and physically. Furthermore, frontal lobe lesion patients engage in other type of maladaptive coping style such as complaint surrender and detached protector. The complaint surrender maladaptive coping style consist of fear of rejection, submissive and obedient personality, while detached

Table 3
Stroop test and frontal lobe lesion (surgical and nonsurgical lesion).

Task	Case 1	Case 2	Case 3	Case 4	M	SD
Color Task						
Item complete	100	99	101	98	99.5	1.29
Incorrect response	05	07	06	06	6	0.816
Color Score	95	92	95	92	93.5	1.73
Color-Word task						
Items completed	82	72	87	93	83.5	8.88
Incorrect response	05	07	04	07	5.75	1.5
Color-Word score	78	66	81	87	78*	8.83

Note. In Stroop Test the Color Word Score primarily used for interpretation. For the age 18–49 the cutoff score is 98, while 50 and above age people the cutoff score is 61. In the present study the age of all the four Cases is below 50. The score of the present cases 78 which shows significance, because the current score is below 98.

* Significance.

protector includes emotional and psychologically withdrawn from pain, in same way, frontal lobe lesion patients engaged in detached self-soother, which includes gambling, overeating, and engaged in risky game, and drug abuse. The result reveals that male frontal lobe lesion patients show more aggression than female patients.

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