Delusional Misidentification and Posttraumatic Brain Injury

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Abstract

Objective: Misidentifications of place and time have been recognized as an important feature of organic mental syndromes. Likewise, a misidentification of persons, such as the Capgras and the Fregoli syndrome has also been acknowledged to be associated with neurological diseases though it has traditionally been related to psychiatric illness. In the present study, we made an attempt to explore possible underlying neuropsychological mechanisms for a post-traumatic brain injury patient who manifested misidentification problems.

Method: The patient was a 37-year-old, right-handed, married woman. She obtained a 14th grade education with an above average performance record, and was a piano tutor. She did not have any prior history of psychiatric and neurological deficits. She suffered from a traumatic brain injury, and the lesion areas mainly involved bilateral frontal and anterior temporal structures. She received a battery of neuropsychological tests including measures of emotional status, and semistructured Neurobehavioral Standard Interview.

Results: The patient evidenced multiple cognitive impairments, mainly including amnesia, executive dysfunction, and visual perceptual difficulty. Misidentifications of time, place, person, and event, as well as remarkably psychopathological manifestations including irritability, jocularity, childishness, confabulation, and a loss of awareness were noted.

Conclusion: Our patient evidenced a wide range of misidentification problems which mainly consisted of misidentifying place, person, and event, and these problems seem to be associated with deficits of temporal sequencing of memory, visual-spatial and visual perception, executive function, and awareness.

Key words: Misidentification; Traumatic Brain Injury

Introduction

Misidentifications of place and time have been recognized as an important feature of organic mental syndromes (Benson, Gardner, & Meadows, 1976). Likewise, a misidentification of persons, such as the Capgras syndrome and the Fregoli syndrome has also been acknowledged to be associated with neurological diseases though it has traditionally been in association with psychiatric illness (Alexander, Stuss, & Benson, 1979; Feinberg, et al., 1999; Forstl et al., 1991; Granacher, 1978; Mendez, Martin, & Smyth, 1992; Roane et al., 1998; Staton, Brumback, & Wilson, 1982). Since duplication symptoms, such as two identical persons or two resembling hospitals in which one is true and the other is an imposter have also been frequently observed in patients with

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misidentification problems, the term "reduplicative paramnesia" was thus coined by Arnold Pick (Alexander, Stuss, & Benson, 1979) to refer to these clinical phenomena. Later, the term "delusional misidentification syndromes", however, has been used in the psychiatric literature to denote these same symptoms. The difference between Capgras and Fregoli syndromes is that the former refers to hypo-identification or denial of familiarity (e.g., the patient's misidentification of his of/her acquaintance as an impostor) and the latter pertains to hyper-identification or assertion of familiarity, such as a misidentification of a stranger as a close acquaintance (De Pauw, 1994). In the literature, most of the researchers attributed misidentification problems to memory, visuospatial/visuoperceptual, or executive dysfunction.

In the present study, we reported a female adult patient, who sustained a severe traumatic brain injury following a motor vehicle accident, and subsequently manifested various forms of misidentification problems including delusion of time, place, person, and event. However, her misidentifications did not manifest a duplication. We further make an attempt to explore possible underlying neuropsychological mechanisms of these problems.

Case Report

Case description

The patient was a 37-year-old, right-handed, married woman with two children. She obtained a 14th grade education with an above average performance record, and was a piano tutor. She did not have any prior history of psychiatric illness and neurological deficits. She suffered from a severe traumatic brain injury following a motor vehicle accident in which she was hit by a car while riding a motorcycle on October 29, 1999. Loss of consciousness was evident at that time, and then she was sent to the emergency room of Taipei Chungshao City Hospital, in which ventricular tachycardia with blood pressure drop was noted. After cardiopulmonary resuscitation, her consciousness became clear. The brain CT taken on October 30, 1999 revealed bilateral frontal-temporal intracerebral hemorrhage, and a craniotomy was then performed to remove the hematoma. After the operation, she was transferred to the neurosurgical intensive care unit. Her consciousness gradually returned to normal with E3V4M6 on the Glasgow Coma Scale, and her vital signs were stable. Although her extremities could move freely, unstable gait manifested. In addition, right facial palsy and bilateral vocal cord palsy were also noticed. On November 14, she was transferred to the general ward, and then to the rehabilitation ward for further care. She was discharged on December 27, and visited ENT at the National Taiwan University Hospital for her bilaterally vocal cord palsy. Meanwhile, she also visited our neurological clinic, and neurological examination revealed no remarkable sensory and motor deficit on January 12, 2000. Brain MRI taken on January 15, 2000 revealed lesion areas mainly involving bilateral frontal and anterior temporal structures, right internal capsule, and left cuneus and lingual gyrus (Figures 1 & 2). The neurologist, then, referred the patient to the Neuropsychology Clinic for an examination of her cognitive function and emotional status.

Neuropsychological Examination

The patient received the neuropsychological evaluation on January 17, 2000 about 3 months after the accident. The neuropsychological test battery included orientation, intellectual function, learning and memory, language and communication, visuospatial perception, attention, executive and manual function, as well as emotional status (Table 1). In addition, she and her husband also received an intensive interview with a semi-structured Neurobehavioral Standard Interview Scale (Hamsher, 1983). In order to minimize the patient's unreliable subjective reports of her emotional status, her husband also received a copy of the informant's version of emotional status inventory (SCL-90-R, Less-Haley, 1989).

Results

Neuropsychological examination

Table 2 shows the patient's performance on neuropsychological tests. Compared to age- and educational-corrected norms, her orientation to time, place, and personal information was impaired. On the WAIS-R, the Verbal, Performance, and Full-Scale IQs were low average. On the semantic memory tasks, recall and recogni-

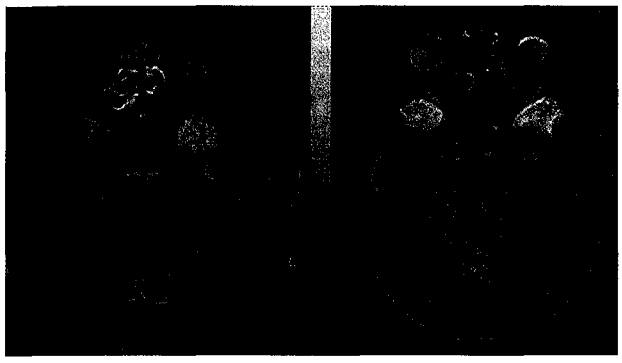

Figure. 1 T2-weighted MRI images of the patient and the lesion site involving bilateral anterior temporal lobes.

Figure. 2 T2-weighted MRI images of the patient and the lesion site involving bilateral medial-orbital and superior frontal regions, right internal capsule, and left cuneus and lingual gyrus.

tion performance on the Recent and Remote Life Events Test was defective, with the exception of recognition performance on the Remote Life Events Test. Likewise, performance on verbal and visual episodic memory tasks, Word Sequence Learning (including immediate and sequential memory, and 10-minute delayed recall) and Benton Visual Retention Test, were also impaired. Performance on the core linguistic function tasks, including Visual Naming, Semantic Association of Verbal Fluency, and Token Test, was impaired. On the visual spatial-perceptual function tasks, performance on the Judgment of Line Orientation was defective while Three-Dimensional Block Construction-Model was normal. On the executive function task, performance on the Wisconsin Card Sorting-Short Form was defective. On the manual dexterity task, performance with the domi-

Table 1

Neuropsychological Tests

Intellectual Function	
	WAIS-R (Wechsler, 1981)
Orientation	
	Temporal Orientation (Benton, Hamsher, Varney, & Spreen, 1983)
	Orientation to Personal Information (Hamsher, 1983)
	Orientation to Place (Hamsher, 1983)
Memory Function	
	Remote Memory (Recall) (Hua, 1986a)
	Recent Memory (Recall) (Hua, 1986a)
	Word Sequence Learning-Revised (Hua, 1986b)
	Benton Visual Retention Test (Benton, 1976)
Language Function	
	Multilingual Aphasia Examination (MAE, Benton, & Hamsher, 1978)
	Visual Naming
	Token Test [a]
	Semantic Association of Verbal Fluency (Hua, Chang, & Chen, 1997)
Spatial Perceptual Function	
	Judgment of Line Orientation (Benton et al., 1983)
	Three-Dimensional Block Construction (Benton et al., 1983)
Executive Function	
	Wisconsin Card Sorting Test-Modified (Nelson, 1976)
Manual Dexterity	
	Purdue Pegboard (Purdue Pegboard Foundation, 1948)

nant and both hands on the Purdue Pegboard was impaired while performance with the non-dominant hand was normal. Remarkable retrograde amnesia was evident on the Galveston Orientation and Amnesia Test. Misidentifications of time, place, person, and event, as well as remarkable psychopathological manifestations including irritability, jocularity, childishness, a loss of patience, and confabulation were evident during the examination, and these manifestations were further confirmed by her husband's report on the SCL-90-R (Less-Haley, 1989) and on the semi-structured Neurobehavioral Standard Interview Scale. The patient, however, denied any cognitive, emotional, personality change, and misidentification problems.

Misidentifications

Place

The patient could correctly name the hospital in which she received the examination. However, she insisted that the hospital was located at a city in Holland (she has ever visited that city with her husband before), rather than a city in Taiwan. Furthermore, she could describe her home address correctly, but had a delusion-

Table 2

Neuropsychological Tests Results

Neuropsychological Tests		Patient Jan-17-'00	Norm (N = 50)
Intellectual Function (WAIS-R)			
Verbal IQ		87	(105)
Performance IQ		87	(105)
Full Scale IQ		85	(105)
Orientation			
Temporal Orientation		-24[c]	-0.11 ±0.42
Orientation to Personal Information		2[c]	8.00 ±0.00
Orientation to Place		2[c]	4.00 ±0.00
Semantic Memory			
Remote Memory (Recall)		32[c]	47.67 ±2.68
Remote Memory (Recognition)		44[c]	49.27 ±1.51
Recent Memory (Recall)		12[c]	37.60 ±2.54
Recent Memory (Recognition)		18[c]	39.70 ±0.92
Episodic Memory			
Word Sequence Learning-Revised	Correct	42[c]	56.13 ±5.61
	Position	20[c]	51.81 ±9.99
	Intrusions	0	
	Learning	2[c]	15.14 ±5.29
	Recall	0[c]	3.51 ±1.43
	Cued Recall	0[c]	3.58 ±1.36
	Recognition	19[c]	28.84 ±2.51
Benton Visual Retention Test	Correct	3[c]	7.12 ±1.78
	Errors	-7[b]	-3.48 ±2.15
Language (MAE)			
Visual Naming		50[c]	57.71 ±3.90
Semantic Association of Verbal Fluency[a]		20[c]	38.20 ±9.90
Token test		41[c]	43.65 ±1.26
Spatial Perceptual Function			
Judgment of Line Orientation		18[c]	25.32 ±3.54
Three-dimensional Block Construction		29	28.23 ±1.97
Executive Function (WCST-M)			
Categories		2[c]	5.43 ±1.59
Perseverative Errors		22[c]	3.07 ±3.44
Non-perseverative Errors		11[b]	4.50 ±3.77
Unique Errors		0	1.37 ±2.50
Manual Dexterity			
Right Hand		12[c]	16.27 ±2.16
Left Hand		12	14.93 ±2.16
Bimanual Coordination		9[c]	13.10 ±1.32

a: Used to measure associative verbal fluency for animal, fruit and vegetable, and replace the original subtest of Controlled Oral Word Association of the MAE
b: borderline, value in the range of 5%ile and 6%ile;
c: defective, p-value < 5 percentile rank.

al belief that her house was located in Holland. The patient falsely believed that she was in Holland instead of Taiwan on the day that a major earthquake hit Taiwan on September 21, 1999. She confabulated that her husband called her in Holland and told her about this disaster.The patient confabulated that it was absolutely impossible for her friend to come to visit her at the hospital and her house in twenty minutes because the trip from Taiwan to Holland by plane requires at least 1-2 days.

Person

The patient has two sons, but she falsely reported that she has 5-7 children including 3 daughters and 2-4 sons during the initial evaluation. She believed that both of her parents-in-law, rather than her own parents, expired 20 years ago.

Time

When asked the patient to describe what she was doing just before she was hit by a car, she falsely depicted that she was a student at the junior college, and was going to participate in a summer activity. In fact, she graduated from junior college almost 15-16 years ago. Likewise, she falsely believed that she just married her husband and he still has contact with his prior girl friend.

Event

The patient's older son regularly made phone calls to his grandparents who live in mid-Taiwan. The patient, however, insisted that her son was lavish with money in making such long-distance calls because those were oversea long-distance calls, Holland to Taiwan.

Discussion

In contemporary literature (e.g., Bouvier-Peyrou, Landis, & Annoni, 2000), the term of delusional misidentification syndromes is a collective term covering Capgras (Capgras & Reboul-Lachaux, 1923) and Fregoli syndromes (Courbon & Fail, 1927), intermetamorphosis (Courbon & Tusques, 1932), delusion of subjective doubles (Christodoulou, 1978), and reduplicative paramnesia (Pick, 1903). A "double" of place, person, time, or event is one of the core clinical commonalities of these syndromes (e.g., Pick, 1903; Benson, Gardner, & Meadows, 1976; Alexander, Stuss, & Benson, 1979; Staton, Brumback, & Wilson, 1982; Cpagras & Reboul-Lachaux, 1923; Box, Laing, & Kopelman, 1999). Our patient manifested of a wide range of delusional misidentification problems, including place, person, time, and event, particularly for place. However, her misidentifications did not manifest accompanying "duplication" or "impostor". It appears that our patient might be an atypical or a variant case of delusional misidentification, more in line with Weinstein and Kahn's (1955) position that "reduplication" might or might not be present in patients with these syndromes.

From the standpoint of neuropsychological deficits, some researchers (e.g., Hayman & Abrams, 1977; Granacher, 1978; Alexander et al., 1979; Shraber & Weitzel, 1979) proposed that misidentifications were primarily due to deficits of visual perception or visual spatial function. Other investigators more specifically contended these manifestations as results of a defect of facial recognition (Ellis & Young, 1990) or prosopagnosia (Rapcsak, Polster, Conner, & Rubens, 1994). That our patient showed a defective performance on the visuospatial task, Judgement of Line Orientation, and a defect of recognition of the faces of her family members reported by her husband seems to further corroborate these previous findings.

The contribution of memory deficits to misidentifications has been postulated and well recognized in the literature (e.g., Talland, 1961; Staton et al., 1982; Feinberg et al., 1999). Talland (1961) proffered misidentifications as a result of actual prior experiences inserting into the present. Our patient's misidentifications are consistent with this description. However, memory deficit does not explain why only one of our patient's past experiences, specifically, time period of her stay in the Netherlands, interpolated with her current experiences. In light of Talland's proposal, Staton and colleagues (1982) took a step further to claim the patient's duplication misidentifications mainly resulting from a false orientation to reality. The disorientation is due to a disconnection of new memory registration from antecedent memory stores. Consequently, the individual is not able to incorporate present cues in a way to facilitate correct orientation to present experiences, such as time, place, person, and event. Nonetheless, this position may not be justifiable for our patient's misidentifications because she was not only defective in new learning and recent memory, but also the remote one.

Schnider and colleagues (1996a, 1996b, & 1999), and Ptak and Schnider (1999) suggested that disorientation and spontaneous confabulation, the latter of which has commonalities with delusional misidentifications in terms of clinical features (Box et al., 1999), are pri-marily due to temporal context confusion. Our patient manifested poor performance on the position order of the Word Sequence Learning test, demonstrating poor temporal sequencing of stimuli. Schnider and co-workers' claim may be a workable account of our patient's problems though this proposal does not explain why our patient's misidentifications only reflected proactive interference (that is, only prior experiences intruded into the present), rather than by both proactive and retroactive interference.

Executive dysfunction has often been used to explain delusional misidentification syndrome in the literature (e.g., O'Connor, Wolbridge, Sandson, & Alexander, 1996; Feinberg et al., 1999). Our patient did manifest a poor performance on the Verbal Fluency, and the Wisconsin Card Sorting Test. She also evidenced working memory deficit. The results seem to partially corroborate prior observations of executive dysfunction. However, executive dysfunction might not be able to wholly explain our patient's delusional misidentifications. Feinberg and colleagues (1999) attributed misidentifications to at least a combination of executive and memory deficits, as well as motivational factor. While both cognitive deficits were indeed evident in our patient, whether motivational factor contributed to her delusional misidentification problems was not clear. The patient's husband reported that she was very impressed with the Netherlands and she described to revisit this country at any opportunity. If this were the case, motivational factor, as initially suggested by Weinstein and Kahn (1955), might have played a role in our patient's confabulations. Although Feinberg and co-workers' proposal appears partially workable for describing our patient's misidentification problems, neuropsychological deficits were not wholly sufficient to explain these problems. Our patient not only evidenced executive and memory deficits, she also was not aware of these function changes. In light of neuropathological involvements of both frontal and anterior temporal regions and our neuropsychological findings, we thus suggest that our patient's misidentification problems might have something to do with above-mentioned deficits (i.e., deficits of memory, visual-spatial and visual perception, executive, and motiviation) or the combination of these deficits with unawareness.

Accordingly, we propose that the combination of deficits in temporal sequence of memory, visuospatial function, and motivation (a selective memory of place and event related to the Netherlands) might have resulted in her mislocating places and events. Because of a lack of adequate monitoring, these mistakes were unable to be timely and properly corrected. Her delusional beliefs of these problems might be attributed to her unawareness. However, we suggest that our patient's misidentification problems of time and person could mainly be attributed to deficits of temporal sequence memory and self-monitoring. Likewise, her delusional belief of these misidentifications appears to be due to a deficit of awareness function.

In summary, our patient did not have any history of psychiatric illness, but manifested episodes of delusional misidentification, which became evident immediately following a traumatic brain injury due to a motor vehicle accident. It, thus, is clear that neuropathological rather than psychiatric origin accounts for her manifestation of misidentifications. Unlike previous findings, however, these misidentifications, were relatively independent of duplication symptoms. Based on the patient's neuropsychological deficits, we, thus, suggest that defects of temporal sequence of memory, visual-spatial perception, and executive function, as well as a loss of awareness might play a crucial role in her misidentification problems.

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腦傷後的錯認症狀

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摘要

目的：「對於時間與地點的錯認」已被認爲是腦傷患者的一個重要的特徵。至於「對於人物的錯認」，例如Capgras症狀或Fregoli症狀，這些過去被認爲是精神科疾病的表現，現在也被認爲與神經科的疾病有關。在這個研究，我們報告一位車禍後出現錯認症狀，卻沒有「複製（duplication）」現象的病患。我們評估她的神經心理功能，並且嘗試探討與錯認現象相關的神經心理機制。

方法：這是一位37歲，慣用手爲右利的女性已婚病患。她曾經接受14年的教育（師專），在學校的成績表現在中等以上，職業是鋼琴老師。病患過去沒有任何精神科或神經科病史。這次車禍主要造成她腦部損傷的位置在兩側額葉與前顳葉。我們評估她的神經心理功能，其中也包括了情緒狀態與半結構神經行爲標準晤談量表的施測。

結果：神經心理檢查的結果顯示，病患呈現多重認知功能缺損，其中包括失憶、視空間知覺與執行功能缺損。病患的錯認症狀，包括了對於時間、地點、人物與事件的錯認。此外，病患還呈現易怒、愛開玩笑、幼稚、編故事（confabulation）與缺乏病識感（awareness）等明顯的心理病理症狀。

結論：這位病患呈現多種層面的錯認症狀，這些症狀可能與病患的時間順序記憶、視空間知覺、執行功能與缺乏病識感等，多重認知功能缺損有關。

關鍵詞：錯認、腦傷