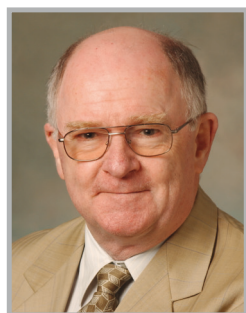


The mirrored-self misidentification delusion



Max Coltheart*

“It appears that the mirrored-self misidentification delusion is not uncommon in cases of dementia, but generally emerges only at so late a stage of the disease that it is too difficult to study in such cases.”

The mirrored-self misidentification delusion is the belief that, when you look into a mirror, the person you see in the mirror is not yourself, but some stranger who happens to look like you. It is an example of a monothematic delusion (i.e., a delusion in which there is only a single abnormal belief present, or at most a cluster of abnormal beliefs related to a single theme). This contrasts with polythematic delusions, where a variety of unrelated delusional beliefs are present; for example, the mathematician John Nash believed during his schizophrenic episodes that he would become Emperor of Antarctica, that he was the left foot of God on Earth and that his name was really Johann von Nassau [1].

Other examples of monothematic delusions include Capgras delusion (the belief that someone emotionally close, such as a spouse, has been replaced by a stranger of the same appearance), Fregoli delusion (“People I know are following me around but I cannot recognize who they are because they are always disguised”), Cotard delusion (“I am dead”), somatoparaphrenia (“This arm [the patient’s own arm] is not

mine, it is yours”) and the delusion of alien control (“Other people can cause parts of my body to move without my willing such movements”).

How might such delusions be explained? What causes them? A promising approach here is the two-factor theory of delusional belief [2–4]. According to this theory, all that is needed for understanding any of the forms of monothematic delusional belief is to discover the answer to two questions. The first question is: what prompted the delusional idea in the first place? The second question is: what caused this idea to become an accepted belief, rather than it being rejected on the grounds of implausibility or bizarreness, or because the patient’s family and friends and clinicians are all insisting that the belief is false?

Some success has been achieved in obtaining answers to these two questions for each of the monothematic delusions described above (for recent review, see Coltheart *et al.* [2]). For each delusion, it is possible to identify or plausibly hypothesize a neuropsychological abnormality responsible for the specific content of the delusional

“The mirrored-self misidentification delusion is the belief that, when you look into a mirror, the person you see in the mirror is not yourself, but some stranger who happens to look like you.”

*Centre for Cognition & its Disorders, Macquarie University, Sydney NSW 2109, Australia; max.coltheart@mq.edu.au

idea: this offers an answer to the first question. A plausible answer to the second question has been that a second neuropsychological abnormality is common to all the forms of monothematic delusion, this being a disorder of a belief evaluation system putatively associated with an impairment of the right dorsolateral prefrontal cortex. It is because of this second impairment that the delusional idea cannot be rejected and instead becomes a belief.

This article focuses on mirrored-self misidentification because it is probably the best-understood of the monothematic delusions and thus serves as a paradigm case for attempts to explain the genesis of such delusions. Breen *et al.* carried out detailed studies of two patients with this delusional belief (patients TH and FE), both of whom, it later transpired, were in the early stages of dementia when they were tested [5]. These studies sought answers to the two questions associated with the two-factor theory of delusional belief.

Patient TH was shown to have mirror agnosia, an acquired inability to understand how mirrors work. In this condition, mirrors are treated as if they were windows (or holes in the wall). For example, if TH was looking into a mirror in which an object held up behind him over his shoulder was reflected, and he was asked to touch this object, he persistently attempted to reach into or behind the mirror, rather than reaching back behind his shoulder. A person seen through a window or a hole in the wall must be in a different part of space than the viewer, and therefore cannot be the viewer. This, Breen and colleagues suggested, is what prompted TH's idea that his reflection in the mirror was not him, but some other person. But this cannot be sufficient to explain TH's delusion, because other patients with mirror agnosia are not delusional about their reflections in the mirror [6]. A second factor needs to be present, an impairment of a right hemisphere belief evaluation system. Indeed, neuropsychological testing revealed impaired right hemisphere functioning in TH, although this testing was not of a form that allowed precise localization of this right hemisphere impairment.

Patient FE showed no mirror agnosia. However, he did exhibit an acquired impairment of face processing. This meant that the percept he formed of his face when he looked into the mirror would be abnormal and so would not match his long-term memory of what his face looked like. This, Breen and colleagues suggested, is what prompted FE's idea that his reflection in the mirror was not

him, but some other person. But this cannot be sufficient to explain FE's delusion, because other patients with face-processing impairments, such as patients with prosopagnosia, are not delusional about their reflections in the mirror. So again, a second factor needs to be present, such as an impairment of a right hemisphere belief evaluation system, and as with TH, neuropsychological testing revealed impaired right hemisphere functioning in FE, although again, this testing was not of a form that allowed precise localization of this right hemisphere impairment.

Although both TH and FE were well oriented cognitively when they were being studied, they soon afterwards began to show clear symptoms of dementia, and then deteriorated rapidly [7]. It appears that the mirrored-self misidentification delusion is not uncommon in cases of dementia, but generally emerges at so late a stage of the disease that it is too difficult to study in such cases. Connors and Coltheart have published, with a commentary, a translation of a 1963 paper by Ajuriagerra and colleagues that described 30 patients with dementia who all had some form of impairment in tasks that involved interacting with mirrors, such as the 'reaching-over-the-shoulder' task described earlier [8]. However, only eight of these 30 patients with dementia (generally the most severely affected patients) thought that their reflections in the mirror were not reflections of themselves but of strangers (i.e., exhibited the mirrored-self misidentification delusion). This confirms the view that the presence of mirror agnosia or mirror ataxia is not sufficient to cause this delusion, even if these mirror-related impairments can be responsible for initially prompting a delusional idea about the identity of one's reflection in the mirror. What is additionally needed in order to turn this initial delusional idea into a persisting delusional belief is, according to the two-factor theory of delusional belief, a disorder of the belief evaluation system.

Although the mirrored-self misidentification delusion is seen in patients with dementia, it is not solely confined to that etiology. The same delusion has been reported in association with schizophrenia [9] and with ischemic stroke [10]. This point is generally true of the different forms of monothematic delusion. None of these disorders is confined to a single etiology such as dementia or schizophrenia or focal brain damage. With this in mind, it is unlikely to be important to consider etiology when trying to develop an understanding of the monothematic delusions.

"...in investigating monothematic delusions, we should care about symptoms (what particular delusion does this person exhibit and why?) and not about syndromes (what is this person's clinical diagnosis – is it schizophrenia or dementia or focal brain damage?)."

For example, if the two-factor theory of delusional belief is an appropriate one, it is offering a cognitive-level explanation involving a factor that is responsible for the content of a delusion and a second factor responsible for its persistence. There is no reason to expect that these two cognitive impairments can only arise in patients with just one particular etiology. Nor is there any reason to expect that both impairments will be present in all patients having some particular etiology.

The two-factor theory is also concerned with the neural correlates of the two particular cognitive impairments that are present, according to the theory, in any case of monothematic delusion, so the theory here is not concerned solely with the cognitive level. But even given this, etiology is not likely to be relevant to explanation. Suppose it is true that, for example, the mirrored-self misidentification delusion occurs when there is a form of brain damage that results in mirror agnosia or else a form of brain damage that results in impaired face perception, plus in either case a form of brain damage (perhaps damage to the right dorsolateral prefrontal cortex) that results in impaired belief formation. There is no reason to suppose that the pair of neuropsychological impairments involved could only be present in a single etiological condition (i.e., in a single syndrome). Therefore, in investigating monothematic delusions, we should care about symptoms (what particular delusion does this person exhibit and why?) and not about syndromes (what is this person's clinical diagnosis – is it schizophrenia or dementia or focal brain damage?).

This approach is consistent with recent work using hypnosis to study monothematic delusion. Many of the standard monothematic delusions

can be evoked in psychiatrically and neuropsychologically healthy individuals by hypnotic suggestion, if these individuals are high in hypnotizability. The behavior of such people when a monothematic delusion has been suggested hypnotically can be remarkably similar to the behavior of people who are genuinely delusional for neuropsychological reasons. This similarity is particularly striking in the case of hypnotically induced mirrored-self misidentification delusion [11].

By way of conclusion, I note that, although I have focused on just one form of monothematic delusion here, all that I have said applies to the other kinds of monothematic delusion too. The two-factor theory seems to be applicable to all of them. None of these disorders occurs only in the context of one particular etiology, and there is no etiology in which any particular kind of monothematic delusion is always seen, so to understand delusion, what we should be studying are the various delusions themselves rather than the clinical syndromes exhibited by delusional patients. Furthermore, several different forms of monothematic delusion have been successfully simulated in the hypnosis laboratory with nonclinical highly hypnotizable subjects.

“...to understand delusion, what we should be studying are the various delusions themselves rather than the clinical syndromes exhibited by delusional patients.”

Financial & competing interests disclosure

The author has no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

No writing assistance was utilized in the production of this manuscript.

References

- 1 Capps D. John Nash's delusional decade: a case of paranoid schizophrenia. *Pastoral Psychol.* 52, 193–218 (2004).
- 2 Coltheart M, Langdon R, McKay RT. Delusional belief. *Ann. Rev. Psych.* 62, 271–298 (2011).
- 3 Langdon R, Coltheart M. The cognitive neuropsychology of delusions. *Mind Language* 15, 184–218 (2000).
- 4 Coltheart M. The 33rd Bartlett Lecture: cognitive neuropsychiatry and delusional belief. *Q. J. Exp. Psych.* 60, 1041–1062 (2007).
- 5 Breen N, Caine D, Coltheart M *et al.* Delusional misidentification. *Mind Language* 15, 74–110 (2000).
- 6 Binkofski F, Buccino G, Dohle C *et al.* Mirror agnosia and mirror ataxia constitute different parietal lobe disorders. *Ann. Neurol.* 47, 553–554 (1999).
- 7 Breen N, Caine D, Coltheart M. Mirrored-self misidentification: two cases of focal-onset dementia. *Dement. Rev. J.* 2, 16–17 (2003).
- 8 Connors M, Coltheart M. On the behaviour of senile dementia patients vis-à-vis the mirror: Ajuriaguerra, Strejilevitch and Tissot (1963). *Neuropsychologia* 49(7), 1679–1692 (2011).
- 9 Gluckman LK. A case of Capgras syndrome. *Aust. NZ J. Psychiatry* 2, 39–43 (1968).
- 10 Villarejo A, Martin VP, Moreno-Ramos T *et al.* Mirrored-self misidentification in a patient without dementia: evidence for right hemisphere and bifrontal damage. *Neurocase* 17, 276–284 (2011).
- 11 Barnier AJ, Cox RE, O'Connor A *et al.* Developing hypnotic analogues of clinical delusions: mirrored-self misidentification. *Cog. Neuropsychiatry* 13, 406–430 (2008).