‘WHERE IS MY KEY? WHERE IS HIS KEY? PERSPECTIVE TAKING AND SOCIAL SENSITIVITY OF THE KEY SEARCH TASK.

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The ability to understand and attribute mental states to oneself and others is referred as Theory of Mind (ToM; Premack & Woodruff, 1978). ToM is essential for comprehension of our own behaviour as well as that of others. These self- and other-orientated attributions have been shown to be dissociable through clinical, experimental and neuroimaging studies (e.g., Bradford, Jentzsch, & Gomez, 2015, Bodden et al., 2010; Decety, & Sommerville, 2003; Harari, Shamay-Tsorry, Ravid, & Levkovitz, 2010). Here we report how simply rewording whether a real-world problem-solving task is completed from the perspective of the self or others can change how the test is performed.

Both patients CW (61 years old) and patient FH (75 years old) were right-handed male patients who suffered right hemisphere ischemic strokes and were recruited through the Royal Infirmary of Edinburgh within one month post-stroke. CW and FH were referred by the Acute Stroke Unit team as they met our selection criteria of no history of previous vascular accident, head injury, psychiatric or other neuropsychological disorders such as amnesia, apraxia, dysphasia or neglect and had normal or corrected to normal vision and hearing. This was determined through a background neuropsychological assessment by a stroke specialist.

CW and FH performed the Key Search task from the Behavioural Assessment of the Dysexecutive Syndrome (BADS; Wilson, Alderman, Burgess, Emslie, & Evans, 1996) which assesses planning and strategy formation both from a first- and third-person perspective. The patients were presented with an A4-sized piece of paper with a 100mm square in the middle and a black dot 50 mm below it representing the field.

Firstly, the Key Search task was administered and scored according to the BADS manual, with the following instructions (Wilson et al., 1996, p 9):

'I want you to imagine that this square is a large field. Somewhere in this field you have lost your keys. You don't know exactly where you have lost them because you have

been all over the field, all you know is that they are somewhere in the field. Starting from this dot I want you to draw a line with the pen to show me where you would walk to search the field to make absolutely certain that you would find your keys no matter where they were.'

During standard administration of the test, it became clear that patient CW could not grasp the concept of 'not knowing' where he had lost his own keys. He insisted that he would know where he had lost them as he would know exactly where he had walked. This led the researcher to change the instructions and deliver the Key Search test once again but from a third person perspective:

'I want you to imagine that this square is a large field. Somewhere in this field John has lost his keys. You don't know exactly where he has lost them because he has been all over the field, all you know is that they are somewhere in the field. Starting from this dot I want you to draw a line with the pen to show me where you would walk to search the field to make absolutely certain that you would find John's keys no matter where they were'.

After changing the instructions from the first- to the third-person, patient CW's score on the Key Search task improved considerably (see Figure 1). The opposite pattern was found for patient FH who performed better on the task when it was administered in the first-person rather than the third-person perspective, although the effect of perspective was not as substantial (see Figure 2).

- Insert Figures 1 and 2 around here -

Here we report an interesting phenomena where the perspective taken affects the way that participants perform the task. Patient FH searched the entire field when looking for his own key but searched only half the field when searching for the key on John's behalf. In contrast, patient CW searched the entire field when searching for the lost key for John, but

made little attempt to search for his own key. Ratings of behaviour on the Frontal System Behavioural Scale (FrSBe; Grace & Malloy, 2001) post-stroke might shed some light on the underlying causes for these differences in performance depending on which perspective the patient is asked to take (Table 1). The FrSBe formerly known as Frontal Lobe Personality Scale (FLOPS: Grace, Stout, & Malloy, 1999) is designed to measure changes in apathy, disinhibition and executive functioning rated both by a close family member (or carer) and the patient. In Table 1 we report scores based on both patients and relative ratings after stroke.

- Insert Table 1 around here -

Patient CW was rated as having the strongest changes in relation to executive functioning (e.g., 'patient gets stuck on certain ideas', 'denies having problems' or 'is unaware of problems or mistakes'). Hence, CW's difficulty of grasping the concept of 'not knowing' where he had lost his own key might suggest very concrete thinking, difficulty in abstract reasoning and is more likely to be associated with general dysexecutive syndrome. Indeed, he had an overall BADS profile score of 10 out of 24 indicating a clinical impairment. In contrast, FH performed within the average range with an overall BADS profile score of 17. His performance on other BADS subtests were also within the average range including the ZOO Map Test (with profile score 4 out of 4) where the patient has to plan a route around a zoo on a map and which is similar to the key search task, suggesting his differences in performance on the Key Search task is not due to an executive or visuospatial impairment. It may be that FH's poorer performance on the 3rd person perspective version of the task is due to a deficit in Theory of Mind (ToM) which literally involves 'putting oneself in another person shoes' while searching for the key. Our results support the fMRI literature

showing that performance on first versus third person perspective tasks depends on different neural processes (e.g., Vogeley, Ritzl, Falkai, Zilles & Fink, 2004). Of course, we cannot completely rule out the possibility of neglect without a more extensive neuropsychological assessment being carried out.

Further work might involve testing and re-testing patients on a variety of tasks from a 1st and 3rd person perspective to determine whether this dissociation is a consistent finding within and between tasks. In any case, the 'key to success' in neuropsychological assessment is being aware that there are many underlying processes that influence test performance, and perspective taking, as highlighted by our observation, might be an important one to consider!

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Table 1. T-scores reflecting behavioural change on the FrSBe subscales (apathy, disinhibition and executive functioning) on the self and family rating after stroke.

Patient	Rater	Apathy	Disinhibition	Executive Dysfunction	Total Score
CW	Self	67 C	53	91 C	78 C
	Family	59	49	79 C	67 C
FH	Self	66 C	71 C	61 B	69 C
	Family	86 C	80 C	99 C	101C

Note: C = clinical impairment, B = borderline impairment

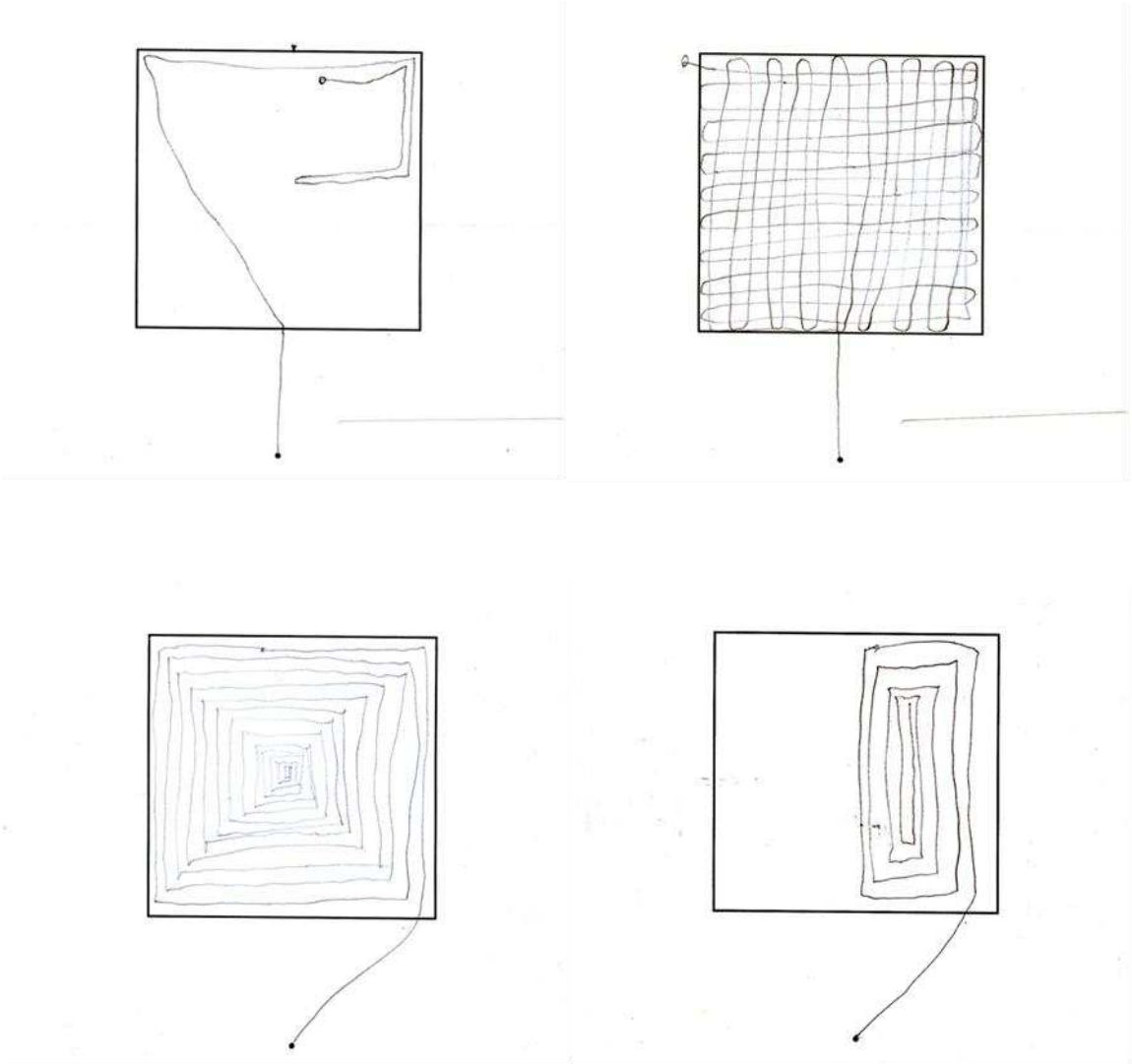

Figure Captions

Figure 1.

Top: Patient CW's performance on the Key Search task from the perspective of the first person (left) scoring 4 out of 16 and third person (right) scoring 15 out of 16.

Bottom: Patient FH's performance on the Key Search task from the perspective of the first person (left) scoring 10 out of 16 and the third person (right) scoring 8 out of 16.