



Clinical Outcomes

OCS

Oxford Cognitive Screen -Australian Version User Manual-2022

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SUMMARY

APPENDIX

Normative data and cut-offs for impairment

1. Administration and scoring instructions

The Oxford Cognitive Screen (OCS) assesses the major cognitive domains of memory, language, number, praxis, executive functions and attention. It has been designed as a screening tool which provides a rapid assessment of a patient's cognitive function, and acts as a pointer for further, more detailed assessment should impairment (s) in any cognitive domain be revealed. It is quick to administer (approximately 15 minutes); and, unlike other current screening tools, allows assessment of aphasic patients (test items are presented both visually and verbally, and the possibility of selecting a correct answer from a multiple choice array). Test items are aligned centrally (reducing the necessity of visual scanning) so attentional allocation is optimised. Unlike other screening tools, OCS provides measures of neglect (both allocentric and egocentric), praxis and numerical cognition.

2. Picture Naming

Administration: Examiner instruction: **“I’m going to show you 4 pictures and I’d like you to tell me what they are.”** The patient is separately presented with 4 pictures to name (giraffe, watermelon, chest of drawers and pear). This is the first question to assess level of expressive language.

Scoring: Participant scores 1 for each correct answer (maximum score = 4). Melon and chest of drawers are allowed alternatives and will also score 1. Self-correction is permitted and the final answer is taken as the participants' response. The score contributes to the overall assessment of *language*.

3. Semantics

- *Administration:* The patient is presented with 4 pictures simultaneously (arranged in vertical orientation) – the pictures are: hammer, pear, carrot, giraffe. Examiner instruction: **“On this page there are 4 drawings, can you point to the fruit for me? Now the animal? And finally the tool?”**
*Note Version B instructions: **“Can you point to the fruit for me? Now the farm animal? And finally the tool?”**

Aside from semantics, this question allows a screening of receptive language ability and reliable pointing.

Scoring: Participant scores 1 for each correct answer (maximum score = 3). Self-correction is permitted and the final answer is taken as the participants' response. The score contributes to the overall assessment of *language*.

4. Orientation

Administration: This question has multiple choice options if needed. First an open question is asked with free response from the participant. If the participant cannot respond (e.g. due to aphasia), makes an error or does not know, multiple choice options are presented. When the multiple choice options are given, the question is read out to the participant and the four possible alternative choices are also read out and pointed to by the examiner to direct the participants' attention to the items in succession. The participant can then point to their selected response.

Examiner instruction: **“I’m going to read you a few questions:**

Which city or town are we in?

Without checking the time, can you tell me what part of the day it is?

Can you tell me the month?

And finally, what is the year we are in now?

Scoring: Participant scores 1 for each free response correct answer (maximum score = 4). Participants are not penalised for needing multiple choice options (levelling the field for patients with aphasia), and the final score reflects number of total correct responses after multiple choice options. The score (maximum = 4) contributes to the overall assessment of *memory*.

5. Visual field assessment

Administration: A simple confrontation test is used. The examiner faces the participant and raises both hands, first to the participant’s upper visual fields, and then to their lower visual fields. In each of these locations, the examiner will waggle the fingers of either the left or the right hand, while checking that the participant maintains a central fixation. Examiner instruction: **“Please look at my nose and tell me by pointing when you can see my hand move.”**

Scoring: 1 tick for each quadrant, resulting in scores out of 2 for left and right visual hemifield. Any deficit would be noted, and care taken to ensure that all subsequent tests are performed in the intact visual field.

6. Sentence reading

Administration: The sentence is aligned centrally on the page, the 15 words are arranged in 4 rows (3 with 4 words each, one with three). The sentence contains 4 critical irregular words (islands, quay, colonel and yacht). Regularisations of these words would indicate a reading deficit such as *surface dyslexia*. Four of the words are ‘high neighbourhood’ words (i.e., words that share end sequences of letters with a number of other words (e.g., have, any, islands, thought), if errors are made on these words *neglect dyslexia* is a possibility. The page is held at a comfortable reading distance from the patient, and the examiner instructs: **“Can you read this sentence out loud for me?”** When the patient has finished reading (or attempting to read), say **“Please try to remember this sentence, as I will ask you about it later”**. Then, for all participants, once the sentence has been read (or not read, if patient was not able to, e.g. due to *expressive aphasia*), the examiner is to read the sentence slowly and out loud to the participant with the examiner pointing to each word as it is read. Examiner instruction: **“The sentence was:”** This allows for the later assessment of *recognition memory*.

Scoring: A mark is given for each word read correctly. Errors should be noted. Self-correction is permitted and not penalised. Performance on this test contributes to the overall assessment of *language*.

7. Numerical cognition

a) Number writing

Administration: The patient is presented with a piece of paper and asked to write 3 numbers (708, 15,200 and 400). Examiner instruction: **“For the next task, I will ask you to write down some numbers for me – please can you write in numbers: seven hundred and eight (pause .repeat once if necessary), Fifteen thousand two hundred (pause .repeat once if necessary) and finally four hundred (pause .repeat once if necessary).** This assesses the patient’s understanding of number and ability to write.

Note* Version B instructions: **nine hundred and six, twelve thousand four hundred and three hundred.

Scoring: The maximum score is 3. Errors usually take the form of increased numbers of zeros (e.g., 7008) as if the patient is writing each individual part of the presented number 700 and 8.

b) Calculation

Administration: There are 4 mental arithmetic questions. Material is presented visually to optimise performance in patients with speech problems. First, the target question is given centred on the page for free responses – patients are also allowed to write down their answers. If the participant cannot respond by free response (e.g. due to expressive aphasia), the patient is asked to select (by pointing) which one of 4 possible answers is the correct one. Examiner instruction: **“I’m going to show you some calculations, can you tell me how much is ...”**

Scoring: 1 point for each correct calculation. As before, participants are not penalised for needing multiple choice options (levelling the field for patients with aphasia), and the final score reflects number of total correct responses after multiple choice options. The score (maximum = 4) contributes to the overall assessment of *numerical cognition*.

8. Attention

Administration: The Hearts Test has been devised as a test of visual attention. The patient is instructed with the practice page: **“Please can you cross through the complete hearts, that is the hearts without any gaps, as you can see in this example (point to the top two crossed out hearts). Now can you try to cross out the complete hearts here along this line”** (direct attention to the single line of hearts by pointing). Feedback is given, and the test is only started when patient makes a reliable selection of the hearts (this could include some false positives if the patient has object-centred neglect) and fully understands the task. If the patient makes no selection, or selects all of the hearts, a second set of practice hearts is given. If after this second practice, the participant still fails to understand the task, the test is stopped.

When the practice is completed, Examiner instruction: **“Now I would like you to do the same on this page, please cross out all the complete hearts”**. Make sure the page is centred, with the triangle in the patients’ midline. If you need to hold the page (the page cannot be turned or moved by the participant), please hold at the centre in the middle, so as not to provide any cues to the width of the page. Please record time!

A maximum time of 3 minutes is given, if the patient completes within this time, the time taken should be recorded.

Scoring:

The total time taken for the task is recorded and 1 point is given for every correctly cancelled heart shape. The overall accuracy is recorded as “Total Correct” (maximum score = 50). A scoring transparency is available which highlights the positions of the correct hearts. This score contributes to the overall assessment of *attention*, and in particular reflects performance of sustained and selected attention.

In addition to the hearts, the test sheet also has 6 small dots equally distributed across both the middle of the sheet, and at the bottom of the sheet. These are not discussed with the patient, but allow the examiner to score performance, as they divide the array into 10 blocks (arranged in two rows of 5). Each block contains 5 complete hearts, 5 with a left-side gap and 5 with a right-side gap. The total number of complete hearts is recorded. A **SPACE** asymmetry score is computed by subtracting the number of correct hearts cancelled in the 4 left-most blocks from the number of correct hearts cancelled in the right-most 4 blocks. If a positive value is obtained, it indicates that the patient has cancelled more right-side hearts than left-side and is showing *left egocentric neglect* (neglect of the left side of space). A negative score indicates that more left-side than right-side hearts have been cancelled, and the patient is showing *right egocentric neglect*.

The total number of false positives are scored by summing the number of left gap hearts cancelled, and the same for right gap hearts. An **OBJECT** asymmetry score is then calculated by subtracting the number of right-gap hearts cancelled from the total of left-gap hearts cancelled. If a *positive value* is obtained, it indicates that the patient has cancelled more left-gap hearts than right-gap hearts and is showing *left allocentric neglect* (neglect of the left side of the objects). A *negative asymmetry score* indicates that more right-gap than left-gap hearts have been cancelled, and the patient is showing *right allocentric neglect*.

9. Praxis

Administration: The task is performed with the patients’ current preferred hand. This is a mirroring task, and thus the examiner needs to demonstrate the meaningless actions with their opposite hand. (e.g. if their currently preferred hand is the right hand, the examiner will perform the gestures with their left hand). Examiner instruction: **“I am going to show you some actions; they do not mean anything, but try your best to copy what I do. You should mirror me, so when I lift this hand (lift your left hand), you should lift this hand (touch the examinee’s right hand). Now I will carry out a sequence of two actions. Please wait until I have finished before you copy me”**. If the patient responds with gestures that are incorrect or imprecise, the examiner repeats the gesture (once only).

Scoring: Three points are scored if the gestures are correct and precise after 1 presentation, 2 points if they are correct and precise after the second presentation, 1 point if there is one error after the second presentation, and 0 points are given if more than one error, no response or perseveration from a previous item after the second presentation. The maximum score for imitating hand movements is 6, and for imitating finger movements is 6 giving a total praxis score of 12.

10. Memory: Recall and recognition.

a) Verbal memory

Administration: Examiner instruction: **“Do you remember you read a sentence for me earlier? Do you remember what this sentence was? Any of the words?”** If the patient is unable to remember the sentence, or only part of the target words, multiple choice assessments are given for each missed or incorrect target word. For each, the patient is shown a page with 4 options distributed vertically. These consist of the target word, a semantically similar distractor and two unrelated words. **“One of the words in the sentence was one of these four”**. The examiner points to each word in turn and reads it aloud **“Can you point to the word that perhaps looks more familiar to you?”** If the patient had been able to recall any words from the sentence correctly, their recognition of those words is not assessed.

Scoring: 1 point is given for each of the irregular words that are recalled correctly (kneading, dough, chef and flour) (maximum recall score = 4). The total score reflects number of total correct responses after multiple choice options. The score (maximum = 4) contributes to the overall assessment of *memory*.

b) Episodic memory

Administration: Examiner instruction: **“I’m going to now ask you some questions about some of the tasks we did earlier”**. For each question, the patient is shown a page with 4 options distributed vertically. **“Which picture did you see before?”** ~ The examiner points to each option in turn WITHOUT describing it.

Scoring: Participant scores 1 for each correct answer (maximum score = 4). The score (maximum = 4) contributes to the overall assessment of *memory*.

11. Executive test: Task switching

There are 3 components to this test. There are two simple tasks (connecting circles presented with triangle distractors, and connecting triangles presented with circle distractors) and a more complex task (where the patient has to switch between the circles and triangles). For the complex task, the patient is asked to draw a trail connecting 14 triangles and circles which are scattered randomly on the page. The patient is asked to alternate between the circles and triangles starting with the largest item and progressing to successively smaller items. Since this is quite a complex task, the two simpler versions are administered **first**. These give the patient time to master the task requirements, and act as a measure of the ability to perform a single task.

Administration: Examiner instruction: **“Can you draw me a line connecting the circles only, going from the largest one to the smallest one, like on this example (show example page from testbooklet)?”** Maximum help is given during the practice to ensure that the patient understands the task. The example is then removed. **“That was a practice, here is the test page, can you do the same, connect the circles going from the largest to the smallest one”** (record the time!).

The second single task is similar to the first, but consists of connecting the triangles from largest to smallest. Practice is given in the same way as before. Examiner instruction: **“This time your task is to connect the triangles, going from the largest to the smallest one, like this** (show example page from test booklet). **Can you try to do the same on this practice page?”** Maximum help is given during the practice to ensure that the patient understands the task. The example is then removed. **“That was a practice, here is the test page, can you do the same, connect the triangles going from the largest to the smallest one”** (record the time!). Once the two single tasks have been completed, the patient performs the complex task. There is again an opportunity to practice the task, and again, maximum help should be given to ensure that the patient understands the task. Examiner instruction: **“The following task requires you to alternate between the circles and triangles. As in the previous two tasks, the connections are from large to small, only now you have to alternate the triangles with the circles. Both need to be successively going down in size. “You should start with the largest triangle, then go to the largest circle, then the next largest triangle, the next largest circle and so on”**

“That was a practice, here is the test page, can you do the same, connect alternate triangles with the circles, going from the largest to the smallest one” (record the time!).

Scoring: There are 7 circles with 7 distractor triangles. One point is given for each correct connection (if an error is made at some point, but subsequent performance is correct, the correct connections are acknowledged). The number of correct connections for the two simple tasks are scored (maximum = 6 each), as is the number of connections for the complex task (maximum = 13). The final measure is a subtraction of the complex task score from the combined simple task scores. Each task is timed with a baseline average score of 30 secs. Although the participant is not penalised for taking longer this provides further information on processing speed and attention.

SUMMARY

A summary of the patient’s performance on OCS should be provided. Scores should be given under different subheadings, together with an evaluative comment. Under a heading **Memory** the scores for the orientation questions and for recall and recognition of the sentence should be given, as well as the episodic recognition scores. The scores for reading the sentence and for picture naming and semantics should be presented under a heading **Language**. Further headings are for **Numerical Cognition** and **Praxis**. The scores for the cancellation and executive tasks should be provided under the heading **Attention**.

Table 1. Comparison between each task on the OCS and OCS-AU, Version A [mean, median, 5th (95th) centile scores] and consensus OCS-AU cut score.

Task order and name/ [maximum (or optimal) score]	Measure	UK OCS mean	UK OCS median ^[1]	UK OCS 5 th centile ^[1]	UK OCS 95 th centile ^[1]	OCS-AU mean	OCS-AU median	OCS-AU 5 th centile	OCS-AU 95 th centile	cohens <i>d</i>	Consensus OCS- AU cut score
1. Picture naming (max=4)	Overall accuracy	3.35	4	3		3.93	4	3		-0.93*	Less than 3
2. Semantics (max= 4)	Overall accuracy	2.52	3	3		3.00	3	3		-1.11*	Less than 3
3. Orientation (max= 4)	Overall accuracy	3.48	4	4		4.00	4	4		-1.17*	Less than 4
4. Visual field assessment (max=4)	Overall accuracy	3.98	4	4		4.00	4	4		-0.09	Less than 4
5. Sentence reading (max=15)	Overall accuracy	14.76	15	14		14.91	15	15		-0.15	Less than 14
6. Numerical recognition											
Number writing (max=3)	Overall accuracy	2.94	3	3		2.97	3	3		-0.12	Less than 3
Calculation (max=4)	Overall accuracy	3.88	4	3		3.95	4	4		-0.17	Less than 3
7. Attention (Broken hearts) (max=50)	Overall accuracy	47.13	48	42		47.50	49	43		-0.12	Less than 42
Left neglect	Object Asymmetry (left inattention > 0, right <0)	0.02	0	0 ^a	0 ^a	0.00	0	0	0	0.05	More than 1 Less than -1
Right neglect	Space Asymmetry (left inattention > 0, right <0)	-0.13	0	-2	3 ^b	0.03	0	-2	3	-0.12	More than 3 Less than -2
8. Praxis (imitation) (max=12)	Overall accuracy	10.68	11	8		11.29	12	9		-0.36 [^]	Less than 8
9. Memory: Recall and recognition											
Verbal memory (max= 4)	Verbal memory recall and recognition	3.91	4	4	3	3.79	4	3		0.32	Less than 3
Episodic memory (max= 4)	Episodic recognition	3.85	4	4	3	3.76	4	3		0.21	Less than 3
10. Executive test: task switching (optimal = -1)	Executive score accuracy (sum of single tasks minus mixed task)	-0.24	0		4	-0.36	-1	-2	5	0.06	More than 4

Note: Mean differences comparisons were conducted using Welch Two Sample t-tests; statistically significant difference based on criteria of $p < 0.5$: actual p value: * = < 0.001 , ^ = 0.01

1. Demeyere N, Riddoch MJ, Slavkova ED, Bickerton WL, Humphreys GW. The Oxford Cognitive Screen (OCS): validation of a stroke-specific short cognitive screening tool. *Psychol Assess.* 2015 Sep;27(3):883-94. PubMed PMID: 25730165. Epub 2015/03/03.

Table 2. Comparison between each task on the OCS and OCS-AU, **Version B** [mean, median, 5th (95th) centile scores] and consensus OCS-AU cut score.

Task order and name/ [maximum (or optimal) score]	Measure	UK OCS mean	UK OCS median ^[1]	UK OCS 5 th centile ^[1]	UK OCS 95 th centile ^[1]	OCS-AU mean	OCS-AU median	OCS-AU 5 th centile	OCS-AU 95 th centile	cohens <i>d</i>	Consensus OCS- AU cut score
VERSION B											
1. Picture naming (max=4)	Overall accuracy	3.35	4	3		3.97	4	4		-1.00*	Less than 3
2. Semantics (max= 4)	Overall accuracy	2.52	3	3		3.00	3	3		-1.11*	Less than 3
3. Orientation (max= 4)	Overall accuracy	3.48	4	4		3.98	4	4		-1.12*	Less than 4
4. Visual field assessment (max=4)	Overall accuracy	3.98	4	4		4.00	4	4		-0.09	Less than 4
5. Sentence reading (max=15)	Overall accuracy	14.76	15	14		14.90	15	14		-0.14	Less than 14
6. Numerical recognition											
Number writing (max=3)	Overall accuracy	2.94	3	3		2.98	3	3		-0.21	Less than 3
Calculation (max=4)	Overall accuracy	3.88	4	3		3.85	4	3		0.07	Less than 3
7. Attention (Broken hearts) (max=50)	Overall accuracy	47.13	48	42		47.48	48	42		-0.12	Less than 42
Left neglect	Object Asymmetry (left inattention > 0, right <0)	0.02	0	0 ^a	0 ^a	-0.10	0	-2	1	0.25	More than 1 Less than -1
Right neglect	Space Asymmetry (left inattention > 0, right <0)	-0.13	0	-2	3 ^b	0.03	0	-2	2	-0.12	More than 3 Less than -2
8. Praxis (imitation) (max=12)	Overall accuracy	10.68	11	8		11.28	12	8		-0.35 [^]	Less than 8
9. Memory: Recall and recognition											
Verbal memory (max= 4)	Verbal memory recall and recognition	3.91	4	4	3	3.77	4	2		0.32	Less than 3
Episodic memory (max= 4)	Episodic recognition	3.85	4	4	3	3.88	4	3		-0.07	Less than 3
10. Executive test: task switching (optimal = -1)	Executive score accuracy (sum of single tasks minus mixed task)	-0.24	0		4	-0.22	-1	-2	6	-0.01	More than 4

Note: Mean differences comparisons were conducted using Welch Two Sample t-tests; statistically significant difference based on criteria of $p < 0.5$: actual p value: * = < 0.001 , ^ = 0.01 ; ^a for a more conservative approach: use cut off of 1^[1] ^b For a more consistent approach: Use cut off of absolute value > 2 ^[1].

1. Demeyere N, Riddoch MJ, Slavkova ED, Bickerton WL, Humphreys GW. The Oxford Cognitive Screen (OCS): validation of a stroke-specific short cognitive screening tool. *Psychol Assess.* 2015 Sep;27(3):883-94. PubMed PMID: 25730165. Epub 2015/03/03.

OCS

Oxford CognitiveScreen

Guidance on determining impairments and using the Visual Snapshot report.

1. Determining impairments:

Please **use the easy scoring template** to check the patient's subtask scores against the normative data. Whereas most impairments arise when a patient has a lower score than the norm, a few tasks are impaired when values are higher than the norm cut offs. This is the case for the asymmetry values reflecting neglect, with large positive values denoting left neglect and large negative values denoting right neglect. Similarly, the executive score, which is calculated by subtracting the mixed score from the sum of the single trails task scores is also impaired when it is larger than the cut off (the larger, the poorer the switching performance with respect to the non-switching trails).

For the neglect assessment, **positive neglect values** denote a Left neglect, both in the spatial neglect measure ("did the patient scan the whole page?") as well as the object neglect measure ("did they notice the gap on the left / right side of the distractor hearts?"). In contrast, **negative neglect values** reflect right neglect, with patients not scanning the right side of the page in the page asymmetry values. A negative object asymmetry means that the patient neglected the gap on the right side of the hearts (and did ok with the left gap ones).

2. Using the Visual Snapshot report:

A summary of the patient's performance on OCS should be provided. Scores should be given under different subheadings, together with an evaluative comment. Under a heading **Memory** the scores for the orientation questions and for recall and recognition of the sentence should be given, as well as the episodic recognition scores. The scores for reading the sentence and for picture naming and semantics should be presented under a heading **Language**. Further headings are for **Numerical Cognition** and **Praxis**. The scores for the cancellation and executive tasks should be provided under the heading **Attention**. See below for a few example reports.

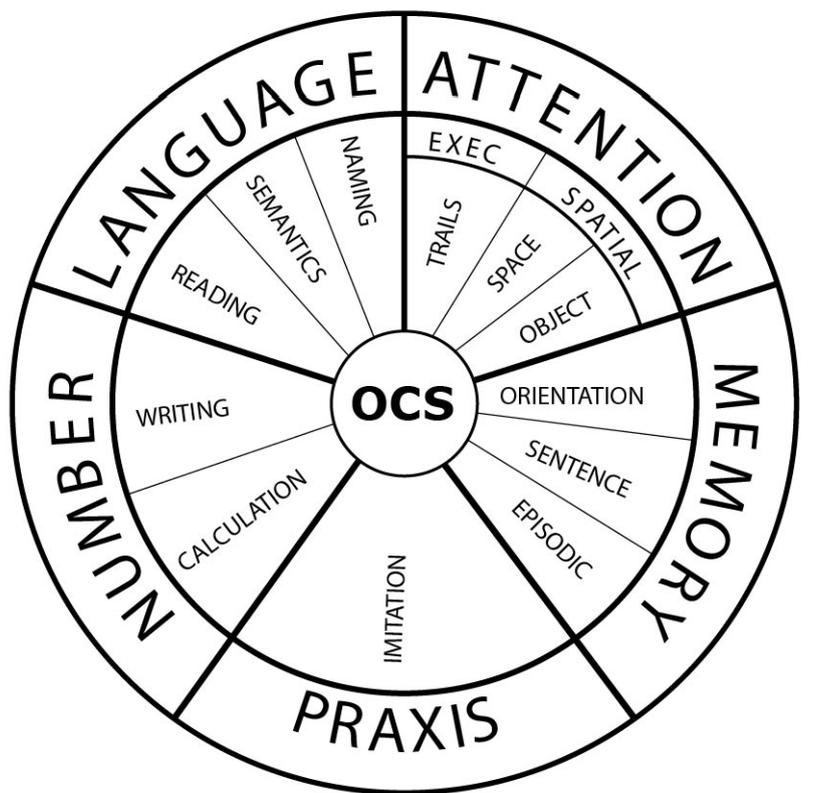
The new version of the OCS report wheel now has the task names in faint writing in the sections to be filled in when these tasks are impaired, this should help you remember the exact task that goes with each section.

It is important to stress that the profile summary should be treated as a template and guide for you to mark on which areas are impaired, but in addition have comments added to it. For example, if a patient has a problem in reading only, but not in the other language domain tasks, you can colour in only part of the pie piece and write next to it (for example: "reading only impaired - score 6/15"). If, in addition, there were interruptions, or other things which may have influenced the task score, for example, the patient did not have their glasses for the reading task, you should comment on this next to the relevant section.

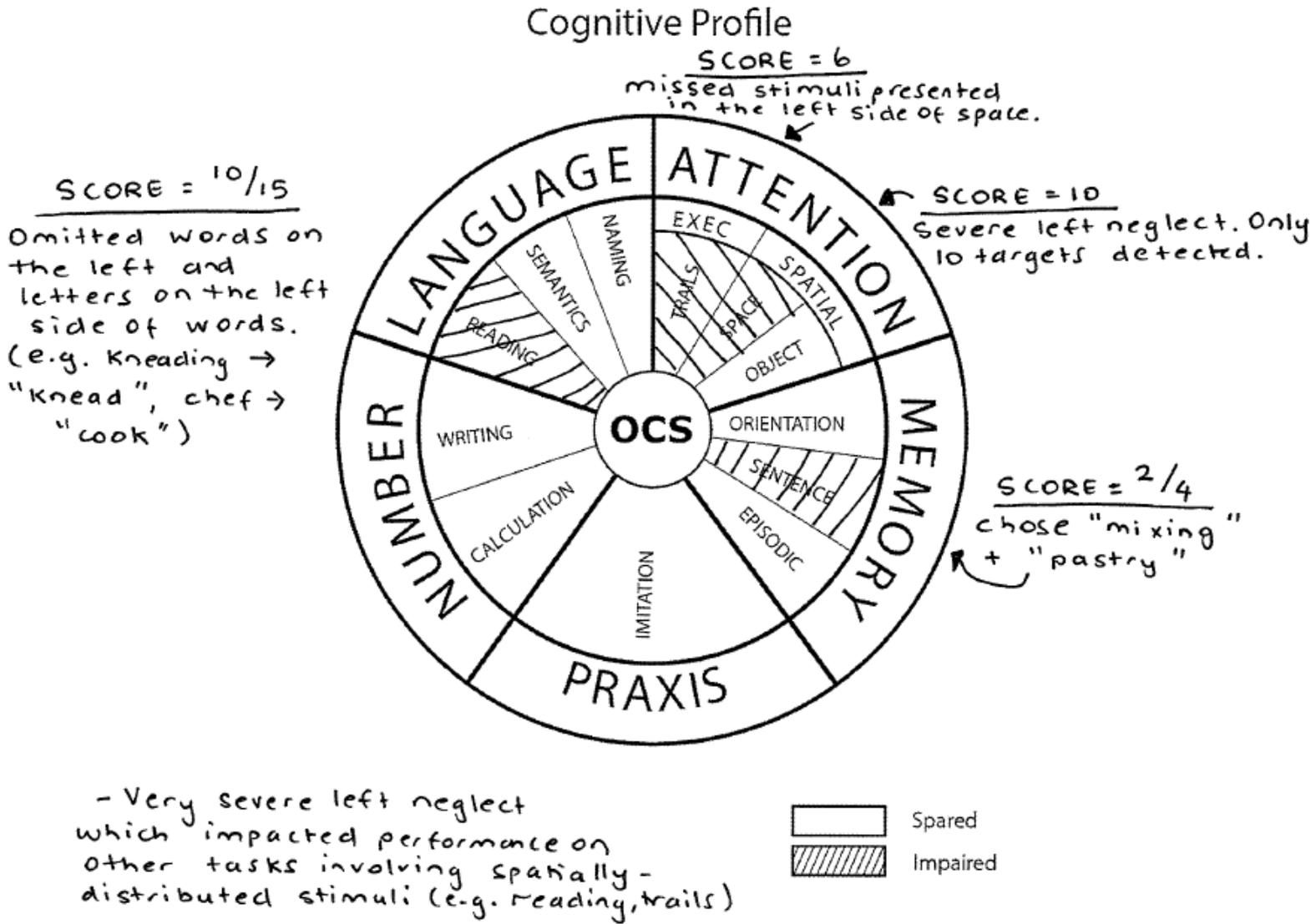
The coloured in snapshot allows members of the MDT to recognize impairments in the different domains at a glance, but in addition, have the short descriptions/comments to elaborate on the pass/fail story.

There are observational details and qualitative information you get from assessing a patient, which may not fall under any of the 5 domains, but with the snapshot as a template, we would recommend you use the space underneath to comment on other aspects of the assessment (e.g. “the patient was very tired and struggled to concentrate” etc).

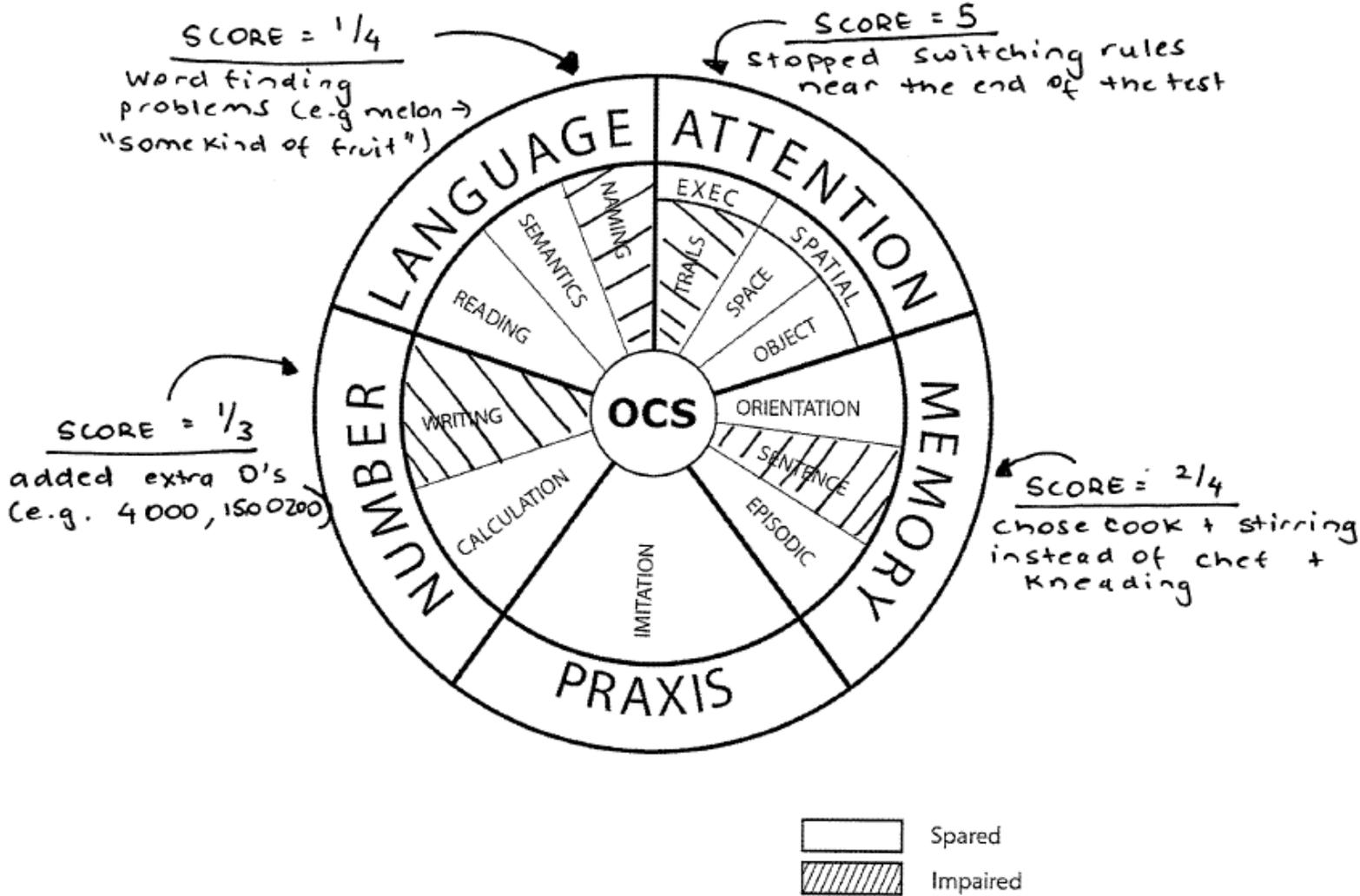
Cognitive Profile



3. Example Reports from the OCS-AU



Cognitive Profile



Cognitive Profile

