

Mobility Assessment Course






Manual



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June 2017

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Introduction

Hemispatial neglect ('neglect') is a frequent disorder after stroke. Patients with neglect ignore or deny the contralesional side of their environment, or respond much slower at stimuli. The Mobility Assessment Course ('MAC') is an observational task to evaluate neglect.¹ During the MAC, patients perform a wayfinding task in corridors while they are instructed to find multiple targets (in the original task and in this manual: yellow squares).

The MAC is suitable to determine the presence of neglect in, for example, the subacute phase post-stroke or during in or outpatient rehabilitation. In some cases, paper-and-pencil tasks (such as cancellation tasks or bisection tasks) do not capture neglect (anymore). For some (rehabilitation) goals, it is relevant to know whether, and under what circumstances, neglect is (still) present. During the MAC, distracting elements (e.g. people walking by) are present, and patients have to perform multiple actions (wayfinding, visual search, target detection) at the same time. There is less room for cognitive compensation (attention has to be divided) or strategic compensation (conscious strategies are less easy to use with higher levels of distraction). The MAC, therefore, resembles everyday life tasks in which motor and cognitive skills have to be elicited at the same time.¹ Assessment of the MAC appeared to be feasible in a rehabilitation setting, and there was a moderate relation with performance on existing neuropsychological tasks.¹ In prior studies with comparable tasks, the interrater reliability for the MAC was high.^{2,3} The task can be used to practice visual scanning or to provide insight. For this aim, administer the task in reversed order and tell, for example, the number of targets in advance. When a patient is unable to move independently, the task can be executed with help (e.g. by calmly pushing the wheelchair). The nature of the task (dual task) then obviously changes; as only one task (searching) has to be performed.

The MAC can be standardized as much as possible by using (within the same building) one route, and by administering the task in a group of healthy control subjects. The activities in the corridor can, however, not being controlled, thus administrations between patients could differ. In addition, buildings and corridors differ from each other, so routes in different settings may not be well-matched. There are some aspects to be considered when choosing a proper route and target locations. This manual is written to support users of the MAC when designing a route.

¹Ten Brink, A.F., Visser-Meily, J.M.A., Nijboer, T.C.W. Dynamic assessment of visual neglect: The Mobility Assessment Course as a diagnostic tool. *Journal of Clinical and Experimental Neuropsychology*. In druk

³Verlander, D., Hayes, A., McInnes, J. K., Liddle, R. J., Liddle, G. W., Clarke, G. E., ... Walsh, P. G. (2000). Assessment of clients with visual spatial disorders: a pilot study. *Visual Impairment Research*, 2(3), 129–142.

³Cunningham, L.J., O'Rourke, K., Finlay, C., Gallagher M. (2017). A preliminary investigation into the psychometric properties of the Dublin Extrapersonal Neglect Assessment (DENA): A novel screening tool for extrapersonal neglect. *Neuropsychological Rehabilitation*, 27(3), 349-368.

How to set up the Mobility Assessment Course

Route

- If possible, choose a corridor with (if possible) a comparable number of turns to the left and right
- Choose a corridor that is as quiet as possible; preferably not at a (main) entrance or reception. It is important that patients can continuously keep on moving during the task and targets are not obstructed by people
- Avoid a route across the patients' ward, since this increases the chance of the patient being distracted (for example by acquaintances or if the bedroom is on the route)
- Keep in mind that the patients should be brought to the starting point, preferably the patients do not yet see the targets on their way
- If possible, use a short route to practice (up to 4 targets)
- Put an arrow (black with a light background on A4 size, as in Figure 1 and the attachment) on every turn on eye level (adjust for wheelchair users). Depending on the possibilities to hang the arrow, they may be put lower or higher

Targets

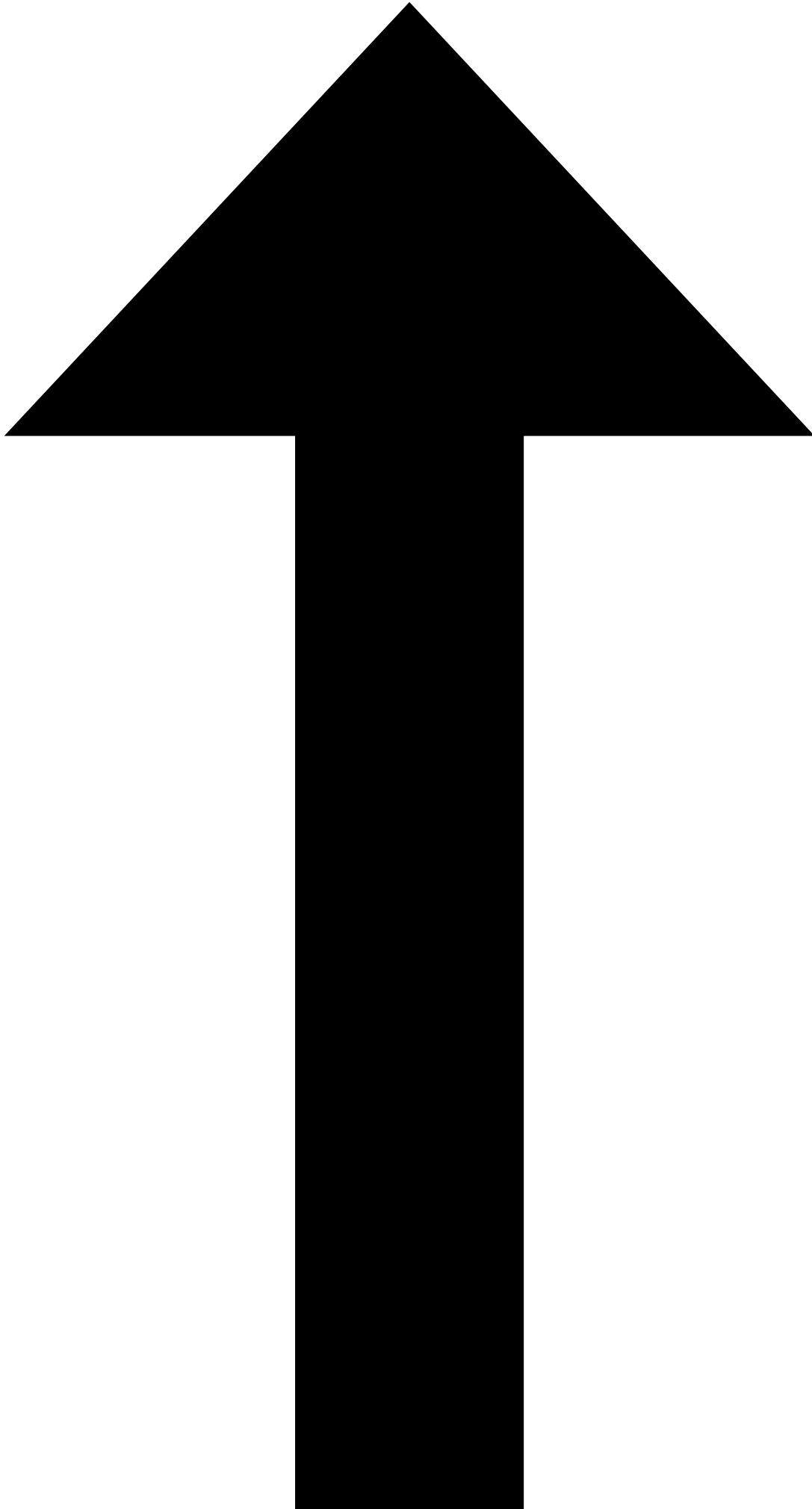
- There are 24 targets (yellow papers, 10cm²; Figure 1), 12 left-sided and 12 right-sided targets per corridor
- The targets are temporarily attached to the walls. Plasticize the papers and use double-sided tape (use special tape that prevents the wall from being damaged) to attach them, the tape can be reused
- Do not attach the targets on windows
- Put the targets at least 10 cm from a corner, door post, beam, etc. (Figure 1)
- Preferably, hang the targets next to protruding objects (such as a painting, fire hose, etc.) so not all targets are visible in advance. Leave distance (about 1 A4) in between the protruding object and the target (Figure 1)
- The targets are located on three different heights (4 low: 40-85 cm, 4 mid-height: 85-125 cm and 4 high: 125-165 cm). For patients in a wheelchair, two heights are used (4 low: 40-85 cm and 8 mid-height: 85-125 cm)
- By varying the heights, multiple versions of the task can be created, so not all target locations are known with multiple assessments (see 'Example target heights per version')
- Use the form with the target locations per version, in order to be able to attach the targets the next time (see 'Example target locations'). The different tables indicate the different corridors. The order of the rows correspond with the order of the target locations.
- Regularly switch between left and right targets, but avoid predictability (see 'Example target locations')



Figure 1. Picture left: a target (± 10 cm next to the corner) and an arrow. Picture right: a target next to a protruding object (the fire hose), on a distance of minimal ± 1 A4 in between the protruding object and the target.

How to pilot the Mobility Assessment Course

- Administer the task in ± 5 healthy control subjects and ± 5 patients (with or without neglect). When targets appear to be located next to crowded situations (e.g. at a counter or copier), or when targets are missed systematically, choose new locations and repeat this step.
- Comparing patient scores with norm scores aids interpreting the results. Set up your own research and administer the task in a group (± 25) of healthy control subjects. Make sure they are about the same age and have a similar level of education as the patient group the task will be used for.
- List the scores of the control subjects in the **Excel template** in order to determine a threshold (i.e. the average asymmetry score [number of missed targets left – number of missed targets right] + 2.5 standard deviation). The Excel template can also be used to calculate the asymmetry score of one patient.



Example: target heights per version

No.	Version 1		Version 2		Version 3	
	Left	Right	Left	Right	Left	Right
1	high	low	mid-height	high	low	mid-height
2	high	mid-height	low	low	mid-height	high
3	mid-height	low	high	mid-height	low	high
4	mid-height	high	low	mid-height	high	low
5	low	mid-height	high	high	mid-height	low
6	high	high	mid-height	low	low	mid-height
7	low	high	mid-height	mid-height	high	low
8	mid-height	mid-height	high	low	low	high
9	low	low	mid-height	mid-height	high	high
10	low	mid-height	high	high	mid-height	low
11	mid-height	low	low	high	high	mid-height
12	high	high	low	low	mid-height	mid-height

Example: target locations

No.	Left		Right	
1			Left next to the left elevator	low
	Left next to C1 602 (room number)	high		
2			Right next to the stairs	mid-height
	Right next to the windows	high		

3			Left next to the toilet C1 624a	low
	In between C1 618 and C1 619	mid-height		
4			Right next to B1 708	high
	Right next to B1 712	mid-height		
5			Left next to B1 706	mid-height
	Left next to B1 713	low		
6	Left next to B1 715	high		
			Right next to the toilet B1 702a	high

7			Right next to stairs down	high
	Left next to B1 201 (on orange wall)	low		
8			Right next to the elevator	mid-height
	Right next to B1 203 (on orange wall)	mid-height		

9			Left next to B1 204, next to door	low
	Right next to A1 124	low		

10			Right next to A1 105	mid-height
	Right next to A1 126	low		
11			Right next to corridor	low
	Left next to door, before A1 129	mid-height		

12			Left next to corridor	high
	Left next to green wall	high		

- Low: 40-85 cm
- Mid-height: 85-125 cm
- High: 125-165 cm

Wheelchair version: low = low; high and mid-height = mid-height (thus, twice as many targets on mid-height)

How to assess neglect using the Mobility Assessment Course

Preparation: Put 24 targets (12 left and 12 right) on different heights, put arrows in the corners. Bring a score form, pencil, clipboard, and one target as an example (stopwatch is optional). Bring the patient to the starting point.

Instruction: “Yellow squares have been attached to the walls in the corridors. [Show one target as an example]. The goal is to find all squares without skipping one. The directions are indicated by black arrows. You can find the way while walking/driving your wheelchair at a leisure pace and just follow the arrows. Speed is not important. You are, however, not allowed to stop or go back. Try to miss none of the squares, sometimes you have to look carefully before seeing the square. If you have found a square please let me know by pointing at it for example. The squares are located left and right on different heights.” [Show the different heights on the wall by holding an example target at all three heights].

During assessment: Indicate the direction. Start recording the time using a stopwatch. Follow the patient and clearly say “Yes” when the patient points to a target. If the patient is moving too fast, repeat once “Try to keep a slow pace, speed is not important”. Intervene as little as possible during the task, and only correct if a patient does not follow the right directions or collides. During task assessment, note on the score form:

- Which targets have been found, which ones were missed, and which targets were invisible (e.g. due to a person or garbage bin in front of the target)
- How many corrections were needed for the patient to follow the indicated direction
- How many collisions were made (score maximum one collision per situation)
- How many people walked by
- Other details (e.g. position in the corridor, head position, task approach, etc.)
- Time in minutes (optional)

After assessment: Enter the number of missed targets on the Excel template. Also enter how many targets were invisible (due to a person or object in front of the target). The difference in missed targets left versus right is the **asymmetry score**. The invisible targets are left out of the computation.

*Example: 2 targets were missed on the right, and 8 targets on the left. In addition, one of the targets on the left was blocked by a person. The number of missed targets on the left is $8 / 11 * 12 = 8,73$ and on the right 2. The asymmetry score is $8,73 - 2 = 6,73$.*

Video of task assessment: <https://youtu.be/yj5Gj582RT0>

Mobility Assessment Course – Score form

Patient:	Date of birth:
Experimenter:	Date of assessment:

	Left	Right
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

V = Hit
- = Miss
O = Invisible (due to external factors)

Version	1 / 2 / 3
Mobility	Wheelchair / Walking
Targets missed left / visible targets / * 12 =
Targets missed right / visible targets / * 12 =
Asymmetry score (missed left - missed right)	
How many corrections for direction?	
How many collisions?	
How many persons were on the route?	
Time in minutes (optional)	