

# Simulated driving after stroke: toward ecologically valid neuropsychological assessment

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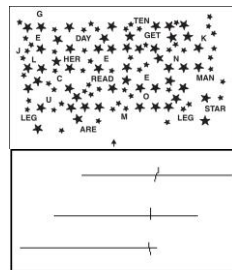
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## Background

Currently visuo-spatial neglect is mainly assessed with paper-and-pencil tasks, which lack the dynamics and complexity to detect mild or well-compensated neglect.

The **aim** of this study is to investigate whether simulated driving can identify neglect in stroke patients and serve as a diagnostic tool.

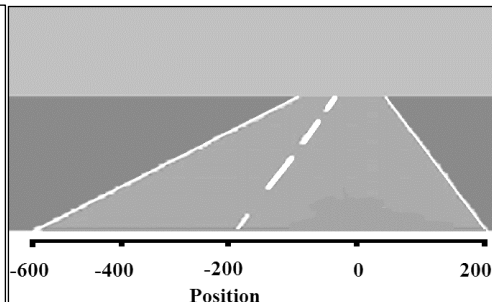


- ❖ We compared the average position on the road and sway (average standard deviation of the position) between patient with and without neglect.
- ❖ We computed correlations between driving performance and neglect severity based on the Star Cancellation (SC), Line Bisection (LB), and the Catherine Bergego Scale (CBS).
- ❖ In order to evaluate sensitivity, percentages of patients with and without neglect as measured with the simulated driving task were provided. The threshold for neglect was based on the average position + 2.5 standard deviations of healthy controls ( $n = 27$ ).

## Methods

59 stroke patients with right brain damage completed a simulated driving task and completed several neglect tasks.

Participants were instructed to use the steering wheel to maintain the starting position on the middle of the right lane during 2 minutes. A continuous 'side wind' was simulated fluctuating regarding direction. Average position and sway were computed every 15 seconds. In total, there were eight timestamps in time.



	Neglect- <i>n</i> =25	Neglect+ <i>n</i> =34
Gender (male)	72%	62%
Age (years)	58,76 (14,95)	58,11 (10,35)
Education (%)		
Low	21	24
Moderate	29	44
High	50	32
Days post stroke	57,84 (107,06)	53,71 (33,76)
Stroke Type (%)		
Ischemic	86	70
Haemorrhage	14	23
SAH	0	7
BI (0-20)*	11,64 (5,89)	8,62 (5,39)
MI arm (0-100)*	76,00 (29,13)	35,58 (40,64)
MI leg (0-100)*	82,14 (27,13)	48,31 (39,52)
SAN (1-7)*	6,20 (0,94)	5,97 (1,24)
MOCA (0-30)*	23,49 (2,66)	18,53 (5,22)



(SAH) subarchnoid haemorrhage; (BI) Barthel Index; (MI) Motricity Index; (SAN) Stichting Afasie Nederland; (MOCA) Montreal Cognitive Assessment. \*A higher score means a better performance.

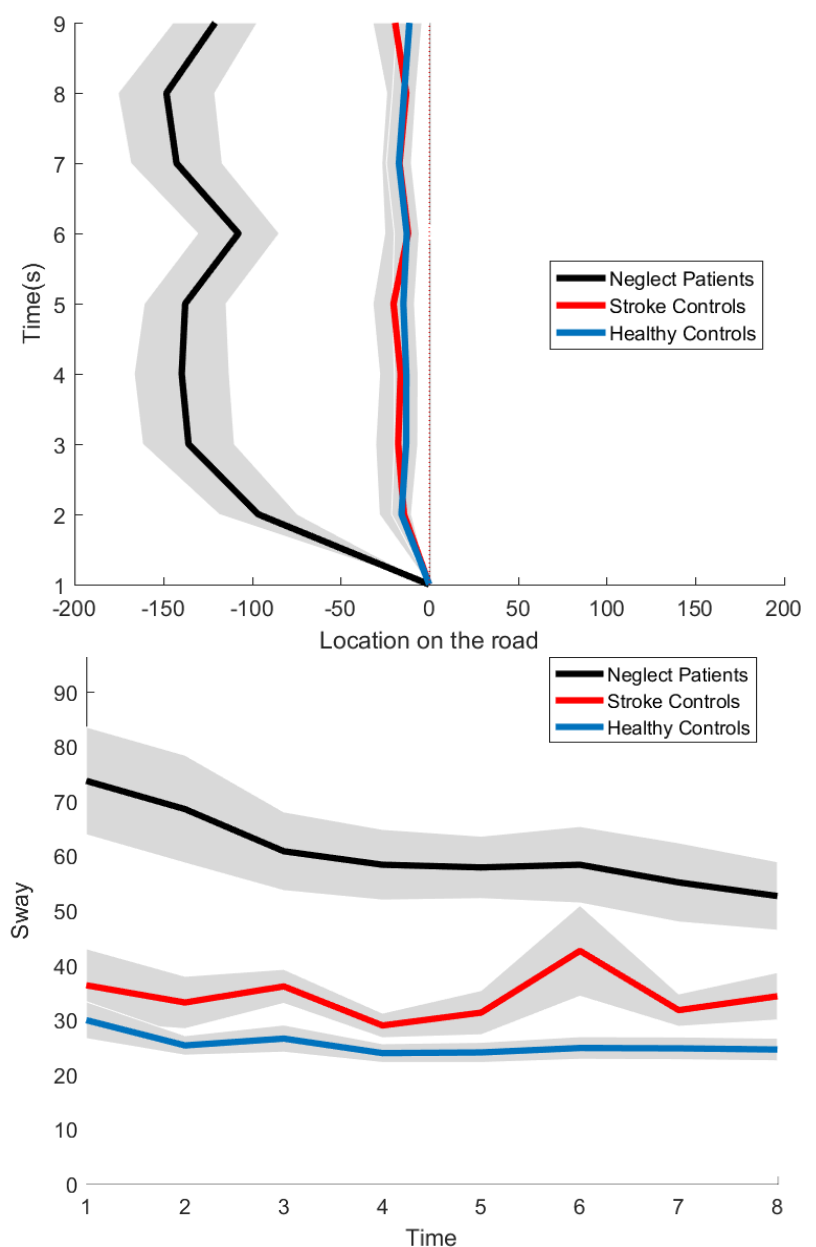
There was a significant difference on education, MI arm, MI leg, and MOCA between the two groups.

## Results

**Average position on the road and sway:** There was a significant difference between the two groups on average position on the road and sway.

	Neglect-	Neglect+	<i>p</i>
Position	-51,99 (97,36)	-130,80 (159,46)	.019*
Sway	39,47 (18,69)	62,55 (40,43)	.002*

$p < .05^*$ ,  $p < .001^{**}$



**Relations with neglect severity:** There were moderate positive correlations between driving performance and neglect severity (based on SC, LB and CBS).

	Position	<i>p</i>	Sway	<i>p</i>
SC asymmetry score	-.28	.013*	.45	<.001**
LB mean deviation score	-.41	.001**	.55	<.001**
CBS total score	-.41	.005**	.34	.023*

**Sensitivity:** the average position on the road fell outside normal range in 60% of neglect patients and importantly in 16% of non-neglect patients.

## Conclusion

Simulated driving might be a useful tool in the assessment of neglect. It can be considered as a more dynamic task enhancing the ecological validity of the assessment of neglect.