

Implicit Learning and Depression in Mild Cognitive Impairment

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Abstract

Background: To date, no studies of implicit learning and depression in mild cognitive impairment (MCI) have been reported.

Objective: To investigate implicit learning and depression in MCI, and to determine whether some forms are impaired, while others remain preserved, when MCI patients with depression are compared to those without depression.

Methods: Six MCI patients with depression were age- and gender-matched to 6 patients without depression. Participants completed two different paradigms of implicit learning – contextual cueing and sequence learning. In the former, people learn to use repeated spatial configurations to facilitate search for a target. In the latter, they learn to use subtle sequence regularities to respond more quickly and accurately to a series of events. People are not informed of the regularity embedded in either task.

Results: For each task, the difference in performance between repeated and novel events was analyzed on response time and accuracy measures, and the data were submitted to mixed design ANOVAs. Results revealed MCI patients with depression were significantly slower at performing both tasks. Further, there was a dissociation: MCI patients with and without depression both showed sequence learning. In contrast, only those without depression showed contextual cueing.

Conclusions: Learning of contextual cues, which relies on the medial temporal lobe system, is particularly affected in MCI patients with depression, implicating further impairment of this system by depression. Sequence learning, which relies on the fronto-striatal system, appears to be preserved. These findings have implications for potential intervention programs that can utilize the relatively preserved implicit system to delay further cognitive decline in MCI.

Participants

	Depressed	Not Depressed
Gender	3F, 3M	3F, 3M
Age	76.3 (4.6)	76.0 (6.0)
Education	12.8 (3.3)	13.2 (1.6)

Note: Standard deviations in parentheses

Procedure

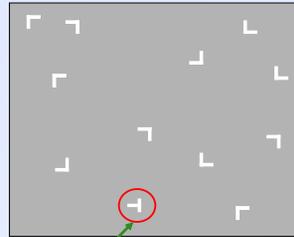
Tasks:

- Contextual Cueing & Serial Reaction Time (SRT)
- Post-experimental interviews & recognition tests at the end of each task.

Measures of Learning:

- Implicit:** Difference in performance between predictable and unpredictable trials (*trial-type effect*).
- Explicit:** Verbal reports and familiarity judgment on recognition tests.

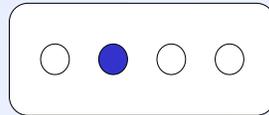
Contextual Cueing



Respond Left

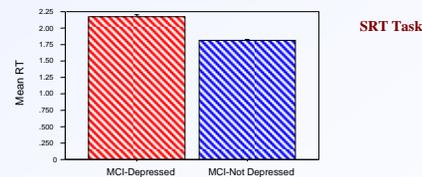
- Visual array of 12 items
 - 11 distractors (L's--orientation varies)
 - 1 target (**horizontal T**)
- 1 block = 24 trials
 - 12 **repeated** configurations
 - 12 **novel** configurations
- On repeated trials
 - Configuration predicts **location** of T
 - NOT direction of T
- 20 blocks (1 set = 10 blocks)

Serial Reaction Time (SRT) Task

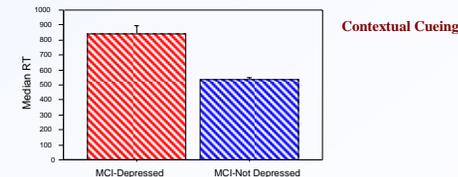


- Spatially arranged locations
- On each trial, one of the circles fills in
- Predetermined 8-element pattern:
 - 1-3-4-1-2-4-3-2
- 10 repetitions of 8-element pattern/block
- 6 blocks: **P- P- P- P- R- P**

Results #1: MCI patients with depression were slower overall on both tasks

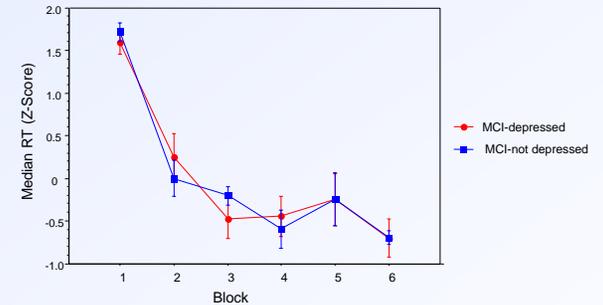


SRT Task

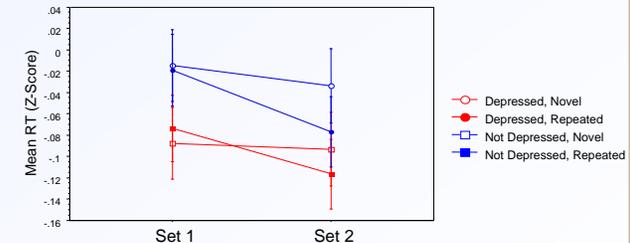


Contextual Cueing

Results #2: Sequence learning was unaffected by depression



Results #3: Contextual cueing was further impaired by depression in MCI patients



Conclusions

- MCI patients with and without depression revealed equivalent amounts of implicit sequence learning, which relies on the fronto-striatal circuits.
- Contextual cueing, which has been shown to rely on the medial temporal lobe system, was more affected in MCI patients with depression compared to those without.
 - *These findings implicate further impairment of the medial temporal lobe system by depression.*

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