Assessing the Effects of Cognitive Decline on Planning Performance and Task Execution

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Introduction

- Planning is an essential, yet complex skill needed for everyday life. It requires prioritization and organization, and if done well, can lead to efficient completion of everyday activities.
- In contrast to concurrent planning (defined as the planning action that takes place during problem solving), initial planning (planning action that takes place before problem solving) has been rarely assessed and codified.
- As people age, changes in planning abilities emerge.
- The objective of this study was to investigate how older and younger adults differ in creation of an initial plan that was used to execute a naturalistic task, called the Day Out Task (DOT).

Method

Participants

- Participants included: 62 cognitively healthy older adults (HOA) and 30 young adults (YA).
- Participants were recruited from within the local community and Washington State University.

	Healthy Older Adults (HOA) N=62		Young Adults (YA) N=31	
Demographics	Mean	Standard Deviation	Mean	Standard Deviation
Age (years)	67.21	8.84	21.03	2.35
Education (years)	16.76	2.44	14.86	0.99
Race	95.16% Caucasian		71.43% Caucasian	
Gender	M=14, F=48		M=10, F=21	

Table 1. Demographic Data for participant groups HOA and YA.

Procedures

- In the Day Out Task (DOT), participants prioritized, organized and executed a series of eight subtasks to prepare for a day out to meet a friend (Table 2).

Eight Main Goal Items (MGIs)	
Choose magazine	Plan bus fare
Pretend to take Dramamine	Bring picnic basket
Gather ingredients for recipe	Microwave heating pad
Plan bus route	Exit

Table 2. DOT Tasks.

- Prior to completing the DOT, participants were given 5 minutes to develop a written plan that would lead to accurate and efficient completion of the task.
- Participants were provided with a written list of the eight Main Goal Items (MGI) to assist with development of their plan (Table 2). Participants were encouraged to multi-task and interweave to complete the tasks in an efficient and natural way.

Measures

- DOT task accuracy and time on task scores were coded by examiners watching participant perform the DOT in a campus smart apartment via live recorded video feed.

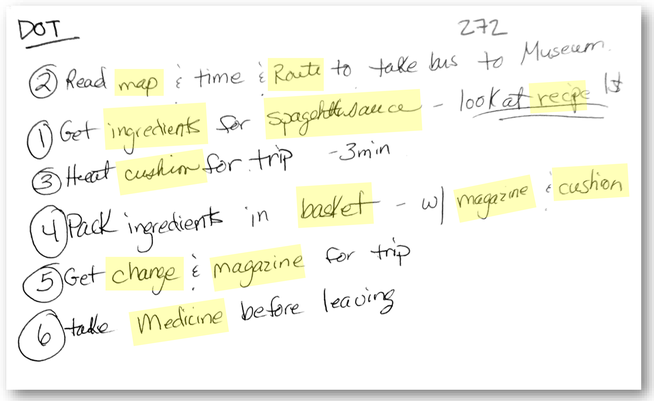

Figure 1. A sample written plan before execution of Day Out Task (DOT).
- MGI units are highlighted yellow for ease of readability.
- Refer to Table 3 for specific coding measures. Units such as "&", "1st", "min", "w/" are counted towards abbreviations. There are 7 abbreviations in this plan. The phrase "look at recipe 1st" is underlined to indicate importance. There are 6 total activities.

- The developed plans (Figure 1) were coded using a comprehensive coding scheme that measured different components of the plan (Table 3).

Variables	Coding Measures
Abbreviations	The total number of abbreviations within the plan. (Eg. "mag" instead of "magazine").
Amendments	The total number of times a plan is altered in someway.
Visual Aid	Did the participant draw a picture, symbol, or map? Arrows that indicate a reorganization of activities within the plan are counted towards amendments. 1=yes, 0=no.
Importance Indicated	Did the participant mark something in a way to indicate importance of an item/task? (eg. Underline, circle, star). 1=yes, 0=no
Total Activities	The total number of activities within the plan. A hierarchy of tasks that is grouped together would be considered one activity.
Total Units	The total number of units within the plan. Units are considered the smallest pieces of information and are made up of the 8 main subtasks (MGIs), locations, indications of time, interactions, connective words, and descriptors.
Extra Units	The number of units not including key units, which are MGIs, locations, and specific indications of time.
Proportion of Total to Extra Units	Computed as the "total units" divided by "extra units" to give a ratio of total to extra units.

Table 3. Variables of DOT plans and Coding Measures.

Results

- T-tests comparisons revealed that the younger adults completed the DOT more quickly than the older adults, $t(80.41) = 5.51$, $p < .001$. The younger adults were also more accurate, $t(78.57) = 4.45$, $p < .001$. (Table 4).

	Healthy Older Adults (HOA)	Young Adults (YA)
	Mean (Standard Deviation)	
DOT Total Time (sec)	672.38 (238.32)	465.52 (103.44)
DOT Total Accuracy[a]	12.54 (3.00)	10.22 (1.72)

[a]lower score is associated with better performance

Table 4. HOA and YA Performances on DOT Variables.

- A t-test comparison on the DOT planning variables revealed that the younger adults (M=1.19, SD=1.86) wrote fewer abbreviations in their written plans than the older adults (M=4.71, SD=3.40), $t(79.575) = 6.101$, $p < .001$.
- T-test and non-parametric tests when appropriate revealed that there were no significant group differences in Visual Aid, Amendments, Importance Indicated, Total Activities, Total Units, Extra Units, and the Proportion of Total to Extra Units.

Conclusions

- Understanding what aspects of plans lead to efficient task completion could give insight into effective planning strategies that can be used to help those with cognitive difficulties function with greater independence day-to-day.
- Healthy older adults required a longer time to complete the DOT than the younger adults, and also had a lower total DOT accuracy than the younger adults.
- We found that the younger adults tended to fully write out units of information, as compared to older adults who used more abbreviations.

Future Work

- Alternately, it may be that younger adults can more easily adjust their plans online during task completion than older adults.
- More sensitive planning measures are needed to meaningfully explain the differences in DOT performance between the age groups. Currently, a coding scheme that measures the number of occurrences, order, and relationships between the specific MGIs are being analyzed.

Acknowledgments

This research was conducted under the Washington State University Gerontechnology-focused Summer Undergraduate Research (WSU GSUR) program funded by NIA grant R25AG046114 and data collection was supported by NIBIB grant R01 EB009675.