Calendars for Individuals with Cognitive Disabilities: A Comparison of Table View and List View

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ABSTRACT
Calendars can be important memory aids for individuals with cognitive disabilities. This study compared the effect of the popular two-dimensional table calendar view and the simpler list view. A controlled experiment was conducted involving 10 individuals with cognitive disabilities and 10 controls. The results show that the list view gave significantly fewer errors and shorter searching times, while editing took longer with the list view.

Categories and Subject Descriptors
H.1.2 [**User/Machine Systems**]: Software psychology.

General Terms
Design, Human Factors.

Keywords
Calendar, cognitive disability, universal design.

1. INTRODUCTION
Cognitive disabilities include dyslexia, ADHD/ADD, learning disorders, etc. Common traits include limited memory, difficulty in orientating and limited concentration. Individuals diagnosed with a cognitive learning disability are sometimes taught to use memory aids. Both paper based and electronic calendars [1, 2] and to-do lists can be important tools for organizing ones daily activities allowing individuals with cognitive disabilities to meet the expectations of their environment and thus successfully complete higher education and participate fully in work life.

Although electronic calendars are common the research literature on general calendars is limited to a handful of studies [3]. Two popular calendar types include the table view and the event list view. The two dimensional table based calendar organize events along representative time axes such as the hours of the day along the vertical axis and the days of the week along the horizontal axis. Clearly, the two dimensional layout means that such calendars require a lot of display real-estate as open slots in the calendar are blank. Microsoft Outlook is one example of a calendar that uses the table presentation as a default view.

An example of event list calendar includes the ANYDO smartphone application where events are listed vertically. Hence, the event list calendars are one-dimensional and it makes effective use of the display real estate. However, the viewer does not get an intuitive view of the event durations and time between events. The effective use of display real estate makes event list calendars suitable for mobile devices with small displays giving cognitively disabled users better access to the memory aids.

This study compared the effectiveness of these two calendar types for individuals with cognitive difficulties. The hypothesis was that users with cognitive disabilities would perform calendar tasks more quickly and with fewer errors using the event list based calendars compared to table based calendars, because it was assumed that the two dimensional view is cognitively more challenging to process compared to the simple event lists.
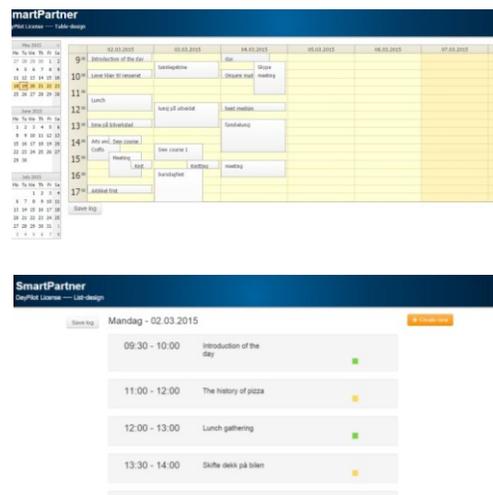
Figure 1. Screenshots of table (top) and list (bottom) views

2. METHOD
2.1 Participants
The participants were recruited by the assistance of the special interest organization ADHD Norway. A total of 10 individuals with an ADHD/ADD diagnosis participated in the experiment and 10 controls. Of the 10 ADHD/ADD participants, 3 were male and 7 female ranging from 19 to 59 years of age (mean age 31). Of the controls 4 were female and 6 male ranging from 23 to 51 years of age (mean age 28).
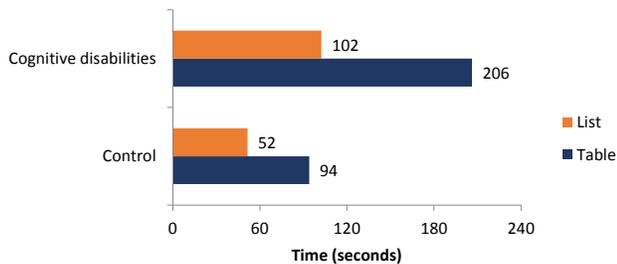
Figure 2. Total search time (task 1)
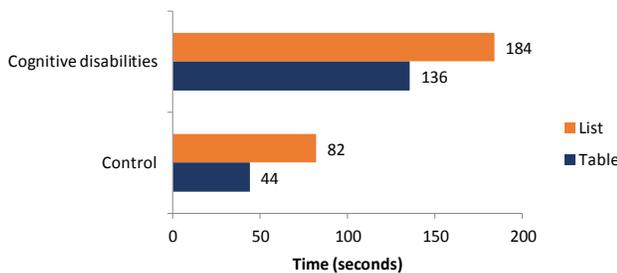
Figure 3. Total time editing (task 2)

Figure 4. Total error rate searching (task 1).
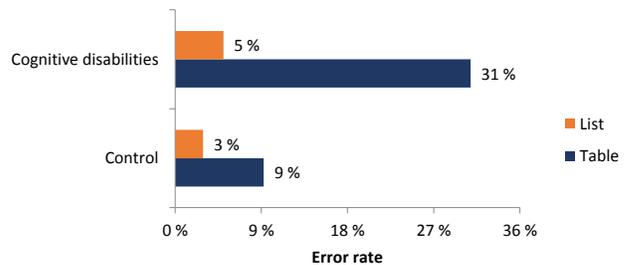
Figure 5. Total error rate editing (task 2)

2.2 Equipment

A test framework comprising a table based calendar and an event list calendar was implemented in PHP. The users accessed the calendars using a Google Chrome web browser. All the events were logged with timestamps.

2.3 Procedure

The participants were asked to perform two tasks. The first tasks involved locating and marking 15 randomly ordered events in a set schedule for a three-day food festival.

The second task was designed to probe the calendars effectiveness in supporting adding, editing and removing events. The participants were asked to add six new events, either by creating new events or altering events already in the schedule. The tasks were performed in random order to minimize learning effects.

3. RESULTS

Figure 2 shows that both groups used shorter time to complete all the searching tasks using the list view compared to the table view, but an ANOVA test showed that this difference was not significant ($F(1, 36) = 0.56; p>.06$). A significant difference was found between the two groups, with the control group completing the task in half the time as the other group ($F(1, 36) = 6.24; p<.03$).

Most participants (five controls and five with cognitive disabilities) reported that they had the impression of using less time in the table view compared to the list view. Only two controls and three participants with cognitive disabilities favored the list view. The others expressed no preference.

Figure 3 shows both groups used more time on editing operations in the list design, although the difference is not significant ($F(1, 36) = 0.17; p>.1$). The diagram also shows that the control group

uses less time in both designs compared to the other group, although the difference is not significant ($F(1, 36) = 0.17; p>.1$).

Figure 4 shows that the list view resulted in significantly fewer errors for searching tasks ($F(1, 36)=19.51; p<.001$) while no significant difference could be detected across the two groups ($F(1, 36) = 1.86; p>.06$). Lists also gave significantly fewer errors for editing tasks as illustrated in Figure 5 ($F(1, 36) = 9.16; p<.05$).

4. CONCLUSIONS

These preliminary results show that list based calendars result in significantly fewer errors for both searching and editing tasks and significantly faster searching. Therefore, since referencing is a more common operation and individuals with high reliance on calendars have lower tolerance for errors the results points in favor of the list based calendar. The results also show that list based calendars also benefit users without cognitive disabilities.

5. REFERENCES

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