Interaction Device Types and Screen Configuration in Co-Located Computer Supported Collaborative Work

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INTRODUCTION

In this poster we describe preliminary results of an empirical study that investigates how system constraints can affect group performance in high pace collaborative tasks. The study presented here attempts to deduce a lower bound of *system-dependent overhead* by investigating the average individual performance with:

- groups of various sizes (1..3)
- different interactive surface orientations (wall, table)
- different interaction devices (laser pointer, mouse)

From a technical standpoint, it is desirable that individual performance during collaboration drops as little as possible, compared with solo activities. Consequently, our experimental design attempts to ignore interpersonal communication overheads and focuses more on technical factors, such as whether there is a need to improve the *technical* capabilities of the infrastructure.

1 EXPERIMENT

The experiment was performed on the Multi-User Laser Table Interface (MULTI) platform [4]. The MULTI system supports multiple laser pointers and mice concurrently and independently. This is achieved by multiplexing the laser diodes in the laser pointers, synchronized with the camera frame rate, [2]. Multiple optical mice are supported via the CPN-mouse package [1], which allows applications to obtain separate pointing events for all mice connected to a computer.

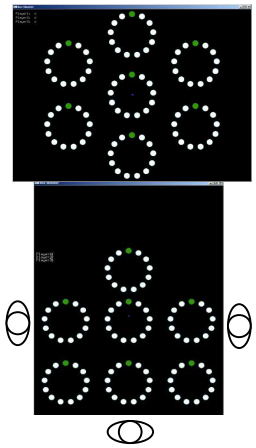

Figure 1. Simultaneous overview of all targets on the wall and table surface.

1.1 Task

ISO 9241-9 pattern, 13 circular dots (4.0 cm diameter) arranged along the edge of a larger circle with 0.30 m diameter (Figure 1). The index of difficulty of such task is approximately 2.9 bits,

1.2 Participants

12 participants with ages ranging from 20 to 29 years, average 23.7. They were recruited from a local university campus and were compensated for their participation.

1.3 Experimental Design and Procedure

Each of the four combinations of (display) × (input device) was tested with each group size, ranging from one to three persons. Additionally, each of the seven possible groupings of three users (3 singles, 3 doubles, 1 triple) was explored for each display and input device condition. We counterbalanced the order of the conditions via Latin Square, to compensate for potential learning transfer effects. Hence, there were a total of 28 trials for each of the four groups, each lasting 100 seconds.

2 RESULTS (SELECTED)

The scores depend on the combination of (*pointing device*) × (*working surface*), $F_{1,143} = 6.09$, $p < 0.05$. A Tukey-Kramer Multiple-Comparison Test indicates, that all pairs are different from all the other pairs ($DF = 9$, $MSE = 106.83$, *Critical Value* = 4.41). Figure 2 illustrates the associations.

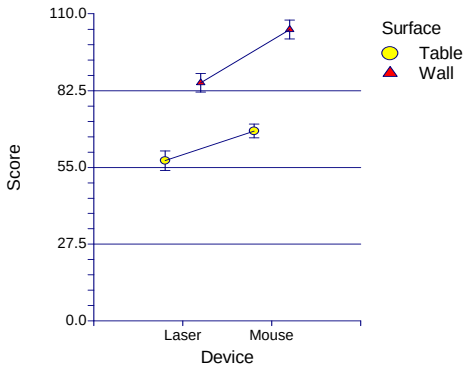

Figure 2. (Pointing device) × (working surface) interaction for total score

3 CONCLUSION

Mice still have an advantage over laser pointer in a co-located collaborative system. We have also observed that vertical wall surfaces yield higher pointing performance compared to tabletops.

4 REFERENCES

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