

Study of cognitive behavior by time of day

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Background

- Based on personal preferences and schedules, Memorado users work out at different times throughout the day.
- Taking into account human circadian rhythms, cognitive performance has proven to reach its highest levels at a high core body temperature (CBT) (1)
- This analysis will also examine whether different types of tasks show different patterns throughout the day, as has been shown in previous studies (2).
- This analysis aims at finding out when users are most inclined to play and compare these results to the users' performance.
- Relating the time of day to a user's performance is a further step in personalizing the training program
- It will be examined if different types of tasks show different patterns of performance and preference throughout the day.
- This analysis can also offer valuable information for employers who gain knowledge on their employees' most productive time of day.

Methods

- Participants chosen for this analysis are aged 18 and older.
- Only participants from Germany, Austria and Switzerland were chosen due to time zone differences in other countries.

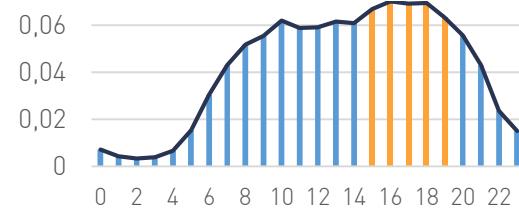


- A variety of 20 exercises were chosen to account for all areas of brain training.

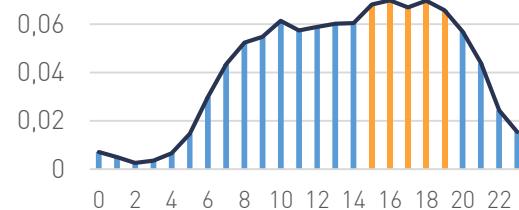
Results:

Most popular time of day

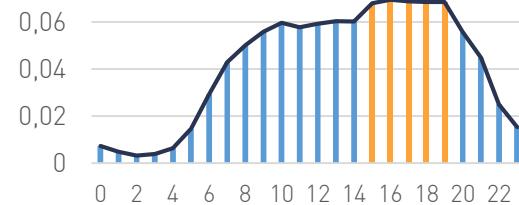
Speed



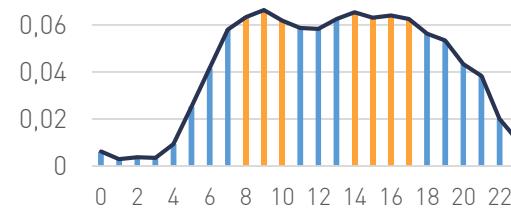
Memory



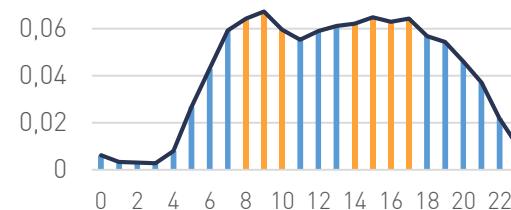
Reaction



Concentration



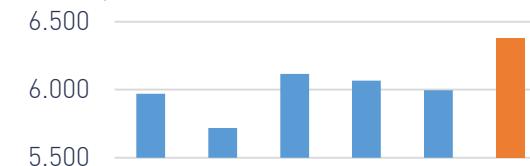
Logic



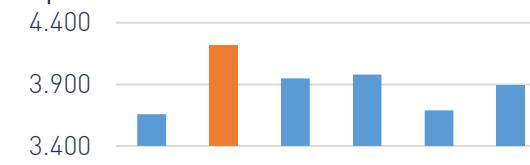
- Maximum difference between 8 a.m. and 8 p.m. is 2,3% (concentration)
- Two notable peaks around 9 a.m. and 4 p.m.

Performance time of day

Memory



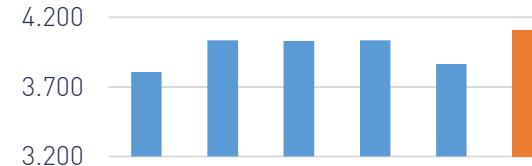
Speed



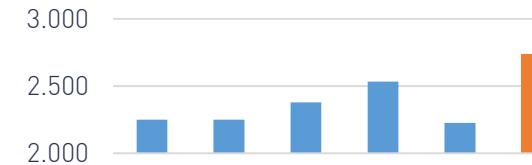
Reaction



Concentration



Logic



Summary

When are the games played the most?

- Concentration and logic games peak in the **early morning** (between 8 and 10am). They have a second, slightly smaller peak in the **afternoon** (2 – 5 p.m.).
- The popularity of games training **speed, memory and reaction** increases throughout the day, **peaking in the afternoon** (3 – 7 p.m.)

When do users perform best?

- Users playing **speed and reaction games** achieve **higher scores in the morning**. Scores decrease during the day and rise again in the **late evening**.
- **Memory games** receive the **highest scores in the late evening**
- Users training **concentration and logic** achieve mostly stable scores throughout the day, have a low point in the evening, but scores **peak in the late evening**.

Discussion

There are a few aspects that can be examined in a further study. Do the popularity or game scores differ between the various age groups or between genders?

Further studies should also examine at which time of day a user shows the most improvement and whether these improvements also occur with untrained tasks.

References

1. Kyriacou, C. P., & Hastings, M. H. (2010). Circadian clocks : genes , sleep , and cognition. Trends in Cognitive Sciences, 14(6), 259–267.
2. Wyatt, J. K., Cecco, A. R., Czeisler, C. A., Dijk, D., Wyatt, J. K., Cecco, A. R., Czeisler, C. A., et al. (1999). Circadian temperature and melatonin rhythms , sleep , and neurobehavioral function in humans living on a 20-h day. American Journal of Physiology, 277, R1152–1163.