



**15th International Conference on Applied Human Factors and
Ergonomics (AHFE 2024)**

July 24-27, 2024 – Université Côte d'Azur, Nice, France



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The Investigation of Systematic Micro-refresh with Auditory Stimuli on Intellectual Work

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Micro-refresh

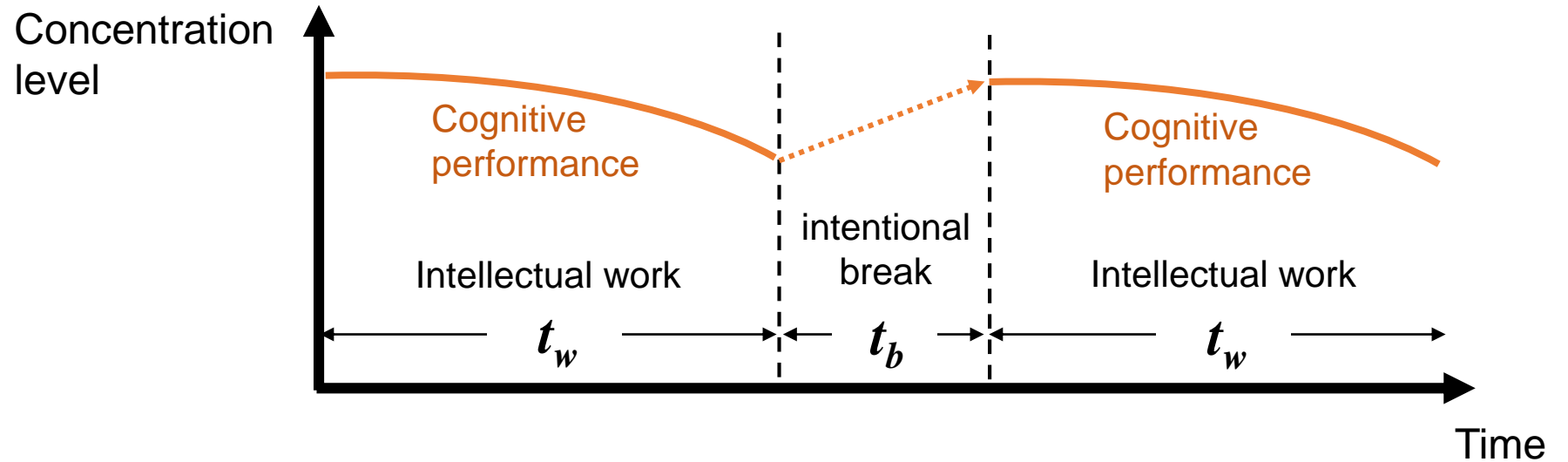


- Recovery-enhancement strategy

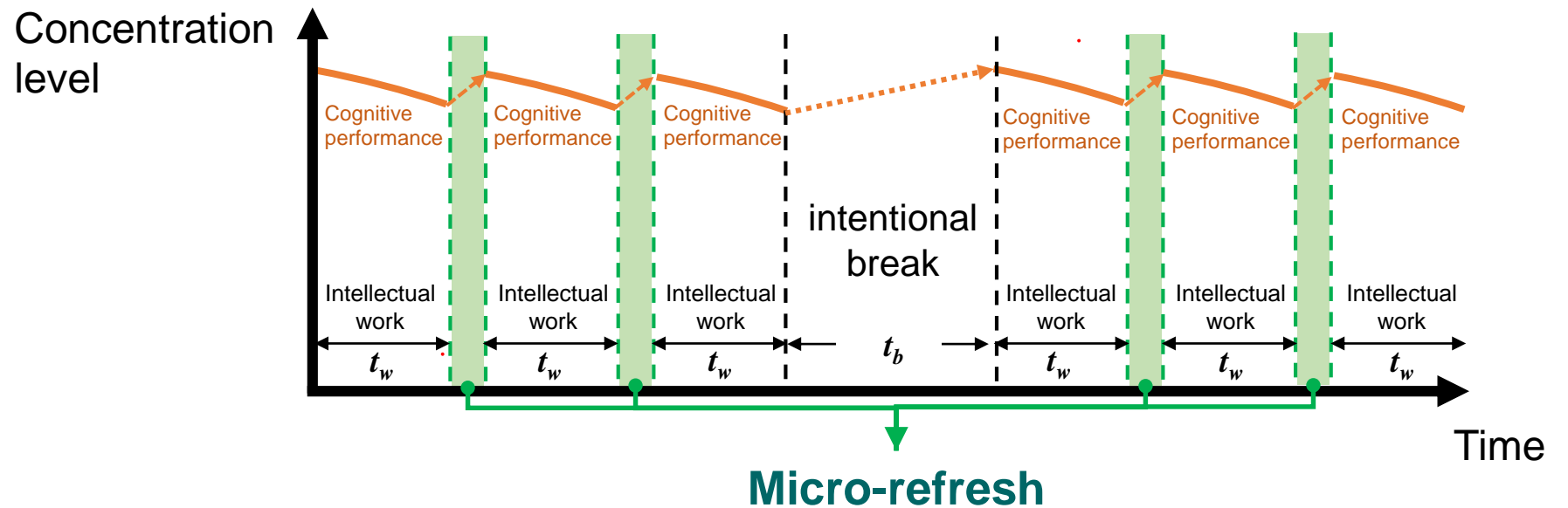


- By design / systematic

Conventional work without micro-refresh intervention



Work concept with micro-refresh intervention



Auditory Stimuli



- Micro-refresh



- Auditory stimuli
(Nature ambience)

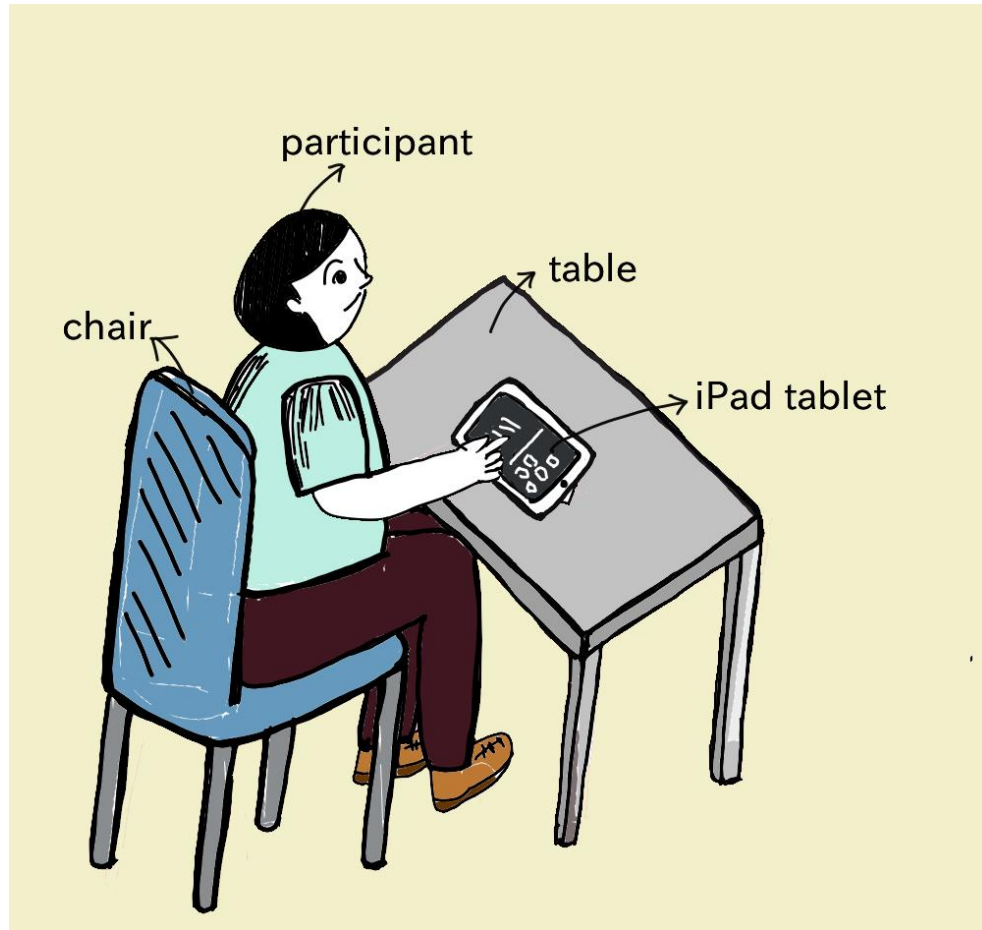


- Intellectual work

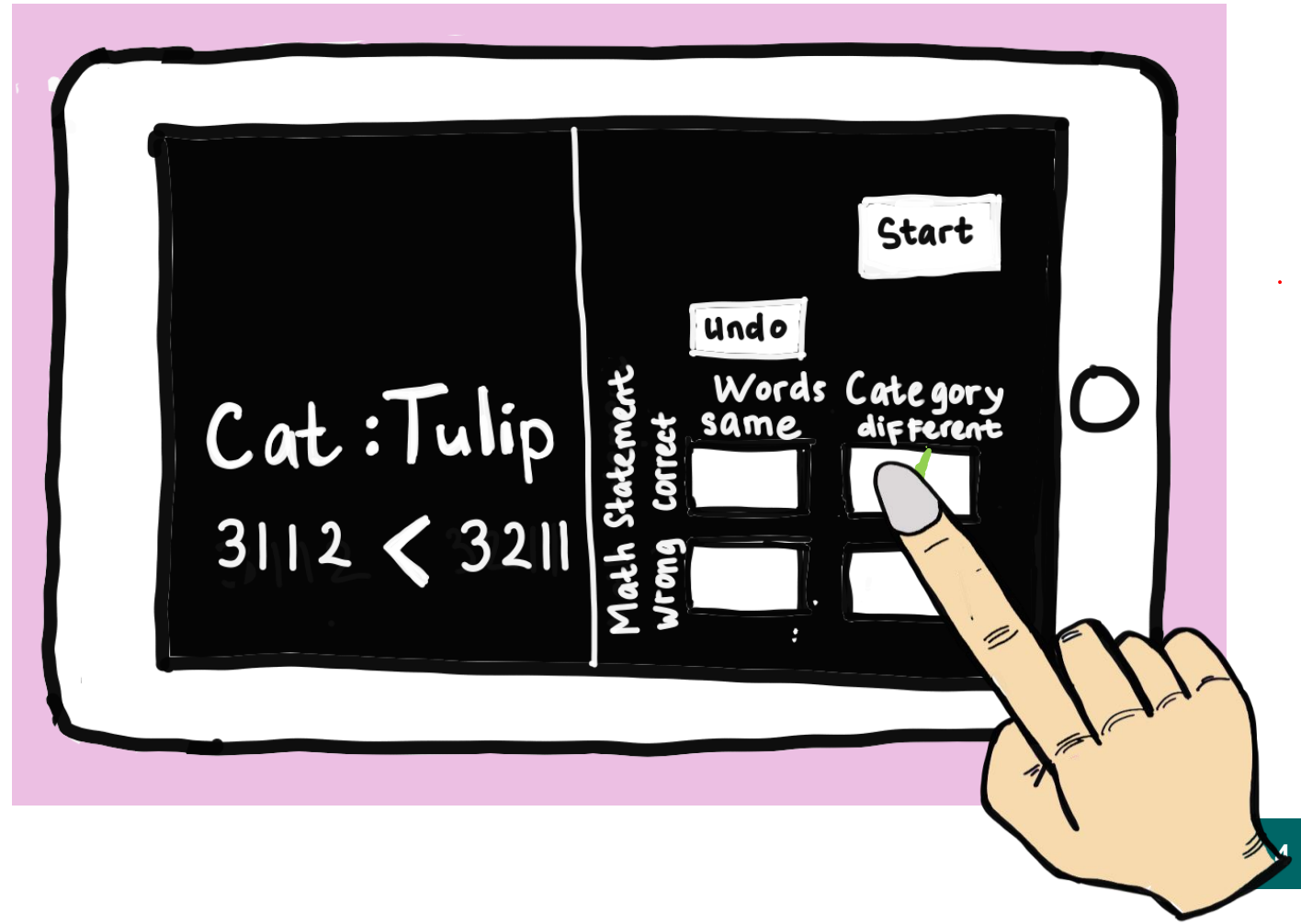
- **The purpose of this study:** investigate the effect of inducing systematic micro-refresh auditory stimuli on intellectual work performance.

Experimental Procedure

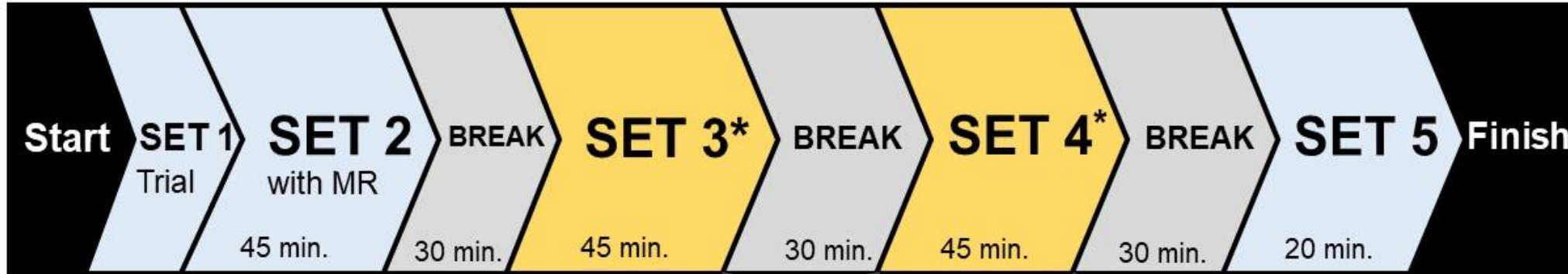
- **Participants:** 5 participants ages 19–27 years old



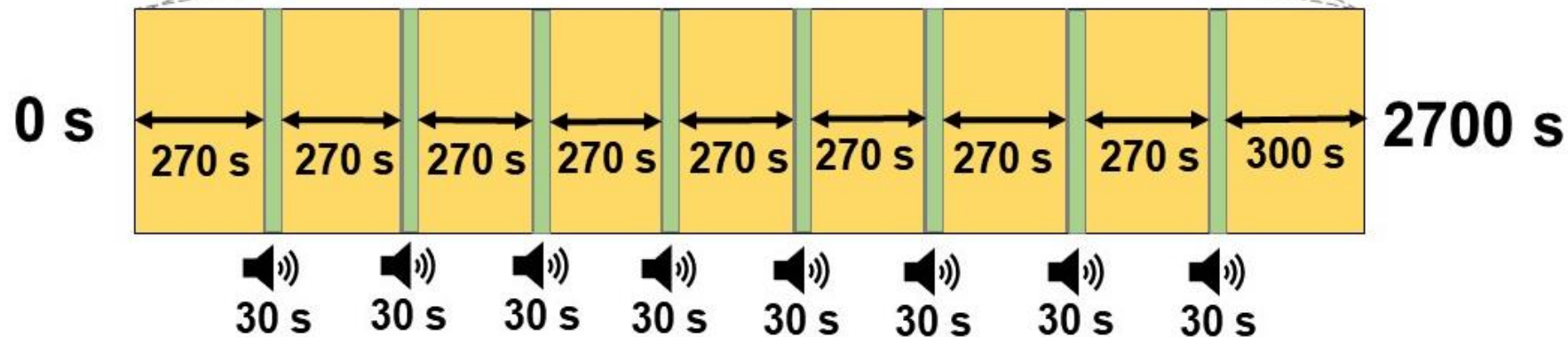
- **Experiment Task:** Cognitive comparison task



Experimental Procedure



**) Micro-refresh appointed in a counterbalanced design for SET 3 and SET 4, the data produced from SET 3 and SET 4 were used in the analysis*



- **Micro-refresh:** auditory stimuli (nature ambience)



Auditory stimuli were given 8 times every 4,5 min during 45 min cognitive task

Measurement



- Answering time



- NASA task load index



- Subjective Symptoms



- Attentional control scale

Results

Average data measurement between conditions with and without auditory stimuli

Data measurement	Average data in a condition with auditory stimuli \pm SE	Average data in a condition without auditory stimuli \pm SE
Answering time (second)	3.065 \pm 0.28	3.338 \pm 0.22
NASA task load index score	48.013 \pm 3.17	53.667 \pm 1.85
Subjective symptoms: sleepiness score	0.8 \pm 0.37	1.8 \pm 1.16
Subjective symptoms: blurriness score	1.0 \pm 0.3	0.6 \pm 0.6
Subjective symptoms: sluggishness score	2.0 \pm 0.7	1.8 \pm 1.3
Fatigue score	18.4 \pm 5.57	21.2 \pm 7.07
Detachment score	2.8 \pm 0.58	1.8 \pm 0.58
Recovery score	1.8 \pm 0.37	1 \pm 0.00
Relax score	2.4 \pm 0.51	1 \pm 0.00

Results

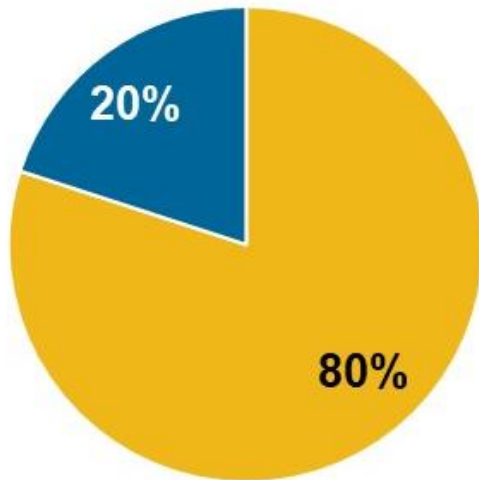
Average data measurement of attention control scale

Data measurement	Average Score \pm SE
ATTC: focusing score	24.6 \pm 2.11
ATTC: shifting score	26.6 \pm 2.16
ATTC: total score	51.2 \pm 3.19

Results

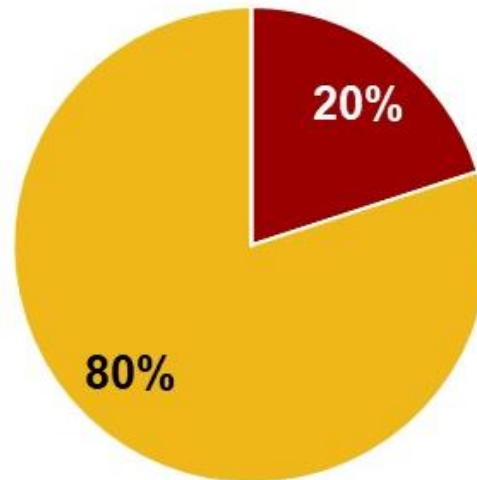
Percentage of attention control scale categories

ATTC Focusing



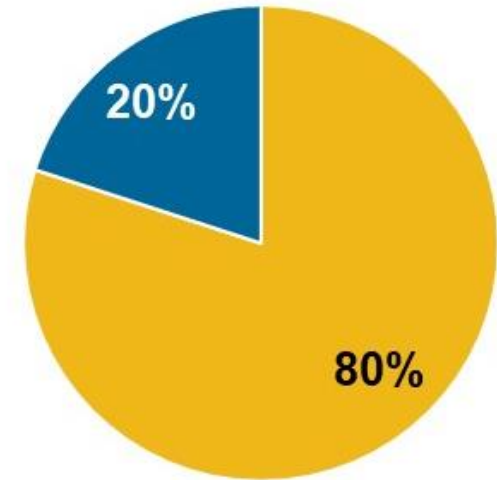
■ low ■ medium ■ high

ATTC Shifting



■ low ■ medium ■ high

ATTC Total



■ low ■ medium ■ high

Discussion & Conclusions

- Promising outcome of auditory stimuli as a micro-refresher during intellectual work.
- During 45-minute intellectual work, answering time under auditory stimuli intervention was faster compared to non-auditory stimuli intervention.
- Auditory stimuli interventions reduce workers' workload, measured by the NASA task load index.
- Some measurements showed a shortcoming result (e.g., blurriness, sluggishness, subjective concentration, and fatigue).
- Participants' are classified as individuals with a medium-high level of attentional control, thus might correlate with positive response to the adaptation of auditory stimuli micro-refresh to improve their performance.

Future Research

- Experiment with a larger number of participants for statistical sufficiency.
- Adding post-experiment interviews to grasp deeper participants' points of view.



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Thank You

