



Cognitive Function in Tropical Climate



Nicolas Robin* and Guillaume Coudevylle

Faculty of Sport Sciences of Pointe-à-Pitre, University of the West Indies, France

*Corresponding author: Nicolas Robin, Associate Professor, Department of Sport Sciences, Université des Antilles, Campus Fouillole, BP 592, 97159, Pointe à Pitre Cedex, France

Submission: 📅 April 10, 2018; Published: 📅 August 17, 2018

Introduction

The physiological and psychological responses to environmental heat stress have been well established [1, 2]. However, in the tropical climate (i.e., hot: 31 °C±2 °C and wet climatic environment: 75%±10%rH), most studies deals with exercise: Aerobic exercise is negatively affected [3] and the impact of this environment on cognition is unclear. This article reviews studies using cognitive tasks realized in Tropical Climate (TC) or using environmental conditions leading heat stress. In the heat, and consequently in TC, there are wide ranges of environmental factors that can influence the cognitive performances [4,5].

Indeed, task complexity (whereas simple task are not affected or faster performed as simple reaction time, more complex task are negatively affected by TC [6,4]), time heat exposition (degradation of performance in sustained attention tasks is proportional to duration and is amplified under thermal stress [7]), acclimation (at least 10-days in TC is needed to limit the performance decrement [8], or acclimatization (people born in CT have a better physiological functioning allowing them to better tolerate heat exposure, to better withstand the loss of performance caused by heat stress and to provide less cognitive effort for a similar performance [6]) can affect cognition of these factors, humidity is particularly debilitating. Indeed, a high level of relative humidity impairs cognitive and dual tasks performance [7,9].

Moreover, individual subjective states as thermal discomfort and fatigue, which are higher in TC or hot environment [2,10], may be other factors affecting cognitive performance. In addition, the evolution of the positives and negatives affective states must also be taken into consideration: TC reduces positive affect without affecting negative affect [5]. The performance decrement can be explained by the fact that participants have at their disposal a certain amount of neural resources that can be allocated to different tasks or activities, performance of the latter will deteriorate when

the amount of resources is insufficient to deal with both the tasks and environmental constraints (heat stress and relative humidity), such that subjects will be able to maintain their performance level until the resources are overloaded [7]. Further investigations, using cooling (e.g., cold drink) or psychological training techniques, are needed in order to try to limit the negatives effects of TC on cognition.

References

1. Cheung S, Sleivert G (2004) Multiple triggers for hyperthermic fatigue and exhaustion. *Exerc Sport Sci Rev* 32(3): 100-106.
2. Gaoua N (2010) Cognitive function in hot environments: A question of methodology *Scand J Med Sci Sports* 20(3): 60-70.
3. Hue O (2011) The challenge of performing aerobic exercise in tropical environments: applied knowledge and perspectives. *Int J Sports Physiol Perform* 6(4): 443-454.
4. Deligières D (1994) Influence de la chaleur humide sur le traitement de l'information et la performance. *Etude technique de l'INSEP*: 1-26.
5. Robin N, Coudevylle GR, Sinnapah S, Hue O (2017) The influence of tropical climate on affect, fatigue and environmental perceptions. *Psychologie Française*, 1-10.
6. Wijayanto T, Toramoto S, Maeda Y, Sonomi S, Tochihara Y (2017) cognitive performance during passive heat exposure in Japanese males and tropical Asian males from southeast Asian living in japan. *J Physiol Anthropol* 36(1): 8.
7. Hancock P, Vasmatazidis I (2003) Effects of heat stress on cognitive performance: the current state of knowledge. *Int J Hyperthermia* 19(3): 355-372.
8. Radakovic S, Maric J, Surbatovic M, Radjen S, Stefanova E, et al. (2007) Effects of acclimation on cognitive performance in soldiers during exertional heat stress. *Mil Med* 172(2): 133-136.
9. Pepler RD (1958) Warmth and performance: An investigation in the tropics. *Ergonomics* 22: 63-88.
10. Lan L, Wargocki P, Lian Z (2011) Quantitative measurement of productivity loss due to thermal discomfort. *Energy and Buildings* 43(5): 1057-1062.



Creative Commons Attribution 4.0 International License

For possible submissions Click Here

[Submit Article](#)



Environmental Analysis & Ecology Studies

Benefits of Publishing with us

- High-level peer review and editorial services
- Freely accessible online immediately upon publication
- Authors retain the copyright to their work
- Licensing it under a Creative Commons license
- Visibility through different online platforms