

# WORKSHOP

Organized by LEAD - CNRS UMR5022  
& Inserm U1093 CAPS

Bénédicte Poulin-Charronnat  
&  
Romuald Lepers

<https://www.u-bourgogne.fr/lead>

27/03/2023  
8:30AM - 4:30PM

## PSYCHOPHYSIOLOGICAL ASPECTS OF PERFORMANCE

**ATTENTION,  
change of address**

Université de Bourgogne  
Amphithéâtre Mathiez  
Extension bâtiment Lettres - 1er étage  
4 boulevard Gabriel - 21000 Dijon - F





# PROGRAM

8:30 am: Reception

9:00-9:15 am: Introduction by **Bénédicte Poulin-Charronnat and Romuald Lepers**

9:15-10:15 am

**MICHEL AUDIFFREN**

Cognition and Learning Research Center (CeRCA) CNRS UMR7295, University of Poitiers, France

**Proposal of a sequential task protocol involving a long and effortful inhibitory control task aiming to induce acute mental fatigue**

10:15-10:45 am

**THOMAS JACQUET**

Inserm U1093, Cognition, Action and Sensorimotor Plasticity, CAPS, Université de Bourgogne, Dijon, France

**Effects of an acute smartphone use**

10:45-11:00 am: Break

11:00-12:00 am

**BART ROELANDS**

Menselijke Fysiologie en Sportkinesitherapie (MFYS), Vrije Universiteit Brussel (VUB), Belgium

**Linking mental and physical fatigue**

12:00-2:00 pm: Lunch break

2:00-3:00 pm

**AINA CHALABAEV**

SENS Laboratory Sport and Social Environment, Grenoble Alpes, France

**Stereotypes under the skin: A biopsychosocial approach of the effects of social stereotypes in the motor domain**

3:00-4:00 pm

**WALTER STAIANO**

Department of Psychology, SDU, Odense University, Denmark

**Brain Endurance Training (BET): Proof of concept, first scientific evidence and practical applications in sport performance**

4:00-4:30 pm: Closing

Université de Bourgogne  
Amphithéâtre EICHER  
Bâtiment Pôle AAFE  
11 Esplanade Erasme  
21000 Dijon - F





# Proposal of a sequential task protocol involving a long and effortful inhibitory control task aiming to induce acute mental fatigue

**MICHEL AUDIFFREN**

Cognition and Learning Research Center (CeRCA) CNRS UMR7295, University of Poitiers, France

Michel Audiffren, Nathalie André, Abdel Benraïss, Thomas Mangin, Sarvenaz Daneshgar-Pironneau, & Alison Lorcery

Acute mental fatigue can be defined as a psychophysiological state, whose symptoms are a feeling of tiredness, a lack of energy and a transient decrease in performance associated with a disengagement of mental effort. The aim of the present talk is to show that a protocol combining the time-on-task and the sequential task protocol and using a 30-min inhibitory control task as depleting task (i.e., a modified computerized incongruent Stroop task), a 30-min documentary viewing task as control task and a time-to-exhaustion handgrip task at 13% of maximal voluntary contraction as dependent task, allowed to observe and replicate a state of acute mental fatigue in young adults. In study 1 (N = 55), results showed that the Stroop task led to a worse performance in the subsequent handgrip task by comparison to when it was carried out after the documentary viewing task. In study 2 (N = 83), we will show that the time-on-task effect observed for Stroop task trials requiring inhibitory control significantly correlated with the sequential task effect observed in the time-to-exhaustion handgrip task. In study 3 (N = 49), we will show that there is a disengagement of mental effort throughout the Stroop task measured through cardiac reactivity indexes (i.e., preejection period and heart-rate variability). Altogether, these results suggest that exerting inhibitory control during 30 min can be sufficiently costly to impair the performance in a subsequent effortful physical task.





# Effects of an acute smartphone use

THOMAS JACQUET

Inserm U1093, CAPS, Cognition, Action and Sensorimotor Plasticity, Université de Bourgogne, Dijon, France



Smartphones have become an integral part of modern society, with billions of people worldwide relying on them for daily communication, entertainment, and productivity. While there are many benefits, its excessive use can lead to psychological and physical problems (e.g., addiction, blurred vision, and pain). If the chronic effects of smartphone overuse are well documented, the acute effects of smartphone use on cognitive and physical capacities have been scarcely investigated. Recent studies showed that acute smartphone use (e.g., 30 to 45 min) could impair sports performance, possibly explained by mental fatigue. Our recent works have shown that acute smartphone use also impairs cognitive performance (e.g., attention and inhibition). However, because of the great variability in subjective measures of mental fatigue and the absence of specific electrophysiological markers, we cannot conclude that the effects observed following acute smartphone use are related to the occurrence of mental fatigue.





# Linking mental and physical fatigue

## BART ROELANDS

Menselijke Fysiologie en Sportkinesitherapie (MFYS), Vrije Universiteit Brussel (VUB), Belgium

Mental fatigue can be defined as a psychobiological state that emerges during prolonged demanding cognitive activity. It results in an acute feeling of tiredness, with potential decrements in physical and/or cognitive performance. It has indeed become clear that mental fatigue can have a significant effect on subsequent performance capacity. Interestingly, this reduction in physical performance in a mentally fatigued state is not mediated by an exacerbation of peripheral factors normally associated to physical fatigue, but rather by a higher-than-normal RPE. During the presentation we will focus on recent findings from lab-based studies looking at the effect of mental fatigue on performance. We will further try to identify potential mechanisms from the literature (as an example the accumulation of adenosine in the anterior cingulate cortex). Finally, some studies have already applied behavioral or nutritional countermeasures in an attempt to negate the negative effects of a mentally fatiguing task. We will look into some of these countermeasures in order to pinpoint their potential in combating mental fatigue and its negative connotations.





# Stereotypes under the skin: A biopsychosocial approach of the effects

**AINA CHALABAEV**

SENS Laboratory Sport and Social Environment, Grenoble Alpes, France

Differences in physical performance are consistently found between different social groups (e.g., gender, age). Beyond the physiological explanatory factors, the aim of this presentation will be to question the role of psychosocial factors in these differences. More specifically, we will present the work on the influence of social stereotypes on different motor and physical parameters, as well as the psychophysiological mechanisms of this influence.





# Brain Endurance Training (BET): Proof of concept, first scientific evidence and practical applications in sport performance

## WALTER STAIANO

Department of Psychology, SDU, Odense University, Denmark

Traditionally, training has focused on improving physiological and biomechanical factors. However, there is mounting experimental evidence that physiological factors, such as muscle fatigue, are not the sole limiting factors in endurance exercise, and that perceptual, motivational, and cognitive factors also play an important role. It has been repeatedly demonstrated that mental fatigue, defined as a psychobiological state caused by prolonged and demanding cognitive activities, impairs physical performance by altering rate of perceived (RPE) without impacting peripheral factors, such as heart rate and lactate. Brain Endurance Training (BET) has been proposed as a countermeasure to tackle the deleterious effects of mental fatigue on performance. This novel training method uses systematic repetitions of fatigue-inducing cognitive tasks alongside physical training to inoculate against mental fatigue, alter the perception of effort, and ultimately boost performance. This presentation will discuss the proof of concept of BET and the different forms of BET (e.g., PRE, CONCURRENT, INTERMIXED, POST) in different sports settings. Furthermore, we will present lab and field studies conducted so far in several physical activities and sports, such as football, cycling, resistance training, and padel, and discuss their efficacy (and limitations) in reducing the negative effect of mental fatigue and boosting performance. Finally, we will consider potential applications of BET in sports using various technologies.



