

in realizing the desired future, as rated by independent observers (Oettingen, Mayer, Sevincer, Stephens, Pak, & Hagenah, 2009). In contrast, fantasizing about a desired future or dwelling on the present reality lead to unchanged energization and performance. Finally, in line with the conception of energization as an unspecific motor-force for behavior (Duffy, 1934, Hull, 1952; Zillmann, 1971), we predicted and found that energization elicited by mentally contrasting successfully solving a given feasible task (e.g., excelling in an intelligence test) fueled performance in a task unrelated to the mental contrasting procedure (e.g., squeezing a handgrip; Sevincer, Busatta, & Oettingen, 2014). We discuss theoretical implications for understanding the role of thinking about the future in the self-regulation of energy and effort and applied implications for designing interventions directed at mobilizing energy and effort for unpleasant or strenuous tasks (e.g. exercising regularly) in various life domains such as the health, academic, or interpersonal domain.

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250

### The impact of pain on subsequent effort mobilization and performance

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This study investigated the influence of a painful vs. non-painful task on effort-related cardiac response and performance in a subsequent cognitive task. Pain was anticipated to deplete cognitive resources due to the implication of executive functions in pain regulation. Consequently, we predicted that effort would be stronger after the painful task to compensate for the cognitive depletion induced by pain and that task performance would be lower after the painful task. Results only confirmed our predictions regarding the effect of pain on performance. However, further correlational analyses indicated that effort-related cardiovascular response was related to pain ratings. A moderate pain led to strong effort whereas a high pain led to low effort. We interpret this finding as suggesting that participants reporting a high pain disengaged from the cognitive task due to stronger pain-related cognitive depletion and in turn decreased motivation to perform the task.

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369

### Measuring the unreportable: tests of unconscious stress and cardiovascular activity

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Background: The disease risk of real life stressors is believed to be mediated by prolonged stress-related physiological activity, which is likely to be caused by cognitive representations of stressors rather than stressors themselves that often last only briefly. Some of these representations are conscious (i.e. worry or rumination, generally called perseverative cognition), but recent insights and findings suggest that an unknown part is unconscious. Several studies have shown that 'unconscious', i.e. subliminal stressful (negative affective) stimuli can

increase physiological activity. A measure of unconscious stress would however greatly expand the research potential in this area. This talk will summarize several studies, in which two measures of unconscious stress were tested and expected to be associated with physiological stress responses during experimental stressors and in real life.

Method: Cardiovascular responses to laboratory stressors were measured, as well as, in real life, salivary cortisol and 'additional heart rate variability (HRV) decreases', that is, HRV decreases that are not due to phasic changes in posture and movement, and therefore most likely due to emotional factors. To measure unconscious stress we used the implicit positive and negative affect test (IPANAT) and a word fragment completion test (WFCT; in real life only).

Results: IPANAT implicit negative affect (INA-I) and low positive affect (IPA-I) were associated with slower cardiovascular recovery after experimental stress, and predicted next day cortisol awakening response. None of these associations were mediated by explicit affect. WFCT negative implicit affect (INA-W), lower IPA, but not explicit stress (negative affect, stress and worry) were linked to higher cortisol levels in real life. Additional HRV decrease was associated with worry, tension and (low) positive affect, but not with any of the implicit affect measures.

Discussion: Although the results offer evidence of physiological concomitants of unconscious stress, the real life tests are inconsistent, and warrant an ongoing search for instruments to measure unconscious stress.

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40

## Symposium C2

### Novel frontiers of brain imaging: from genetics to pharmacology, from mind reading to forensic

Organizer: Pietro Pietrini (Italy)

In recent years, developments in cognitive neuroscience, pharmacology and behavioral genetics have yielded to new evidence concerning the neural and genetic correlates of human cognition, emotion and behavior. In particular, the combination of neural data with genetic information and pharmacological probes is not only improving our understanding on how genetic variation or drugs affect brain structure and functioning, but it is mainly creating novel therapeutic approaches for neuropsychiatric disorders. Equally, in the field of in vivo brain functional exploration methodologies, such as functional magnetic resonance imaging (fMRI), there is an increasing interest in using the tools of machine learning to identify distinctive features that can allow "brain-reading", prediction of mental states or behavior, or recognition of mental disorders directly from brain functional data. Consequently, these novel approaches are not only providing original information to understand mental function, but also prompting novel inputs from brain functional imaging to several other disciplines, from social neuroscience and anthropology to bioengineering and robotics. In particular, the spread of neuroimaging tools has led to diverse practices of forensic psychiatry and the emergence of novel disciplines, such as neuroethics and neurolaw. Lectures of this symposium will rely on speakers from different international research groups providing their novel experimental findings and theoretical aspects on these novel frontiers of brain imaging. Examples of these novel and multidisciplinary approaches in neuroimaging will be presented, together with emerging recommendations and limitations in the employment of these integrated research tools.

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