RUHR-UNIVERSITÄT BOCHUM

RUB

SFB 874/INI - COLLOQUIUM

Monday, July 16th, 4 - 6 pm

Location: NB 3/57

Katharina Henke (University Bern)

Conscious versus unconscious memory for episodes

Episodic memory builds on the rapid encoding of flexible what-where-when associations. When we are aware of our episodic memories, they originate from consciously witnessed events. But episodic memories may also originate from an unconscious processing of subliminal or unattended events. I'll report experiments on the supraliminal (conscious) and subliminal (unconscious) encoding of movies that put the idea of unconscious episodic encoding to a critical test and that examine the hypothesis of a larger memory capacity for unconscious versus conscious episodic memory. Information load was manipulated in 3 steps with 1, 3 or 9 consecutive movies presented for encoding. Retention of movies was assessed using a two-alternative forced-choice task with accuracy as explicit and reaction time as implicit measure of memory. This task records the retention of relational inferences participants made while watching a movie. Reaction times revealed successful long-term retention of inferences made on both subliminal and supraliminal movies. These results support the notion of an unconscious form of episodic memory. Accuracy caught memory of supraliminal movies alone. Retrieval performance remained robust with high load in the subliminal condition but collapsed in the supraliminal condition both in terms of accuracy and reaction times. We assume that unconscious versus conscious episodic encoding yielded sparse and segregated memory representations with little overlap, which may provide for less interference and a larger capacity. Just as the strength of conscious episodic memories comes with a limited capacity, so the weakness of unconscious episodic memories appears to come with a large capacity. The hippocampus supported both the conscious and unconscious encoding and retrieval of flexible what-where-when associations.

Simon Ruch (University Bern)

Implicit relational vocabulary encoding during sleep is bound to slow-wave peaks

Learning while asleep is a dream of mankind but is often deemed impossible because deep sleep lacks conscious awareness and the neurochemical milieu thought to be necessary for learning. Today's evidence for sleep-learning is inconclusive. We tried to resolve the conditions under which rapid implicit relational binding can occur during slow-wave sleep. We hypothesized that peaks of slow-waves are conducive to sleep-encoding because peaks demarcate periods of neural excitability. Young women and men were played words of a fake foreign language plus translation words for relational binding while in slow-wave sleep during a nap. When the presentation of the second word of a pair coincided with a slow-wave peak, chances increased that new semantic associations between words were formed and retained. Formed associations translated into waking, where they guided forced-choices on an implicit memory test. Reactivations of sleep-formed associations were paralleled by brain activation increases measured with functional MRI in language areas and hippocampus, a brain structure critical for relational binding. We infer that implicit relational binding has occurred during peaks of slow oscillations recruiting a hippocampal-neocortical network just like vocabulary learning in the waking state does.

Host: Sen Cheng (Institut für Neuroinformatik, RUB)

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