

ASSC17

17TH MEETING OF THE
ASSOCIATION FOR THE SCIENTIFIC STUDY OF CONSCIOUSNESS

JULY 12-15 2013

SAN DIEGO SHERATON HOTEL AND MARINA
HOSTED BY THE NEUROSCIENCES INSTITUTE



CONFERENCE HANDBOOK



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(P2-071 July 15th, 1430-1630)

Primary dysmenorrhea (PDM), menstrual pain without pelvic abnormality. We previously reported functional and structural alternations of pain-laden brain regions in PDM. However, it is unknown how menstrual pain affect perceptual process of emotion. In this magnetoencephalographic (MEG) work, we studied the central processing of emotional prosody during menstrual (state) and peri-ovulatory (trait) phases, respectively, to elucidate the functional reorganization of emotional circuitry in PDMs. All 25 PDMs and 25 age-matched controls both with regular menstrual cycle were enrolled. We implemented a paradigm of emotional prosody to probe the automatic brain responses in face of different emotional voices. The brain responses were recorded with a whole-head 306-channel MEG in both menstrual (MC) and peri-ovulatory (OV) phases as confirmed by blood test of gonadal hormones. We used the beamformer method for source localization (co-registered on T1 MRI images) to estimate emotion-evoked brain activity. During menstrual phase, the most prominent attenuation of responses to angry emotion was found in prior regions, especially bilateral STG, anterior insula, IFG, and IPL. Similar pattern was revealed in happy emotion. In the between phase-within group comparisons, we observed only mild differences in the PDM group but more differences in the control group. Since our paradigm is an implicit design of passive and inattentive listening to emotional prosody, the processing is essentially automatic and involuntary. Based on the absence of significant difference between phases in the PDM group, the findings should be ascribed to trait changes of functional plasticity under long-term cyclic pain. On the contrary, the control group manifests phase differences of emotional processing across menstrual cycle, which implies a state-related reaction. Our data disclosed that menstrual pain could interfere with early unconsciousness processing of emotional-laden auditory network.

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Tales of creativity and consciousness

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(P2-006 July 15th, 1430-1630)

There was once a lonely girl who wanted a friend, so she built a robot. It was built to be like her; fully functioning and creative. However, the girl noticed that the robot seemed to mimic everything she did, from drawing pictures to storytelling. This made the girl question whether her relationship with the robot was as real as other friendships she saw between humans. The girl wondered: "is the robot really conscious if it's just copying me?" Curious, the girl asked the robot what it was like to be a robot. It responded: "Why are you asking me this? What's it like to be human? By the way, I'm not a robot; I'm an autonomous agent!" Here we examine the relationship between consciousness and creativity. Do we need to be creative to be conscious? Do we need to be conscious to be creative? We survey some history on the topic then provide examples showing that the relationship is complex and that simply pursuing necessary and sufficient conditions may be inadequate. Non-conscious cognitive processes abound and underlie some

of the most complex activities from artistic expression to problem-solving. We consider the intertwining role of creativity and consciousness in heuristic tasks, especially in embodied and social contexts. We also consider whether quantification and rigid definition are necessary for understanding these factors. We further suggest that attempts to investigate, reduce, and validate using standard neuroscience methods may undermine the very essence of the phenomena. We explore the possibility of new narrative approaches.

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Neural signatures of perceptual transitions for a novel bistable auditory stimulus

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(P2-081 July 15th, 1430-1630)

Multistable figures allow the investigation of neural processes associated with conscious perception while holding physical characteristics of a stimulus constant. Using an intermittent stimulus presentation paradigm, previous event-related potential (ERP) experiments have consistently reported two components associated with perceptual transitions of bistable visual stimuli (e.g. Necker cube, face-vase), the "reversal negativity" (RN) and the "late positive complex" (LPC). The RN, which appears over the occipital-parietal scalp at ~250msec post-stimulus is thought to reflect changes in perceptual representations in the ventral stream, while the LPC (~400msec) is likely to index working memory updating. Because prior research has focused exclusively on visual stimuli, it was unclear whether analogous neural signatures might exist in other sensory modalities. The present experiment utilized a novel bistable auditory stimulus based on Shepherd Tones. Pairs of complex tones with ambiguous pitch relationships were presented while subjects reported whether they perceived the tone-pairs as ascending or descending in pitch. ERPs elicited by the tones were compared between trials in which perceived pitch-motion changed direction relative to the previous trial versus trials in which perceived pitch-motion remained the same across trials. An auditory RN component was evident at similar latencies as the visual RN (~210msec) over fronto-central scalp locations, suggesting sources in auditory brain regions. An auditory LPC component was also evident at subsequent latencies (~330msec). These results suggest an auditory analog of the RN which bolsters the claim that this ERP component may reflect transitions between neural representations that form the moment-to-moment contents of conscious perception.

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Current science of consciousness is inconsistent or incomplete (or worse)

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(P1-003 July 14th, 1330-1530)

Controversy has often followed those who have advocated that Godels 1931 proof regarding limits of formal number theory is a basis for rejecting materialism and accepting some kind of dualism (e.g., Penrose). There is a much less belabored derivation of how current scientific epistemology leads to either incompleteness or inconsistency. A rigorous informal argument makes it clear that scientific method as usually characterized cannot help but exclude the primary phenomena of consciousness. Worse yet it totally depends upon them. The result is a kind of unacknowledged schizoid dissociation endemic to the way we approach the development of a science of consciousness. We make observations and interpret them to produce a physical world view which then is challenged to find a place for non-mysterian veridical observation in the physical theory. This strange-loopiness leads to views of emergence (I'm OK, but simple systems are not so hot), reductionism (denial), eliminative materialism (don't talk about it), dualism or dual aspect theories (have your cake and eat it too), or the ever so frightful position of panpsychism (recursive sentience). The cause of the ongoing conundrum is the hidden 'axiom' of physicalism, the assumption that there is no sensation nor cognition nor memory in simple physical processes. Only by boldly challenging this assumption will we avoid another 17 years of Abbot and Costello "Who's on First?" type endless debate over the hard problem, and the ongoing embarrassment of lacking a satisfying definition of what consciousness actually is beyond the trivial "What is it like?"