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### ***Creative isomorphism between object, idea and states of consciousness***

Liza Lim (University of Huddersfield)  
(Short communication)

An artist's report on the composition of 'The Green Lion Eats the Sun' (2014) for double bell euphonium, in which a severe case of 'writer's block' was resolved in unusual circumstances. The work was largely composed in a busy airport lounge during a 7-hour delay in which I switched into a trance-like state of high creative focus. The subject explored in the composition is that of parallel structures of consciousness in which one can only gain access to one world at a time through a switching mechanism. This idea partially relates to Benjamin Libet's experiments showing that there are gaps perforating the weave of our consciousness and in which perception is seen to be a discontinuous phenomenon (Massumi, 2014). The musical work is realized through a parallelism between the structure of this dual interior life and the morphology of the instrument with its two bells or sound sources that can only be activated alternately.

The report looks at the isomorphic relation between an object (the musical instrument), the artistic concept (conscious and unconscious layers) and the state of mind in which the composition was carried out, speculating on ways in which external representations help to amplify and prompt creative thinking in music.

### ***Emotional expression and creativity: An fMRI study of jazz improvisation in response to emotional cues***

Malinda J. McPherson, Monica Lopez-Gonzalez, Patpong Jiradejvong, and Charles J. Limb  
(Johns Hopkins University School of Medicine and the Peabody Conservatory)



A primary function of music is to convey emotions, yet empirical research in this area has largely focused on the perception, rather than the production of emotion in music. We attempted to address this void by using fMRI to study piano improvisation in response to emotional cues. Twelve professional jazz pianists (mean yrs performing professionally =  $18.35 \pm 13.28$ ) were shown photographs of an actress representing a 'Positive', 'Negative', or 'Ambiguous' emotion. During each image presentation they were either instructed to passively view, play a chromatic scale, or improvise music that they felt best represented the emotion expressed in the photograph. Subjects improvised with their right hand using a thirty-five key keyboard.

Our findings demonstrate that emotional intent modulates neural activity in emotion processing areas such as the insula (suppressed during Positive trials), amygdala (increased activity during Positive and Negative trials), temporal pole (active during Positive trials), and anterior cingulate cortex (active during Negative trials, suppressed during Positive trials, baseline during Ambiguous trials). These effects were not seen during chromatic scale and viewing conditions; they were specific to improvisation. Furthermore, emotional intent greatly altered the BOLD signal in the dorsolateral prefrontal cortex, an area that is deactivated during creative processing. Various musical analyses revealed that improvisations were statistically different between emotion conditions.

This study shows that emotional intent greatly alters both the neural systems involved in creativity and the neural systems responsible for processing emotion. The observed emotion-specific neural changes suggest that emotional intent influences the ability of performers to lose self-consciousness and enter a creative flow state. Furthermore, the data indicate that expressing emotion through music requires the use of lower-level emotion centers of the brain, a finding that may have ramifications for understanding music performance as a means personal emotion regulation as well as a means of modifying group affect.