

„Altered state phenomena induced by visual flicker stimulation“

Summary English

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In the present study the authors systematically investigated the effects of flicker light stimulation (FLS) on different domains of consciousness, perception, executive functions and mood. Furthermore the impact of underlying personality traits on the susceptibility for FLS was assessed. Using Lucia N°03 (light attendance gmbh) the phenomenology of experienced FLS was studied under two experimental conditions applying stimulation with 3 Hz and 10 Hz. Accordingly the current study design enables the structured comparison of quantitative and qualitative aspects of altered state phenomena as previously induced by the application of pharmacological methods (e.g. LSD, psilocybin, ketamine) as well as non-pharmacological methods (e.g. hypnosis, sensory overload, perceptual deprivation).

FLS was applied to a sample of twenty-four voluntary German native speakers (mean age: 24.0 ± SD 6.4; 19 female, 5 male) without any history of neurological or psychiatric disorders.

The statistical analysis at the chosen threshold ($p < 0.05$) revealed that the effects induced by FLS are dominated by simple visual hallucinations which are associated with deeper relaxation states characterized as blissful and even related to aspects of spiritual experiences. Moreover it could be shown, that FLS with a frequency of 10 HZ led to a higher intensity of altered states of consciousness (ASC) and a higher amount of flicker induced visual hallucinations. In the line with the results of previous studies the extent of ASC experience was correlated with participant's trait of Absorption. This trait factor is known to be experienced in situations of high and focused attention. In addition it is supposed that Absorption facilitates entrance into deep

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meditational states or experiencing altered states of consciousness (ASC) after intake of psilocybin.

Further analysis of the results revealed no significant or consistent patterns regarding the tested personality traits, e.g. as neuroticism, extraversion, openness to experience, agreeableness and conscientiousness. While FLS showed significant effects on time perception as well as certain mood alterations, no significant effects could be found with respect to divergent thinking.

In conclusion, the results of the present study indicate that by presenting FLS to healthy volunteers primarily visual hallucinations similar to those induced by certain psychedelic substances could robustly be provoked. Alterations in other aspects of consciousness or perception were less prominent in the context of the chosen study design. Thus the authors point to the possibility of extending the application settings by accompanying FLS with music and by additionally varying the flicker frequency or intensity which might yield more substantial, relaxing and personally meaningful states.

Overview / effects of FLS / corresponding domain

Perception / consciousness

reduction of vigilance

increase of imaginal alterations, e.g. seeing colors or patterns with closed eyes, and the visual perception of geometric patterns

high self-awareness as well as focused and mainly self-directed attention

Given the assessed alterations in visual perception the authors conclude, that FLS might thereby constitute a non-pharmacologic technique comparable to certain psychedelics (dimethyltryptamine) in its ability to induce visual effects.

Time Perception

altered time perception (overestimating of elapsed time)

These results are well in line with previous studies linking higher time estimations to reduction in vigilance.

Mood Alteration

„small“ negative effect on mood

The assessed negative effects on mood are thought to be due to the chosen monotonous FLS application, since other studies reporting positive effects in recreational settings employed variable frequency settings.

Divergent Thinking

No significant effects could be found with regard to the domain of divergent thinking in both experimental conditions.

Personality Traits and alterations in subjective experience

higher score of „Absorption“ correlates with susceptibility for alterations after FLS

The current results indicate that higher scores of Absorption significantly facilitate ASC induced by FLS in both conditions. This result is well in line with previous results, where high scores on Absorption have been linked to highly focused attention “involving a full commitment of available perceptual, motoric, imaginative and ideational resources to a unified representation of the attentional object“. Accordingly Absorption was as well a significant predictor of consciousness alterations after psilocybin intake, as shown in previous studies.

Summary English:

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