

Perceived (in)congruency of audiovisual stimuli consisting of Gabor patches and AM- and FM-tones

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<https://hdl.handle.net/2324/4475140>

出版情報 : Kyushu University, 2020, 博士 (芸術工学) , 課程博士
バージョン :
権利関係 :

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| 論 文 名 | Perceived (in)congruency of audiovisual stimuli consisting of Gabor patches and AM- and FM-tones (視聴覚刺激における知覚的調和：ガボール・パッチと振幅変調音および周波数変調音) | | |
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論 文 審 査 の 結 果 の 要 旨

The objective of the doctoral research was to examine how auditory and visual information is combined and processed into perceptually congruent percepts. To this end, stimuli consisting of a Gabor patch and a frequency-modulated (FM) tone or an amplitude-modulated (AM) tone were utilized. Four experiments were performed and the objectives were: (1) to investigate the perceived congruency in relatively long stimuli (2 seconds) consisting of a Gabor patch and a modulated tone; (2) to compare the perceived congruency of such stimuli with an AM-tone and an FM-tone; (3) to investigate the effect of static (spatial frequency of the patch and the carrier frequency of the tone) and dynamic or temporal parameters on perceived congruency to determine the most prominent factors for congruency in such stimuli. Gabor patches of various spatial frequencies (2-10 cpd) were used with flickering or drifting gratings in combinations with AM- or FM-tones of 0.5 - 4 Hz modulation, and 500-, 1000- and 2000-Hz carrier frequencies. Data were collected through experiments in which combinations of a Gabor patch and a tone were rated on a scale from 1 (incongruent) to 7 (congruent).

The results showed, first, that stimuli with a flickering Gabor patch and an AM-tone showed significantly higher perceived congruency compared to stimuli with an FM-tone. Besides, the effect was especially strong in stimuli in which the patch-flicker frequency and the tone-modulation frequency were (almost) similar. Second, the dynamic parameters, such as the flickering (temporal) frequency of the patch and the modulation frequency of the tone, played a prominent role in determining perceived congruency, while static parameters had little or no effect. These findings were confirmed for stimuli of different duration (1 - 4 seconds).

The results suggest that the temporal similarity between auditory and visual components plays a prominent role in determining audiovisual (in)congruency. Additionally, the similarity in the dynamics of auditory and visual components can further enhance congruency. The crossmodal matching of the visual component's spatial frequency and the auditory frequencies, on the other hand, has no measurable effect on the (in)congruency of dynamic stimuli.

Overall, the number of experiments, the level of the research in general and the conclusions described in the doctoral thesis merited a high evaluation by all committee members. As a result, the committee decided that a doctoral degree (Doctor of Philosophy in Design) can be conferred upon Ms. Natalia POSTNOVA 本論文は博士（芸術工学）の学位に値すると認めた。