

論文 / 著書情報
Article / Book Information

題目(和文)	主観的時間感覚に与える数字の順番や運動制御モードの影響
Title(English)	EFFECTS OF NUMERIC ORDER AND MODE OF MOTOR CONTROL ON SUBJECTIVE TIME
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Category(English)	Doctoral Thesis
種別(和文)	論文要旨
Type(English)	Summary

(博士課程)
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論文要旨

THESIS SUMMARY

専攻： 知能システム科学 専攻
Department of
学生氏名： 饒伊智充
Student's Name

申請学位(専攻分野)： 博士 (理学)
Academic Degree Requested Doctor of
指導教員(主)： 中村清彦
Academic Advisor(main)
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要旨 (英文 800 語程度)

Thesis Summary (approx.800 English Words)

The processing of temporal information is ubiquitous in cortical computation. It is important for both perception and action, serving as an essential element of how the brain constructs models of the environment. This thesis investigated effects of perceptual and motor contexts on subjective time empirically. The thesis is composed of five chapters. In chapter 1, a motivation and a purpose of a research about subjective time were described. In chapter 2, review of preceding studies on subjective time was described. The following chapter 3 and 4 are the descriptions of experiments that I conducted. In chapter 3, an effect of numeric order on time perception was investigated. Preceding studies suggested that magnitude of stimulus (e.g., physical size, brightness, digit, etc.) affected temporal processing of the brain. A subject perceived a stimulus with larger magnitude as longer than that with smaller magnitude. The presented stimuli that many preceding studies used were static. In this chapter, I investigated whether stimuli the magnitude of which changed gradually would also affect subjective time. The Arabic number, which is thought to be familiar to many people in Japan, was used as the stimulus. In the experiment, nine digits from '1' to '9' were presented in ascending, descending, or random order. A square followed the presentation of digits as a target stimulus. A presented interval of each digit was fixed at 500 ms. The target stimulus was presented shorter or longer than the each digit. A subject judged whether the presented interval of target was shorter or longer than that of each digit. The result showed that the subject tended to overestimate the target duration in ascending order condition compared to the other conditions. A point of subjective equality (PSE), which indicates the target interval that the subject perceived the target as the same duration as each digit, was calculated for each condition. The result of PSE showed that PSE in ascending order condition was significantly smaller than in descending order condition, indicating the subject perceived the target in ascending order condition as longer than in descending order condition. These results indicated that the stimulus the magnitude of which changes gradually also affected our temporal processing. In chapter 4, an effect of mode of motor control on subjective duration was investigated. Sensorimotor contingency is one of the main factors to warp time perception. Preceding studies showed that voluntary actions such as saccades and hand movements affected the subjective perception of temporal duration. Motor control can be categorized hierarchically depending on an engagement of consciousness. For example, voluntary movement and intended action are thought to be close to conscious movement. On the contrary, reflex like movement and reflex are thought to be close to unconscious movement. In addition, spontaneous or self-timed movements are thought to be located intermediate between them. The preceding study showed that the perceived timings of action and stimulus are affected by whether an action was automatic or controlled. In this chapter, I investigated an effect of the mode of motor control on duration estimation. In the experiment, a duration reproduction paradigm was used. A subject remembered a reference interval and reproduced its length by keeping pressing a key after a Go signal. By limiting a timing at which the subject began to press the key after the Go signal, the mode of motor control was controlled. In experiment 1, an effect of automatic, self-timed, and cognitively controlled movement on reproduced interval was investigated. Reproduced intervals were shorter when actions were initiated by automatic manner, compared to self-timed or cognitively controlled actions. In experiment 1, the subjects knew which action they would conduct when they remembered the reference interval. Therefore, there was a possibility that an internal state such as attention and concentration were different between the conditions and it affected a process of remembering the reference interval. In experiment 2, the experimental procedure was modified so that the subject did not know which action she or he would do when remembering the interval of the reference stimulus. The result in experiment 2 was consistent with that in experiment 1. These results indicated that the mode of motor control affected our temporal processing in such a manner that automatic action might accelerate the flow of subjective time. In chapter 5, general discussion was described. I summarized and discussed the results of the experiments in chapter 3 and 4. Future works were also given in this chapter. In summary, this thesis showed that both perceptual and motor contexts affected our temporal processing. In both experiments in chapter 3 and 4, the factors that affected temporal processing were set just before the subject estimated the interval. It was the order of digit and the mode of motor control in chapter 3 and 4, respectively. Therefore, it indicated that our subjective time progresses by being affected by both the context of perception and motor mechanisms.

備考：論文要旨は、和文 2000 字と英文 300 語を 1 部ずつ提出するか、もしくは英文 800 語を 1 部提出してください。

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