

## Analysis of Heart Rate Fluctuations II

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Since  $1/f$  fluctuations have been found in the RR intervals of electrocardiograms (ECG), much research has been done on  $1/f$  fluctuations in biological rhythms. In particular, how  $1/f$  fluctuations of heart rate vary with diseases and aging has been studied. But, neither the generative mechanism nor the functional meaning of  $1/f$  fluctuations have been elucidated. To elucidate the mechanism by which the heart rate variability shows  $1/f$  fluctuations, we have been studying various factors which can generate  $1/f$  fluctuations. We have already confirmed that  $1/f$  fluctuations originated from fractal natures in biological organs. In this paper, a phase model is proposed which associates local fluctuations originating from the fractal structure with global fluctuations, such as heart rate variability. The model is simulated numerically. The phase model reflects the fractal structure of the nervous system. As a result, it is suggested that  $1/f$  fluctuations of heart rate variability originate from the fractal nature of structures in the nervous system.

## Development of a Rorschach Test System

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The Rorschach test is a very general test used in psychoanalysis. It provides a good evaluation but requires some complicated calculations. We were asked by one of the mental hospitals to develop a support system which utilizes a personal computer to aid in the calculations. In preparing the system, we wrestled with an analysis of operations. The system that was devised can be operated by inexperienced personnel because it uses the GUI (Graphical User Interface), which makes operation very easy and practical. However, a part of the procedure is carried out manually, because the data used in the test is obtained by conventional methods.

## Performance of Auditory Lexical Decision Tasks by Aphasics

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The ability to perform auditory lexical decision task was investigated in 20 aphasics according to characteristics of words and types of aphasia. Also performances in visual lexical decision making with kana were compared to auditory lexical decision performances. The overall performance level in making auditory lexical decisions was high, and frequency of use of target words influenced the performance. Among aphasic types, Wernicke aphasics and transcortical sensory aphasics made errors in deciding nonwords versus words. Broca aphasics and Wernicke aphasics showed high correct response rates with words, but they showed low correct response rates with nonwords in auditory lexical decisions. In visual lexical decisions of kana words and