161 STOCHASTIC INTERFERENCE AND AUDITORY PERCEPTION

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Introduction: Due to physiologic memory effects, the formation of spike patterns of nerve activities can be characterized by fractal geometry. Acoustic stimuli such as music obey fractal geometry. The converging and diverging neuronal pathways, in which such fractal geometries are processed present additional challenge to an understanding of the processes contributing to auditory perception, in particular to speech and to music.

Materials and methods: Any method which attempts a faithful representation and reconstruction of the electric activity pattern has to implement fractal geometric stimuli of auditory nerves, and also has to cope with the converging and diverging processing of those stimuli.

Results: We present a study in which small changes in the fractal geometry of input signals yield a potentially large change in the fractal geometry of the output signal by taking the joint of the input signals equivalent to the logical AND operation. This effect, in which the variation of the fractal dimension of the secondary spike pattern is proportional to the number of converging input signals and to the variation of their fractal dimension. This effect remains unchanged if white noise is added.

Conclusion: The increase in sensitivity to variations of the fractal dimension due to the convergent and divergent signal processing contributes to the auditory perception. We propose here to utilize this effect for a better signal discrimination in a multielectrode cochlear implant configuration.

162 EVALUATION OF STREAMLINED PROGRAMMING PROCEDURES FOR THE NUCLEUS® COCHLEAR IMPLANT SYSTEM WITH THE CONTOUR ELECTRODE ARRAY

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Introduction: The objective of this study was to evaluate the effectiveness of procedures for streamlining the programming of the Nucleus cochlear implant system. Given the rapid expansion in numbers of recipients who require programming, and the limitations on available clinical time and funding, an effective streamlined procedure would be of significant benefit to cochlear implant clinics, clinicians and recipients.

Materials and methods: The effectiveness of a range of procedures was initially examined through an analysis of MAPs for the first 103 Contour recipients in the Melbourne clinic. A subset of the procedures were then selected and evaluated in clinical studies. A first study compared the clinical MAP with a MAP based on interpolating across three behaviorally measured T- and C-levels in a group of sixteen newly-implanted subjects. The second series of studies investigated the effect of using a single interpolated profile as the basis to creating the entire MAP, with the interpolated profile being based on five, three or a single behavioral measure. Outcomes for the different MAPs were compared by evaluating speech perception scores in quiet and in noise, and through evaluating preference via a questionnaire.

Results: Initial analysis showed that, as expected, larger differences were observed between the clinical and derived MAP levels as interpolation was applied across fewer measured electrodes, and that the use of a single interpolated profile introduced more deviation. Results of speech perception evaluations showed no significant difference in the scores recorded by the subjects when programmed with the clinical MAP as compared to the streamlined MAP obtained through interpolating across three T- and three C-levels, nor between the clinical MAP and the MAPs obtained through using the interpolated profile based on five behavioral measures. These findings were supported by the questionnaire data. Extension of the latter procedure to involve three rather than five measures resulted in equivalent mean speech perception scores for the group of subjects, however poorer outcomes were observed for some subjects. The use of a MAP based on a single measure resulted in significantly poorer speech perception and preference outcomes.

Conclusion: Two streamlined procedures for programming are recommended. These involve interpolating across three measured T-levels and three measured C-levels, and interpolating across five measured T- or C-levels and applying this profile to the alternative profile.