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DETECTION OF A SIGNAL AS A FUNCTION OF INTERAURAL DIFFERENCES
IN THE INTENSITY OF MASKING NOISE

A thesis submitted to the University
of Auckland in partial fulfilment of
the requirements for the degree of
Doctor of Philosophy.

-----oOo-----

Jennifer A. Stillman

Auckland, December, 1987.

"But, as frequently occurs, the simplicity that makes the model attractive carries an attendant risk No matter how simple the task may seem to the experimenter, the complex adaptive processor (sensory system) utilizes whatever it has available to optimize performance."

Schubert (1979)

ABSTRACT

A series of experiments was undertaken to explore the effect of interaural differences in the intensity of masking noise upon the detection of a signal. The signal was a 2-kHz sinusoid, and the masker was composed of either one or two 800-Hz wide bands of noise. The centre frequencies of the two bands of noise, one above and one below the signal frequency, were varied. On most occasions both noise bands were used to create a spectral notch surrounding the signal. The following factors were manipulated:

- (1) The width of the notch: from 0 to 1900 Hz.
- (2) The location of the lower and upper frequency edges of the notch relative to the signal: either equidistant from the signal, or with one edge 150 Hz nearer to the signal than the other edge.
- (3) The spectrum level of the noise: either 20, 35 or 50 dB SPL.
- (4) The degree of interaural disparity in the intensity of some components of the noise: either 0 dB, 10 dB or infinite.
- (5) The ear to which a particular masking noise was sent.
- (6) The manner in which the noise was presented: either diotically or dichotically.
- (7) The manner in which the signal was presented: either diotically or monotically.

The results of the first two experiments were interpreted as showing that threshold signal levels in the presence of interaural differences in the intensity of masking noise depended principally on the ear in which the signal-to-masker ratio at the output of the auditory filter was larger. To test this possibility, auditory filter shapes were derived from two listeners. These were then used to predict thresholds when there were interaural differences in the spectral envelope of a masking noise. The results of a comparison between the predicted and obtained thresholds were consistent

with the previous interpretation. Thus it appears that the detector following the filter can discriminate the output of the two ears and base detection on the better output. This ability may be useful in normal listening, where both wanted and extraneous sounds are subject to change from moment to moment.

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TABLE OF CONTENTS

	PAGE
ABSTRACT	i
ACKNOWLEDGEMENTS	iii
LIST OF FIGURES	iv
LIST OF TABLES	xi
CHAPTER 1:	
INTRODUCTION	1
The filter analogy	4
Filter determination	5
Filter position	10
Filter asymmetry	13
Filter shape	17
The nature of the auditory filter	19
The current study : an overview	24
CHAPTER 2:	
EXPERIMENT 1	
Method -	28
Control and generation of stimuli	31
Procedure	33
Subjects	37
Results -	38
Signal-to-noise ratio and signal offset	51
Auditory filter shapes	55
Discussion -	59
Auditory filter asymmetry	59
Processing efficiency	61
Conclusion -	61

	PAGE
CHAPTER 3 :	
EXPERIMENT 2	
Method -	63
Procedure and stimuli	64
Subjects	64
Results and discussion	65
CHAPTER 4 :	
EXPERIMENT 3	
Method -	
Procedure and stimuli	68
Subjects	69
Results and discussion	69
CHAPTER 5 :	
EXPERIMENT 4	72
Method -	75
Generation and control of stimuli	76
Procedure	76
Subjects	77
Results -	78
Auditory filters	78
Off-frequency listening and resulting gain	83
Thresholds with dichotic stimuli	88
Discussion	91
CHAPTER 6 :	
SUMMARY AND CONCLUSIONS	93
Experiment 1	93
Experiment 2	98
Experiment 3	99
Experiment 4	99
Summary	104
Conclusion	105

	PAGE
APPENDIX A :	
The significance of ear advantage in Experiments 1 and 2	108
EXPERIMENT A1	113
Method -	
Stimuli and procedure	113
Subjects	116
Results -	118
Subject RC	119
Subject AM	121
Subject NO	122
Subject JS	123
Discussion	123
APPENDIX B :	
Threshold estimation with PEST	128
APPENDIX C :	
Statistical analyses	133
REFERENCES	144

LIST OF FIGURES

		PAGE
FIGURE 1	Schematic representation of the advantage afforded by shifting the filter to beyond signal frequency when the masker is a low-pass noise.	11
FIGURE 2	Representative frequency spectra of the noise bands and sinusoidal signal for a complementary pair of notch offsets.	30
FIGURE 3	Schematic diagram of the apparatus.	34
FIGURES 4 - 7 (a)	Masked threshold for the 2-kHz diotic signal as a function of the total width of a notch in the dichotic masker, for two positions of the notch. The spectrum level of the noise was 20 dB SPL. The data are from individual listeners.	39 - 42
FIGURES 4 - 7 (b)	Auditory filter shapes derived from the threshold curves in Figures 4 - 7, (a).	39 - 42
FIGURES 8 - 11 (a)	Masked thresholds for the 2-kHz diotic signal as a function of the total width of a notch in the dichotic masker, for three positions of the notch. The spectrum level of the noise was 35 dB SPL. The data are from individual listeners.	43 - 46
FIGURES 8 - 11 (b)	Auditory filter shapes derived from the threshold curves in Figures 8 - 11, (a).	43 - 46

FIGURES 12 - 15 (a)	Masked thresholds for the 2-kHz diotic signal as a function of the total width of a notch in the dichotic masker, for two positions of the notch. The spectrum level of the noise was 50 dB SPL. The data are from individual listeners.	47 - 50
FIGURES 12 - 15 (b)	Auditory filter shapes derived from the threshold curves in Figures 12 - 15, (a).	47 - 50
FIGURE 16	Signal-to-noise ratio at threshold, as a function of masker intensity, with notch width as parameter, for two directions of notch offset.	54
FIGURE 17	Representative frequency spectra of the upper and lower frequency noise bands for the closed notch, showing the area of overlap in which frequencies are common to both ears.	60
FIGURE 18	Threshold as a function of the normalized distance from the 2-kHz signal to the edge of one noise band for a symmetrically positioned notched noise presented either monotically or dichotically, and for monotonically presented single noise bands.	66
FIGURE 19	Thresholds as a function of noise level when a single notch was presented dichotically, using two directions of notch offset.	70

FIGURE 20	Schematic diagram of a representative pair of dichotic stimuli for Experiment 4.	74
FIGURE 21	Threshold signal-to-noise ratios in Experiment 4, as a function of the normalized distance from the signal frequency to the nearer edge of a spectral notch in the diotic masking noise.	81
FIGURE 22	Auditory filters derived from the threshold data in Figure 21.	
FIGURE 23	The normalized distance by which the auditory filter is predicted to move off-frequency in order to achieve the maximum signal-to-noise ratio at its output. (Predictions for subject BF.)	84
FIGURE 24	The normalized distance by which the auditory filter is predicted to move off-frequency in order to achieve the maximum signal-to-noise ratio at its output. (Predictions for subject KV.)	85
FIGURE 25	Axonometric plots showing the relationship between filter shift, gain in dB and notch width for the subjects in Experiment 4.	87
FIGURE 26	Predicted thresholds for a diotic 2-kHz sinusoid when the masker was a broadband noise containing a spectral notch of variable width surrounding the signal. The masking noise was presented dichotically, and frequency components above and below the notch had unequal spectrum levels. Predicted thresholds are shown separately for each ear. The obtained thresholds with dichotic stimuli are also shown.	89

FIGURE 27	Threshold curve fitted to the average data of four listeners in Experiment 1. Masked threshold is plotted as a function of the deviation of the edge of the upper frequency masking noise from the signal frequency. The spectrum level of the masking noise was 50 dB SPL.	97
FIGURE 28	Thresholds as a function of the normalized distance from the 2-kHz signal to the edge of one noise band for a symmetrically positioned notched noise presented either monotically or diotically. The data are the average of two listeners.	101
FIGURE A1	Pattern of ear advantages when the lower and higher frequency noise bands were equidistant from the signal in Experiments 1 and 2.	110
FIGURE A2	Schematic representation of the stimuli used in Experiment A1.	115
FIGURE A3	Thresholds from four listeners for the single-sideband, contralateral band, and diotic/dichotic stimuli used in Experiment A1	120
FIGURE B1	A sample computer print-out for a block of trials using parameter estimation by sequential testing (PEST).	130
FIGURE B2	Thresholds as a function of notch width obtained from the same subject in Experiments 1 and 2.	132

LIST OF TABLES

		PAGE
TABLE 1	Notch specifications for the maskers used in Experiment 1.	31
TABLE 2	Left- and right-ear hearing levels in dB (re ISO standards), for the four listeners in Experiment 1.	38
TABLE 3	Auditory filter parameters derived from the fitting process for four listeners in Experiment 1.	58
TABLE 4	Left- and right-ear hearing levels in dB (re ISO standards), for the two listeners in Experiment 4. The difference in dB between the left- and right-ear hearing levels is also given.	78
TABLE 5	Auditory filter parameters derived from the fitting process for two listeners in Experiment 4.	80
TABLE A1	Left- and right-ear hearing levels in dB (re ISO standards), for the four listeners in Experiment A1. The difference in dB between the left- and right-ear hearing levels is also given.	117