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ASSESSING INTRUSIVE NOISE
AND LOW AMPLITUDE
SOUND

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in fulfilment of the requirements for the degree of
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in Health Science

Massey University
Wellington Campus
Institute of Food, Nutrition and Human Health

Ethics Approval

Ethics approval for the trial of instrumentation and methodology for assessing low amplitude sound as a low risk project was received on 18 October 2007. The approval states:

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research. If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor Sylvia Rumball, Assistant to the Vice-Chancellor (Ethics and Equity), telephone 06 350 5249, email humanethics@massey.ac.nz

ABSTRACT

Annoyance due to relatively high levels of sound and noise, above 50 dB, has been well documented in noise assessment literature. The potential for annoyance or disturbance from low amplitude sound, below 50 dB to the threshold of an individual's hearing, is not as well documented. The thesis presents a new approach to the measurement and assessment of intrusive noise and low amplitude sound. Acoustical and sound quality measures are integrated with measures of loudness, pitch, dissonance and tonality to provide physical measures of sound. Individual amenity is assessed with respect to personal noise sensitivity and personal attitudes to sound in the environment, the environment itself and the perceived qualities of the audible sound. A decision-support methodology to integrate perceived noise with noise performance indicators, annoyance criteria, personal noise sensitivity and amenity is presented. A method for rating intrusive noise is derived. Designs for sound measurement and calibration instrumentation are described. Methods to measure and assess low amplitude sound are presented.

Keywords

annoyance, intrusive-noise, noise-sensitivity, sound-quality, soundscape

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This research developed over time as people asked questions about why it seemed to be so difficult to measure noise. The usual definition that noise is “unwanted sound” is obvious but the definition is so broad that it is meaningless. Hopefully, the research provides useful meaning to the term, and I want to thank friends and colleagues for their time and patience in helping me. In particular, Dr Densil Cabrera for permission to modify PsySound2, the program that provided a solid stepping stone for this research and Brian Cruse, for all his enthusiasm in translating PsySound2 from Mac to Windows format and in coding my new analysis and display routines. Sue and Daniel: thanks for your thoughts and assistance. The permission of Trevor Cox and Andy Moorhouse of Salford University Acoustic Research Centre (Sound Quality Research) to reference their work on sound quality and sample soundfiles is acknowledged with thanks. My special thanks to Dr Ernst Terhardt, Dr Richard Parncutt, Professor BCJ Moore, Dr Rod Nave and Professor Will Hopkins for their permission to reference their respective works.

For those of us who find field work is a great way to spend the day:

Analysis: so many dragons, so few spears

Results: a bat in the bag is worth two in the belfry

And to all those people who over the last 15 years have said “that noise is driving me crazy... can't you hear it?” Sorry guys, I still can't hear it so that must mean...

Bob Thorne

Rotorua New Zealand

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