LETTER TO THE EDITOR

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WIND FARM NOISE

For some time I have been following the technical political and medical difficulties associated with wind farms. The excellent technical note by Neville Fletcher [1] made me rethink the problem.

A few weeks ago Ray Hartog, a long standing Acoustical Consultant, took me up to Newcastle to look at a small, solitary wind turbine on Kooragang Island. This unit is small by today's standards being only 73 metres high and generating only 0.6 megawatts, but I felt that viewing a single unit would be instructive. The turbine, when we were there, was rotating at 28 rpm with a blade pass frequency of around 90 rpm. As we were very close we could hear the swish and measure with some inaccuracy the very low frequencies. While we didn't record levels we confirmed that we were able to register the fundamental frequencies of the turbine.

At the end of Neville's article he implied that 180 degree out of phase sound generation may reduce the transmitted noise. Usually with noise cancellation the position of the speaker and the polar plot of its signal are critical. However, at such low frequencies the speaker's polar plot should be circular and so make the effort more possible. Fixing a problem at its source, if that is possible, is usually the preferable thing to do.

On assuming a band pass frequency of around 1 Hz, Professor Fletcher drew attention to the coincidence of that low frequency with human pulse rate, walking pace and rhythm. This exemplifies the possible involvement of pressure pulses as wavelength at such low frequencies seems an unlikely direct cause of distress.

To my knowledge the reviewed literature is bereft of examples of people affected by wind farm noise, so I think it is reasonable to suggest that few are affected. Having said that, if even a small number are affected we should find the mechanism by which it occurs and then find a way to minimise the effect.

When I was in charge of the NAL test facilities, I once took a group of adult students into the anechoic room. After a short time one lady said that she felt pressure in her ears. I pointed out that as the large door to the room was open the pressure outside and inside was the same. With that the lady shouted at the top of her voice "WHY WON'T YOU BELIEVE ME?".

I have emphasised this last statement because today, more than ever, perception is reality. To some extent it always was, but now it is generally difficult to call on the authority of, say, a physicist or an engineer to support an argument, as opinion is regarded to be of greater importance. There is hardly any effective reaction against the State Government's science cutbacks or the Federal Government's 'quadrimate' (1 in 4) of CSIRO's staff.

I suspect that, for some people who live in quiet rural areas, their tympanic membrane may stretch to give maximum sensitivity searching for aberrant sound that they perceive may cause problems, in our case wind farm noise. I think this searching for a signal is exactly what happened to the lady in the anechoic room. This I believe can be a very uncomfortable feeling.

We could test this by placing the subject in an area where they can see some turbines, then play pleasant music at a reasonably loud level, say 80 dB SPL and see if, after say 30 minutes, the general distress they previously experienced subsides.

While I think a large proportion of the problems experienced may be explained by this ear discomfort, Stephen Cooper, a very experienced Acoustic Consultant, tells me that he has at least one subject who can tell when the vanes on the local generator are moving and when they are still. So it appears that there may be more than one cause and, therefore, there may be more to the story.

I would like to give another suggestion of how we could progress further. There is a very small possibility that, in some people, the low frequency beat from the generators could pull the heart or breathing rate into synchronisation. With the thunderous lack of any other explanation I suggest a low risk method of testing to hopefully eliminate this theory: Attach a CO2 sensor near the nose and/or a movement detector on the chest as well as attaching a portable ECG monitor to the susceptible subject. Each instrument should be fitted with a transmitter. The outputs could then be compared with the electrical output of a monitoring SLM that is recording the turbine.

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Thank you Den for being available to discuss with me my mad and a little less mad ideas. All responsibility for these dubious ideas is mine.

REFERENCES

[1] N. Fletcher, "Musical rhythm, vibrato and wind turbine noise", *Acoustics Australia* **41**(2), 174-175 (2013)