'Aa Canna' Change The Laws Of Physics!' :
The Science of PWB Electronics.

Star Trek's Chief Engineer was right. Physical laws are here to stay, can't be ignored if we want to stay alive, and can't be altered because we don't like them. So at Peter Belt's workshop in Leeds UK: , it's gravity that keeps his feet on the floor and the photons from his light bulbs don't break the intergalactic speed limit. Peter Belt wouldn't want anything different.

Not that you'd think so, according to Belt's detractors. With statements bordering on the libellous, he is regularly accused of peddling 'Snake Oil' by people who find his claims literally incredible - or he's written off as mad. 'Prove it,' people demand of him daily, 'Let's have some *science* written down clearly.'

So what does Peter Belt claim, to fuel this Inquisition? He's neither Galileo nor Darwin, he simply talks about audio, and the gist of his thinking is this:

> Cheap audio equipment performs far better than we think it does.
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> All audio equipment (regardless of price) under-performs because of factors in its environment.
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> Environments can be fixed easily and often at modest cost.

All really interesting, you might think, but then the *Life of Brian* effect kicks in. Just as many public bodies in the UK:, Europe and the USA: banned the 'blasphemous' Monty Python film before seeing it, a fair number of Peter Belt's critics don't even try his free 'treatments.' They defy the 'laws of physics', people say, and dismiss him out of hand. The ideas really are straightforward however, and this selection is typical:

> Freezing and then slowly thawing CDs improves their sound
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> Tying reef knots in cables or interconnects also improves performance
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> Sticking two tiny pieces of a special aluminium foil on the label side of a CD retrieves more information from the disc. The foil is a free sample from PWB, by the way.

When people do try these things, a large proportion *can* hear improvements but an *Alice in Wonderland* effect often seizes them. Though Peter Belt and his wife May, patiently point out that no measurable changes *whatever* have been made to the audio pathways and assert that only listeners' *perception*s have changed because Belt techniques remove adverse environmental influences, people often start talking White Rabbits and say they must be imagining things. It's a tough life is pioneering, and that's a fact.

Occam's Razor

Entia non sunt multiplicanda praeter necessitatem – often paraphrased as "All things being equal, the simplest solution tends to be best " is a pretty good principle for thinking about puzzles. So, after hearing better sound from Peter Belt's procedures, it's totally reasonable to conclude that it happens because you're *fooling yourself*, and you're in tune with the 14th century's William of Ockham if you do that. The simple explanation for the 'Belt Effect' keeps everything else simple too; you rock nobody's boat and you save yourself further worry. OK, you can say, it's like complementary medicine : people feel better after acupuncture because they *believe they do.* The *placebo effect* is responsible.

Except….maybe not. As a solidly practical audio engineer and an Occam's Razor man to his core, Peter Belt has shown many times that his assertions hold up when tested 'blind'. Significant numbers of audio journalists have correctly chosen his 'treated' environments and audio components as producing superior results against 'untreated' samples over the years, all of which have been fully reported in trade journals. Belief and self-deception can be eliminated as the *only* causes for the perceived effects, since in blind-testing the judges have no knowledge at all about which situations are 'treated' and which are not. Articles on the PWB web site list many references to support these statements and it begins to look as if other explanations than simple massed self-deception are needed.

'What If?' Questions

Even though the term 'Thought Experiment' (*Gedankenversuch*), wasn't invented until 1820 by Hans Christian Ørsted, this technique for working out problems has been used by philosophers and scientists from Pre-Socratic times onwards. A thought experiment typically poses *carefully structured* 'What if? ' kinds of question to examine propositions that can't be tested practically, ie using the classical methods of direct observation or physical experiment. A famous example from quantum mechanics is the 'Schrödinger's Cat ' experiment (Wikipedia link) : and another is the less popularised 'Quantum Suicide' experiment following up Schrödinger's argument from the cat's point of view.(Wiki link)

Although he doesn't talk about his work this way, much of Peter Belt's method of enquiry is to ask all manner of different 'What if' questions about audio and the environment. Some early ones went like this:

> What if there were undiscovered electromagnetic activities present in all audio equipment, detracting from the equipment's perceived performance but *too small to be measured*?
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> What if these hypothetical influences could somehow be removed?

Since Peter Belt is a qualified audio engineer who had marketed his own highly regarded products, he was fully familiar with all the usual electronic techniques used in equipment design (including cables and interconnects) when these questions occurred to him. Consequently, his early questions were fairly simple extensions of orthodox thinking

He wondered initially for example, whether the spinning platters of disc turntables and CD players were generating spurious and undetected EM fields, (see the first 'What if?' question above) and decided that they might be. After a long and careful series of experiments, he

devised a series of products to deal with the notional influences, including the now famous (or notorious, dependent on your point of view) 'Cream Electret,' ' Silver Rainbow Foils' and 'Sol Electret.' All of these devices were reported favourably in the HiFi press for over two decades including two persuasive articles from Greg Weaver for *Soundstage* and *Positive Feedback's* Roger S Gordon . Mr. Gordon describes how he arranged a 'blind' comparative test of different disc treatments on eight listeners, five of whom heard definite improvements in sound from the 'foiled'and 'creamed ' and frozen discs.

From the outset, Peter Belt insisted that his treatments made no physical changes to the audio components receiving them. Nothing could be *measured* and in any case the most 'physical' example of what could be achieved – freezing and slowly thawing both CDs and whole pieces of equipment - hardly explained why an entirely digital medium like the CD itself (where the laser simply 'reads' a series of pits in the disc) would be improved by physical changes to materials carrying the signal. Instead, he was convinced that his devices worked by somehow improving the listener's capacity to hear *the detail already present on the disc* – or tape or radio signal if that was the source involved. Added to this however was the additional problem of explaining how coating a CD's *case* with Cream Electret could possibly improve 'the sound' from the disc that was playing, *even when the disc had been removed* prior to 'creaming' the case so that no 'contamination' of the disc itself could took place. This, and many other similar instances of a positive effect at a distance, needed more consideration and more difficult 'What if? ' questions.

Distant Environmental Influences

In the second of three articles on PWB Electronics written for the classical music review web site Music Web International in 2005/6, I said that Peter Belt's initial explanation for his results was that:

> …. 'electronic *smog' (in the form of unremarked but adverse electromagnetic fields) affected human perceptions of the performance of hi-fi equipment. Clear this up, the reasoning said, and better sound reproduction would result from quite inexpensive components. Since even the physical spinning of a CD could generate electronic pollution apparently, then fixing this by applying small pieces of permanently charged metal foil to the discs was one of the things that would do the trick. So far so good*.'
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> And:
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> *---' What did remain a puzzle though was that according to Peter Belt, one of the charged foil strips used to treat CDs had to be placed in a very specific location – over the 'Compact Disc' logo that appears on all commercial discs, to be precise. And unless this was done exactly, the perceived benefits to the sound did not occur. Why ever not? If the printing on discs was generating spurious electromagnetism, then either all of the print should be covered with the charged foil, or else the specific placement of the foil strips should make no great difference. But the placement of the foil really did affect the result, which means that something additional to the 'smog' theory must be at work on CDs to produce the benefits…. '*

Questions like my own and the serious problem of how 'treating' elements of the listening environment at ever greater removes from the active audio equipment produced positive and repeatable effects, led Peter Belt to speculate on wider possibilities than localised 'electronic

smog.' That clearly didn't explain how treating a CD case with Cream Electret apparently improved the disc's sound or how other similar non-local effects could happen. To paraphrase twenty years' work into one simple problem, the burning research questions became:

> What if there are other kinds of energies adversely affecting the perception of sound from audio sources, that are unrecognised as yet or are simply unacceptable to every day orthodox science?
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> And then:
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> What if these energies can be affected / treated / neutralised even though they are not wholly understood?

In a third MusicWeb article written last year (Brain Cramp) I discussed the psychological phenomenon called *Cognitive Dissonance* that seems to affect many people (including myself initially) when they first try out Peter Belt's devices. I said:

> *…… there's an idea in social psychology called Cognitive Dissonance which goes some way to explaining both my brain cramp and why some people are so vehemently dismissive of Peter Belt's products. Cognitive Dissonance (CD) theory says that perception of conflicts between elements of knowledge (or between attitudes, emotions, beliefs or behaviours) can produce uncomfortable personal tensions in people faced up by the dissonance. This tension is often reduced by the acquisition (or invention) of new thoughts or beliefs that explain away the conflicts, even when the new ideas are completely fals*e.
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> *In my own case, the thing that I'm calling brain cramp came about because I couldn't bring myself to believe the theories the Belts use to explain how their products work which made me uncomfortable and self-doubting: and when 'non- believers' get so vehement about PWB products (as some audio journalists have been for example) they invariable conclude that the Belts just have to be lying charlatans, snake-oil merchants fooling gullible people with flim-flam. Interestingly, the most vehement critics rarely try Belt products themselves – they just know that they're rubbish and a confidence trick. And even if they do try some products, the same critics almost always conclude that they're imagining any perceived differences. QED then? Well, CD more likely….*

What didn't strike me when I wrote this, was that the same kind of problem must have hit Peter Belt himself; at least in his early years. Imagine his situation: there he is, a respected audio engineering expert who, almost before he realises it, begins to think the unthinkable. Presumably, it can't have been easy.

Discovery and Inductive Reasoning

As Peter Belt's enquiries progressed, he made discoveries so unlikely that they generated more incredulity by their sheer audacity. Discussing the 'Red X Coordinate Pen' for example,

reviewer Carol Clark wrote in *Positive Feedback Online - Issue 1*:

….Yes, dear reader, the pen works, and works brilliantly! Let me describe what I did, what I heard, and more importantly, what an unsuspecting outside party heard when I performed my experiments. As with any such phenomenon, hearing for yourself is believing. Do not discount what you are about to read unless you are ready to try it yourself. According to the literature I received, the simplest way to prove the efficacy of the pen is to sign your name on the outside cover of a compact disc. You use your normal signature, and write it like this: Carol Clark > o.k. You need to include the "o.k." to transfer beneficial thought patterns from yourself to the written message..

Outlandish, eh? That's what Carol thought too but she persevered with her experiment and concluded:

…..As in my earlier Peter Belt experiments, I assumed I was subject to the power of suggestion. I was afraid that I had set myself up to hear what I heard, and that I wanted to hear the treated CD in a positive light. This is where I called on my unwitting accomplice, Dave. I used the eraser pen that was provided and erased my signature from the case, thus letting him hear both untreated copies of the CD so he could satisfy himself that they indeed sounded the same. I chose a different song, "Hanging On a Curtain" by Morphine, since it is a song he is more familiar with. I gave him the red pen and asked him to sign his name, then whisked both CDs away, out of his sight. We then talked for a few minutes, so that his mind would turn away from the CDs. I played the treated CD first, and when it was done he indicated that it sounded very good. The untreated CD went in next, and he almost immediately told me that it sounded worse.

You may now take a moment to roll your eyes and say this is all a bunch of hogwash. Go ahead, get it out of your system. Many of you will think I've flipped my lid. I agree that Belt's claims for this product sound completely ludicrous. All I can say is, don't knock it until you've tried it. Trust me when I say the result is sweeter, less discordant music….

It is extremely important to recognise that Peter Belt's work on the pen and his other devices required many years of patient repetitive experimentation and research. Realising early on that he was breaking new ground, he concluded fairly quickly that the usual process of *deductive* scientific reasoning about his findings would never be possible. It became clear to him that the principles of Newtonian physics and standardised electronic engineering practices were simply incapable of generating testable (and falsifiable) hypotheses for the supposed effects of his products. And in any case, neither the processes taking place nor the effects could ever be *measured* in any standardised manner. Quite some problem for a methodical engineer.

The alternative approach of *inductive reason* was available however. What Peter Belt did was to speculate that some particular aspect of the environment might affect the listening experience adversely and performed systematic observations to see whether or not patterns seemed to emerge. He then formed tentative hypotheses about what might be happening and *only then* looked for explanatory theories to fit them. This 'thinking outside the box' as his wife May often describes it, is a perfectly valid method for exploring new ground when orthodox explanations are inadequate. The 'laws of physics' remain immutable, of course.

Theoretical Speculations: Quantum Mechanics and Morphic Resonance

Other kinds of energies than stray EM fields within listening environments do seem to affect the perception of sound from audio sources adversely. The corollary of this statement was that even very modest audio equipment handles information far better than we realise and performs beyond all expectations when the impediments to accurate perception are removed.

The adverse energies involved seem to be entirely overlooked by the orthodox sciences (mostly Newtonian physics) used in developing audio equipment. As such they are not readily amenable to measurement.

Adverse energies seem often to be completely unconnected with the audio equipment itself. Aspects of the environment at substantial distances from the equipment's location and often having no *apparent means of whatever of influencing the equipment*, appear to act on the equipment's perceived performance. This means that it is the *listener who is being affected*. The 'improved sound' experienced after an environment has been treated is *already there in the room before* Belt 'treatments' are applied.

> Devices developed by PWB Electronics do seem to remove or neutralise the adverse energies sufficiently frequently to be taken seriously. Importantly, the beneficial effects resulting from using the devices, can be demonstrably and repeatedly *reversed* when the devices are removed from the listening environment.

In one sense, the obvious place to begin seeking explanations was in the area of post-Newtonian physics, especially in the quantum mechanical universe inhabited by Schrödinger's Cat. Peter Belt was aware that Thomas Young's 'double slit' experiment (circa 1801) - which consists of letting light diffract through two narrow slits to produce fringes or wave-like patterns on a screen - could also be performed with a beam of electrons or atoms, and produced similar interference patterns. This demonstrable phenomenon is usually taken as evidence of the 'wave-particle duality' predicted by quantum physics although it becomes 'quantum mechanical' only when quantum *particles* - atoms, electrons, or photons – are seen to manifest as waves.

This idea was appealing in terms of providing evidence that peculiar and difficult to measure phenomena were already accepted as real by serious physics. And when coupled with the even odder idea of Quantum Entanglement (Wikipedia Link) which Einstein had called 'Spooky Action at Distance, ' (Wiki Link) 'wave-particle duality' seemed to offer at least a generalised theoretical framework that made a least partial sense of the raft of data collected on the Belt devices.

Peter Belt could easily have stopped there, but he didn't. Keen to find a theory that fitted his data more exactly, he discovered an unlikely but useful source in the work of the Cambridge:City>:place> biologist Rupert Sheldrake. To explain the action of the Red X Coordinate Pen and similar PWB devices, Sheldrake's ideas about things he calls ‘Morphic Fields’ and ‘Morphic Resonances’ seemed potentially fertile. Sheldrake's web site is (Here) for those interested in learning more, and although the content is regarded as distinctly controversial by some of his more orthodox colleagues (a past Editor of ‘Nature’ suggested that one of his books should be burned, for instance) he is undoubtedly a carefully trained scientist who conducts his studies with a good deal of rigour.

Sheldrake's revolutionary idea is that 'memory is inherent in nature and that the so-called laws of nature are more like *habits*.' He maintains that:

> Genes do not wholly explain the development of organisms (simple or complex) and that 'morphogenetic fields' (called biological, positional or developmental 'fields' by some biologists in the past) are needed to impose different kinds of order on otherwise random genetic processes.
>
> These 'morphogenetic' fields are not fixed forever, but evolve.
>
> The fields are inherited by new members from past members of a species through some kind of *non-local* effect that he calls, 'morphic resonance.'

The consequences of these suggestions are that the 'morphic fields' presently organizing the activity of the nervous system in humans and other creatures, are *inherited* through morphic resonance, conveying a collective and instinctive *memory* among species. Individuals within a species however, both *draw upon* and also *contribute to* the collective memory of their species. This accounts, Sheldrake says, for why new patterns of (animal) behaviour sometimes spread more rapidly over huge distances than would otherwise seem likely. Sheldrake maintains for instance, that humans in one location can learn and (digest) new ideas *faster* once some kind of critical mass of people *somewhere else* have already learned them. It's not telepathy exactly but a mysterious 'something in the air' that makes the accelerated learning possible.

Could it be that Morphic Resonance and Quantum Entanglement fit together in some peculiar way? Since Quantum Entanglement seems to allow Quantum Teleportation (Wikipedia Link) of information Peter Belt thinks they may do. Basing his thinking on Sheldrake, he also suspects that inherited evolutionary 'habits' concerned with survival, condition everyone's *perceptual abilities* even today, particularly when it comes to the perception of *sound*. This staggering assertion means that human ability to process sound is seriously impaired by *defensive strategies developed over evolutionary time* and inherited by all humans from one generation to the next. For e*very* human being, everywhere: *all* of the time.

Thinking the Unthinkable

The idea that normal human hearing is always below its potential is clearly an extraordinary claim: one that needs further justification in its own right. Once again referring to Sheldrake, Peter Belt speculates that the evolution of stereoscopic sight gradually made the need for super - acute hearing increasingly redundant as a survival mechanism. Sound is obviously still important to us of course – we all know that – but arguably we have learned through the action of morphic resonance to depend on sight far more than hearing for most practical purposes.

It is not simply the case either (as Daniel Barenboim asserted in the BBC's 2006 Reith Lectures) that we have become so swamped with visual images and spurious noise that we have forgotten how to listen. Additionally, we have failed to develop capacities for dealing with the increasing number of relatively modern adverse energy fields affecting hearing because to do so has yielded no particular survival advantage for us so far. Thus, we have an unidentified problem with auditory perception which we ignore simply because it poses no other threat than to our pockets, when we invest in hifi equipment.

If - and it's a substantial if – as Peter Belt would agree, his audio treatments are fixing us rather than our equipment, then much of the HiFi industry is barking up not just one wrong tree when persuading us to buy expensive equipment to get better sound, but a fairly substantial forest. That's certainly what Peter Belt thinks these days, while still maintaining every respect due to the 'laws of physics. ' And the really hard question left for the rest of us is:

What if…. Peter Belt and his science are right?
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