

# For those psychologists about to rock...

...we salute you. With a little help from his friends, Editor **Jon Sutton** looks for shortcuts to musical expertise.

I think I only have two regrets in my life: selling my vinyl collection, and not learning the guitar when I was a kid.

For my 30th birthday, I was bought an acoustic guitar. I'm ashamed to say that this lovely gift sat in the corner gathering dust for another seven years, at which point I decided to buy a beautiful Gretsch electric to keep it company. Both are now proudly displayed on the wall, and I get them down as often as family life allows, but they may as well be screaming '10,000 hours!' at me – the amount of graft many psychologists think is necessary to achieve mastery of a skill.

I don't have 10,000 hours. I'm looking for shortcuts.

The early signs are not good. My brain just doesn't seem to be suited to the task, and the less said about the fingers the better. Luckily, one thing I have in my job is access to an awful lot of psychological expertise. And, I noticed, a lot of psychologists and neuroscientists out there (see also box, 'A marriage made in heaven?') are actually doing this: they play guitar, drums, or sing, on stages, in front of people! This is way beyond what I want to achieve, so surely they can help me in my quest to knock out a passable version of some 90s shoegazing classic.

When Dr Christian Jarrett, then editor of the Society's Research Digest, put together a list of psychologists and neuroscientists who rock ([tinyurl.com/psychshorock](http://tinyurl.com/psychshorock)), I decided to get in touch with them. Could this

supergroup of psychology performers help me unleash my inner rock god, while also exploring the relationship between psychology and music more generally?

## Can psychology help?

My first question was whether my background in psychology could influence how I learn or perform music.

Of course, psychology can provide subject material. People write about what they know: psychologists are no different, and happily their academic subject matter



...sat in the corner gathering dust

also happens to be 'all of life'. Look at Ian Deary, a Professor of Differential Psychology at the University of Edinburgh, and front man with Dancing Mice. No, really, look at him on YouTube, singing 'The G Factor', intoning the words 'standard deviation from the mean' while busting some fairly impressive Ian Curtis-esque moves. Then consider Joseph LeDoux, a Professor at New York University and performer with The Amygdaloids, whose essay 'The flip side: Scientists who rock' certainly struck a chord with me. 'Most of the songs I write are about mind and brain and mental disorders (sort of like most rock songs, actually)', he tells me. 'Our records are titled Heavy Mental, Theory of My Mind, and All in Our Minds.' Professor Andy Field (University of Sussex, drums in Fracture Pattern) says: 'As an undergraduate I used to play guitar in a heavy metal band, and some of my lyrics included the lines "emotions, skewed against the norm", and "regression, where will you draw the line", which suggests that my subconscious mind knew that I would be more successful as a statistics textbook author than a musician.' Dr Ellen Poliakoff (University of Manchester and bass, violin and vocals in Stray Light: see pic, right) has a song called 'Hearing Shapes', inspired by synaesthesia, and she has converted her own EEG recording into a sound file to add some noise to the middle of a song ('Briar Patch'). And Dr Rebecca Lawson (UCL Institute of Cognitive Neuroscience) drums with The PRK, who have a song called 'Dr Freeman' about the American physician/psychiatrist with a penchant for trans-orbital lobotomies. 'Despite the jangly sound the song is lyrically quite dark,' she tells me.

But I'm looking for deeper connections: I'm looking for those shortcuts. Daniel Levitin, Professor of Psychology and Neuroscience at McGill University in Montreal and author of *This Is Your Brain on Music*, confirms my worst fears. 'The role of practice in attaining expertise – the so-called 10,000 hour

## references

- Broughton, M. & Stevens, C. (2009). Music, movement and marimba: an investigation of the role of movement and gesture in communicating musical expression to an audience. *Psychology of Music*, 37, 147-153.
- Elbert, T., Pantev, C., Wienbruch, C. et al. (1995). Increased cortical representation of the fingers of the left hand in string players. *Science*, 270, 305-307.
- Hambrick, D.Z., Oswald, F.L., Altmann, E.M. et al. (2013). Deliberate Practice: Is That All It Takes To Become An Expert? *Intelligence*.
- McPherson, G.E. & McCormick, J. (2006). Self efficacy and music performance. *Psychology of Music*, 34(3), 322-336.
- Meister, I.G., Krings, T., Foltys, H. et al. (2004). Playing piano in the mind: An fMRI study on music imagery and performance in pianists. *Cognitive Brain Research*, 19, 219-228.
- Rasch, B. & Born, J. (2013). About Sleep's Role in Memory. *Physiological Reviews*, 93(2), 681-766. doi: 10.1152/Physrev.00032.2012
- Vogt, S., Buccino, G., Wohlschlägeret, A.M. al. (2007). Prefrontal involvement in imitation learning of hand actions: effects of practice and expertise. *NeuroImage*, 37, 1371-83.



## A marriage made in heaven?

Many more psychologist-musicians were unearthed in the researching of this article. Adrian Owen (Chair of Cognitive Neuroscience and Imaging at the University of Western Ontario) is in a band called You Jump First; Dr Charles Fernyhough (University of Durham) plays guitar with the Aimless Mules; Dr Paul Redford (University of the West of England) plays bass in Traps; and perhaps best of all, Dr Allan McNeill (Senior Lecturer in Psychology at Glasgow Caledonian University) and Professor Keith Laws (University of Hertfordshire) were founder members of Scots stadium rockers Simple Minds and new wave band The The respectively. Are psychologists in some way destined for the spotlight?

'Not really', is the rather disappointing consensus. Daniel Levitin says: 'I don't think there's anything special about psychology in this regard, other than psychology is quite broad in its mandate, and sits at the intersection of social sciences and hard sciences, and so it's likely to attract rather broad-minded individuals.' Tim Byron thinks that musicians and psychologists are both fundamentally concerned with what's between the ears: 'musicians are generally trying to use chords and notes and rhythms to influence how you feel, whereas clinical psychologists use homework and identifying thoughts, etc. to do the same thing. So it's not surprising that some people gravitate to both.'

Andy Field feels there is a link between music and the scientific enterprise more generally. 'Science is an incredibly creative pursuit – from generating research ideas, operationalising them, and coming up with creative explanations of data, to teaching, which involves disseminating complex ideas to varied audiences, engaging students, and thinking about interesting ways to assess learning. Every aspect of our job requires a creative and laterally thinking brain. It's no surprise to me that many scientists also express this creativity in other ways such as music, art, writing, blogging, and so on. Perhaps psychologists are a bit more in touch with their emotions than some other sciences, and perhaps that lends itself to music.'

theory – has profoundly affected how I approach practice and what I expect from it,' he tells me. 'Understanding the sheer amount of practice necessary, and the amount of time the experts still spend practising, has been eye-opening. I don't give up as easily when something isn't working; I now know it's not because I have small hands or because I lack some special genetic component – it's most likely that I didn't practise enough.'

Surely all we know about learning and memory can at least knock a couple of thousand hours off? 'When learning the drums I definitely used a lot of techniques that I advise students to use when revising for exams – and these are based on what we know about memory,' says Andy Field. 'For example, I use spaced retrieval to try to memorise rhythms, I stop practising new rhythms at the point where I feel my hippocampus is getting overloaded and come back to it the next day, and if I'm finding a new rhythm challenging and frustrating I take a short break to clear the mind and then go back to it.' Dr Matt Wall, an imaging scientist at Imperial College London, agrees: 'I'm very aware of plateau effects in practising; periods where I get stuck and don't seem to be progressing.'

That use of psychology to put the

brakes on, to relax, is a recurring theme. Deary warns of the dangers of over-arousal: 'In the band we all notice that, when we start recording, even things that we have played flawlessly several times will suddenly go awry: the red light pushes us to the wrong part of the Yerkes-Dodson curve.'

The elusive goal is effortless, autonomous performance, but under conscious control. Dr Catherine Loveday (University of Westminster) is intrigued by how this comes about. 'Most of what I perform now comes from the deep recesses of my mind – a combination of memory and improvisation. Some of the most popular songs in my set list have come from random requests at gigs – songs we had never played but had heard enough times to have a go at. It continues to amaze me how effortlessly and unconsciously the chords for a song that I've never played can seem to flow. In fact, as soon as I start thinking about it, it usually falls apart. According to Fisk, this suggests that I have stalled at the autonomous stage, which means that I am sometimes on shaky ground. The really good musicians I know also experience this sense of flow but unlike me they also have a conscious intellectual hold on what they are doing. This

provides them with a reliable cognitive safety net and the ability to adapt to any lapse in flow or change in circumstances. I secretly yearn to progress beyond the implicit stage to a point where I can understand, explain and describe what I am playing. There is relatively little written about how this occurs.'

Dr Tim Byron (University of Queensland, keyboards with Lazy Susan) has a cautionary tale concerning overplaying this idea of flow: 'I was once playing in a band, the Aerial Maps, at a nice venue in Sydney, and in the backstage room before the gig, I found myself talking to the drummer about the idea that you play best when you're "in the zone", when you're not worrying what you're doing but just letting it flow. After the show, the drummer found me and said, "Why did you have to fill my head with all that bullshit? It totally ruined the gig for me, I was thinking too much, and I made too many mistakes!" I also had a terrible gig, so I could only commiserate. I blame Mike Csikszentmihalyi!'

### Evidence-based tips

However, I'm nothing if not persistent (although not actually persistent enough

to pick up the guitar and persist with it). Surely you can point to the odd paper I can put to good use, I beseeched my talented troupe of musicians? Here's what they came up with.

Picture this  
Matt Wall harnesses the power of mental rehearsal, or imagery, particularly when trying to learn new material. 'Research has shown (e.g. Meister et al., 2004) that mental rehearsal of musical performance engages essentially the same brain systems as actual performance. I certainly find it very helpful. I try to imagine my hand and finger positions, the feel of the guitar neck, and the corresponding sounds, for as multi-modal an experience as possible. This kind of "practice" can be done anywhere, at any time, and I'd recommend it to anyone who's struggling to progress with technique, or learn new material.'

This is essentially daydreaming about playing the guitar. That, I can do.

Standing on the shoulders of giants  
Ellen Poliakoff says that learning from another person (i.e. action observation) can be extremely helpful. 'See the work of Stefan Vogt on action observation – he uses guitar chords as stimuli (e.g. Vogt et al., 2007). And playing with a more experienced musician will help your rhythm – there is a burgeoning literature on social synchronisation of actions.'

Feedback to the future  
Alan Redman (occupational psychologist and former lead singer with 'a 90s indie guitar-pop four piece in the Britpop/New-wave mode... My favourite psychology-pop crossover was the lyric "she's in your face and supra-liminal" in our timeless classic "Ultrahoney"') thinks that learning from others doesn't have to be about observation. 'Feedback is not just a great scene-stealing technique for lead guitarists, it is also a powerful driver of effective skills development. Ask people for constructive advice about what you should stop, start, and continue to improve your playing and performance. Other musicians and your audience are helpful sources of feedback. Groupies are variable in quality; music critics should be avoided when seeking feedback.'

Good vibrations  
That feedback should fuel a particular fire. 'Self-efficacy seems to be an important determinant of academic performance,' points out Dr Katherine Woolf (University College London, and 'rock karaoke' band Someone Else's Wedding), 'and McPherson and McCormick (2006) suggest high self-efficacy leads to good

performance in music exams too. So before a big performance, boost your self-efficacy by reminding yourself that you're good and that practice will make you even better, and then practise with people who can give you positive constructive feedback.'

Alan Redman concurs. Rather than try to manoeuvre the super-tanker of your global self-confidence, you should focus on your specific feelings of self-efficacy in relation to playing the instrument. Get really good at one song. Play it at the beginning of practice sessions or when you're asked to perform. Your feelings of self-efficacy will insulate you from any anxieties driven by low levels of global self-confidence. Remember that entire careers in rock have been carved out of three chords. Focus your energies on C, G, Am and F [see [tinyurl.com/axisofawe](http://tinyurl.com/axisofawe)]. Leave the tricky B variations to the jazz musicians.'

Enter the sandman  
If you find those creative energies sapped, perhaps there's an easier route to rock. 'Without fail,' says Andy Field, 'when learning a complicated and annoying polyrhythm, I find that if you stop at the point where you're beginning to get worse (i.e. brain overload) and come back the following day after a sleep you will play it better from the off the next day. Rasch and Born's recent review on sleep and memory probably explains why.'

Get down tonight  
'A 2013 review paper by Zach Hambrick and colleagues suggests that sheer hours of practice accounts for about 30 per cent of the variance in musical expertise,' Tim Byron tells me. Yes, yes. 'But I should point out that "musical expertise" is usually defined as the skills of a classical musician rather than the skills of a Jimi Hendrix in these studies; there are more rules about

how to be a classical musician than how to be a pop musician and so it's easier to quantify; part of "practice" for a pop musician is probably having an encyclopaedic knowledge of pop music rather than just learning fingering techniques, etc.' Hurrah! 'And crowds generally enjoy showboating,' Byron continues. 'Broughton and Stevens (2012) found that participants were more interested in musical excerpts when accompanied by video of a marimba player who moved their body expressively compared to video of the same marimba player keeping body movements minimal. So feel free to practise your rock god moves in front of the mirror.'

### Will I become a better psychologist?

Daydreaming, going to gigs, sticking to four chords, sleeping, and showboating. All sounds good, but perhaps psychology is not going to be my sole saviour. The meteoric rise to stardom, the difficult second album, the inevitable slide towards a tragically bloated death on the toilet... all will have to be put on hold. But could music be my path to becoming a better psychologist?

Most of my rocking researchers suggest that it might, in a fairly general way. Dr Roy Baumeister of Florida State University (incidentally, one of the most creative psychologists I know) told me: 'When I was a student, one professor told me there was evidence that being creative in one domain would increase one's creativity in other domains too. I like to think my efforts to compose and improvise on guitar and, more recently, on piano have bolstered my creativity in psychology.'

Ellen Poliakoff agrees. 'I think there can be a "spill-over" in creativity between musical creativity and creative thinking in research. In my band we attempt to write songs collaboratively, which can be a very liberating experience. I certainly found that having another creative outlet (with more relaxed rules) whilst writing up my PhD was extremely helpful.' More specifically, Poliakoff says that the experience of being a musician links into her research, especially on visuomotor processes. 'One of my interests is in how people with Parkinson's disease respond to stimuli in their environment, and I was fascinated to speak to a patient who listens to marching music on his headphones to help with his walking.



How is musical expertise defined?

## Guitars & MRI

My interest in music has also shaped some of the materials that I teach students about, such as the classic paper showing that stringed instrument players have an enlarged representation of their left hand, which they use on the strings (Elbert et al., 1995), showing use-dependent plasticity of the brain.'

For others, music is always present in the background of their research. Dr Katherine Woolf says: 'Although my job now might seem to have nothing to do with music, I regularly reflect on my musical experiences when researching why people who score extremely high on conventional measures of intelligence – doctors and medical students – sometimes perform very poorly. Performance anxiety, support from caring teachers (or lack thereof), and the influence of social contacts on learning, are just three factors that affect people in medicine and music. Doctors and musicians must both demonstrate "note perfect" skills in high-stakes performance situations. I've never inserted a catheter into a model penis with an examiner watching, but I've felt the terror as I played a Mozart sonata in front of a critical audience. And I've felt the benefit of a piano teacher who tried really hard to help me enjoy learning. My research has shown that medical students, particularly from minority ethnic backgrounds, feel their learning is hindered by teachers who don't care about them, bully or humiliate them.'

Sometimes music can lead more directly to academic output. 'My musical playing did lead to at least one publication,' says Roy Baumeister. 'The dominant view in creativity theory is that consciousness is useless or possibly an impediment. I thought it must do more than that. I recorded some accompaniments and improvised lead solos as part of my daily practice. One day I tried doing it with cognitive load – counting backwards by 7 from a high number. I was able to keep the beat and stay in key, but the creativity was seriously degraded, even to the point that my wife (who is not very musical) remarked upon the difference. We

'A couple of years ago when I was simultaneously recording an album and helping run an fMRI study, I was struck by the similarity between being in a recording studio and fMRI scanner,' Ellen Poliakkoff tells me. 'Both have a windowed control room, there are quite high stress levels getting things right coupled with lots of waiting around, there are many leads connecting equipment and both are trying to capture and record something fragile evolving in real time.'

Others see more technical connections. Matt Wall says: 'I've always wanted to try plugging my guitar into a MRI scanner and using the magnetic field as a loud-speaker. Donald McRobbie did this and recorded several guitar tracks using the different X, Y and Z gradient coils as outputs, with a custom pulse-sequence for percussion too (you can hear one of them here: <https://soundcloud.com/donald-mcrobbe/3-d-layla-mp3>). Absolutely amazing. Unfortunately the MRI physicists where I work won't let me hack a guitar input into our scanner's systems.'

conducted an experiment with actual musicians along the same lines and found results consistent with my experience: under load, musicians could keep the rhythm and stay in key, even across an unexpected key change, but the solos were rated much less creative than in control conditions. Thus, when playing or improvising, rhythm and key are maintained by the unconscious, but the creation of new melodic lines requires consciousness.'

There are other, more obvious areas where musical performance and being a psychologist overlap. As Deary points out, 'being the front man in a band and giving a lecture to a large class involve overlapping crowd-control skills'. Tim Byron concurs: 'Simply being up on stage in front of hundreds of people makes it easier to lecture to large classes – it's less alien.' Andy Field uses 'short stupid songs about statistics' in his lectures and begins with musical clips 'to get my students into the right mood – although whether Slayer creates the right mood for statistics is open to debate!'

Other links are more indirect. Matt Wall tells me he's 'always been a tinkerer' with his guitars: 'I'm constantly taking them apart and changing the pickups. I learned to solder and about electronics by doing this when I was a teenager, and that's come in very handy when I've had

to build response boxes, custom cables and other bits and bobs for research purposes' (see also box, 'Guitars & MRI').

### Long stairway to guitar heaven

I've come across some fantastic music (see also box, 'A marriage made in heaven?'), and if we've missed you off [tinyurl.com/psychswhorock](http://tinyurl.com/psychswhorock) do add your details). And I've picked up some handy tips. But sadly, there doesn't seem to be anything fundamental about being a psychologist that is going to ease my path to guitar hero from 'guitar zero'. As Gary Marcus, professor of psychology and author of the book of that name has suggested, there's no substitute for the dreaded practice. 'Practice, practice, practice,' confirms Joseph LeDoux. 'But not just random playing. Set goals and achieve them in each session (easier said than done).' 'Practise; a lot', concludes Ian Deary. 'Play things that seem too difficult to start with; you will master them and move on. The point at which you can rely on your hands to play a piece, without having to concentrate hard on it, is the first safe time to play in public.'

See you in 10,000 hours.

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