SOUND SCULPTOR

Ten years on from Strad3D, project co-developer Samuel Zygmuntowicz talks to **Chloe Cutts** about the impact of the groundbreaking study of violin form and function within the context of the story of American lutherie and his own journey as a maker and researcher

'As a violin maker you spend your entire time trying to imagine what the thing you are constructing will sound like as a finished instrument. But you can't see the vibrations, only the parts. You're like a medical student examining a heart or the nervous system: you can't see the beating valves pumping the blood around the body, and you can't see the electricity running down the nerves and across the synapses. You're essentially working in the dark.'

Comparing a violin to a heart might seem a little fantastical, but to US luthier and researcher Sam Zygmuntowicz, his analogy encapsulates perfectly how he views this most elusive of musical instruments. It is a perspective that has come about over the course of a 40-year career as a maker who takes a long-range view of his craft and his place within it – telescoping back in time to the founding fathers of current lutherie in America around the turn of the 20th century, and forward to the future and how making might evolve as advances in technology continue to open up new worlds in our understanding of how violins work. All this at a point in time when lutherie generally is experiencing what he sees as a golden age.

'In many ways the trade is healthier now than it has been in its history,' he asserts. 'We have more independent makers making high-quality bespoke instruments for professional musicians today than ever before. The relationship between makers and players is really maturing, and new instruments have gone from being a viable alternative to something that is exciting. In our little corner of the profession, as a side effect of recent history and the convergence of science and lutherie, we're sitting in a very sweet spot.'

We are at the end of a series of conversations conducted over several weeks and concluding with a transatlantic Skype tour of Zygmuntowicz's town house in Brooklyn, which serves as both abode and workshop. Our discussions have taken many paths, beginning with a brief history of the migration of instruments and expertise from Europe to the US after the wars; the influence of his former teacher, Mirecourt-trained René Morel; and Zygmuntowicz's own story as an aspiring sculptor-turned-luthier growing up in Philadelphia and training in Salt Lake City. There have been all manner of digressions along the way, among them the patronage system of top-end instrument ownership and loan; the perils of conformity in violin design; the dangers of excessive reverence towards the great makers of the past and – connected to this – the impetus behind the pioneering project Zygmuntowicz co-directed in 2006 to study violin form and function in startling new ways: Strad3D.

'To study a Strad and figure out what makes it tick is one thing; but to say that these objects are relics of the past that can never be recreated or surpassed is existentially unsatisfying,' he says, on the motivation behind the initiative. 'I wanted to shift the conversation because I got tired of the questions: What's the secret of Stradivari? What's the secret of the varnish? These questions, to me, have only the most minuscule connection to what's really going on. I wanted people to see things differently.'

This is where the heart analogy comes in. Could being able to see, as well as hear, the vibrations created when a violin is played radically alter our understanding of how a violin functions? This question became a defining quest for Zygmuntowicz and the acoustical engineers and researchers who took part in the Strad3D DVD project – among them physicist and co-developer George Bissinger, who had pioneered the use of vibration scanning using lasers. The details of the project are documented in an article written by Zygmuntowicz for *The Strad*, January 2009, but in a nutshell

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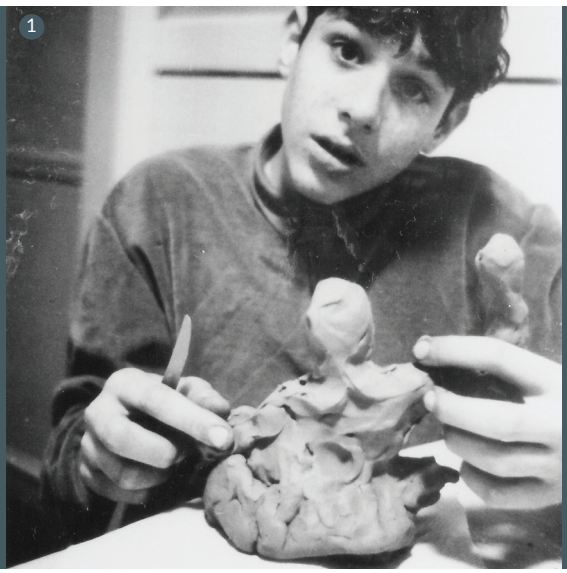

1. Zygmuntowicz the aspiring sculptor aged nine: 'Rodin was my ideal of what a sculptor should be. I mainly worked with clay, and my aesthetic as a maker was formed by the immediacy and tactile quality of this material.'

2. Finishing an Appalacian dulcimer in 1973: 'In some ways they were the most creative work I've ever done, because I was completely self-taught and at liberty to make up the design'

the inquiry involved using modern imaging techniques with three great Cremonese violins – 'the 'Titian' and 'Willemotte' Stradivaris and the 'Plowden' Guarneri 'del Gesù' – 'to see what a Strad does, not just what it looks like', Zygmuntowicz explains. 'The instruments were gently activated by tapping the bridge, and then three scanning lasers detected the resulting patterns of vibration, which were revealed on screen as a rippling landscape of colour and motion, rather like a motion-capture animated film.' The team was seeing – for the first time – the three-dimensional movements of violins in use.

'I was electrified when I saw the images,' Zygmuntowicz recalls. 'We all knew that the violin surface vibrated in various patterns, but the vibrometry lasers rendered these shifting hotspots visible. Just imagine the front of the "Titian" undulating like a belly dancer! I realised that these images could tell a story that anyone could understand.'

Zygmuntowicz credits the late Norman Pickering – 'a hugely influential person in the violin world and a brilliant researcher, inventor and cool-headed rationalist' – as a key figure whose spirit of experimentation propelled acoustic research forward in the US, paralleled by traditional makers and restorers such as Simone Sacconi and his protégé René Morel. 'America was almost a blank slate when it came to violin making before the 1950s,' Zygmuntowicz says. 'There was Carl Becker making new instruments, but nothing had taken root in a big way. In European centres of lutherie like Mittenwald, Mirecourt and Markneukirchen, making was a local profession, long developed, but the regional stamp did not necessarily equate to the highest levels of making. Here in America there was a vacuum because we had no native styles to draw on, but there were a handful of makers and restorers who had come over – Simone Sacconi, René Morel, and Hans Weisshaar among them – and were developing the styles they had been taught. As students we were hungry for source material, and not just from our teachers and from books, so we questioned and discussed. Questioning authority was a way of examining truth because while in Europe there were guild systems and formal apprenticeship programmes, here it was the Wild West!'

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Zygmuntowicz's own story begins in Philadelphia, where he was born to Jewish Holocaust survivors from Poland. His father ran a laundry, while his mother, an aspiring writer and poet, brought up their four sons. Both parents were musical, and in this hard-working, artistic environment Zygmuntowicz showed early leanings towards sculpture. 'Everyone expected me to become an artist,' he recalls. 'I spent a lot of time as a teenager at the Rodin Museum – Rodin was my ideal of what a sculptor should be. I mainly worked with clay, and my aesthetic as a maker was formed by the immediacy and tactile quality of this material.' But at the age of 13 he read a book about a violin maker and, captivated by the technical artistry, resolved to become an instrument maker. His early forays into stringed instrument making began with two Appalachian dulcimers, made from wood sourced from a lumber yard and based on patterns he designed by examining a guitar making manual. One of these instruments takes pride of place on the wall of his workshop. 'In some ways they were the most creative work I've ever done,' he muses, 'because I was ▹

3. Zygmuntowicz with Isaac Stern in 1991, holding the Ysaÿe and an original-model small viola

4. Detail from a recent (non-antiqued) violin, featuring Zygmuntowicz's own f-hole design, the 'Chevron-wing'

Zygmuntowicz's 'testing corner' in his listening room, insulated with Oriental rugs to improve the acoustics

completely self-taught and at liberty to make up the design.' He later got a job at a local violin shop where he learnt the basics of violin repair and tool handling, all the while continuing to make his own instruments, before electing to study at the Violin Making School of America (VMSA) in Salt Lake City with Mittenwald-trained maker Peter Paul Prier from 1976–80.

Three years at Salt Lake gave Zygmuntowicz a traditional grounding in violin making technique, but it was a stint working with Carl Becker that had the most seismic impact on his eventual direction as a maker. 'I spent six months working with Carl in Wisconsin before I graduated from Salt Lake, and it was the most intense work experience of my life,' he says. 'In their heyday Carl and his father, Carl Becker Sr, had made 17 violins a year, so they were highly efficient and they carried out the most exquisite and elaborate restoration work. Most tellingly, Carl was a keen observer of violin structure, and was tireless in his search for his ideal sound adjustments.'

This outlook chimed deeply with Zygmuntowicz's own world view of making. He returned to complete his VMSA training, 'but I was on my own trajectory by then,' he says. 'Working with Carl had opened up a world of high-level violin making to me.' It was a Becker-style Stradivari copy that won Zygmuntowicz two gold medals – for violin workmanship and tone – at the Violin Society of America Competition in 1980. Becker was also the 'magic name' that helped land Zygmuntowicz a job in New York that year at Jacques Francais Rare Violins Inc., in the shop of René Morel.

He spent five years with Morel, whom he credits as his main teacher and mentor. The shop was an incubator for young makers, including a number of Salt Lake-trained Americans. The meeting of old-world European training and the young Americans created some conflicts of perspective, as Zygmuntowicz recalls: 'René Morel came from a school of French makers who were incredibly accomplished. The instruments they made in Mirecourt were hand-worked, but they had to make two or three violin bodies per week, with the scrolls and varnishing done elsewhere. The finished instruments were sold in Paris or shipped abroad. It wasn't glamorous, but the technical training was excellent. The beauty and strength of traditional training is the tool handling, and many of René's new assistants hadn't started out in the manual trades.'

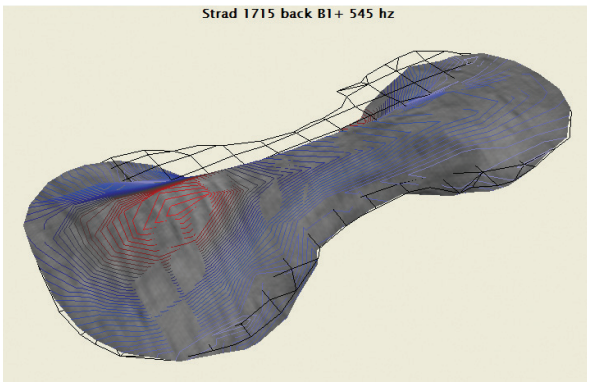
Of particular interest to Zygmuntowicz was Morel's work with top musicians. 'René was a keen observer of the past masters, but he developed his own philosophy about how sound works, and his own language about sound: he knew what he wanted to hear and he had a coherent view about how the violin functions.' Morel's adjustments showed how profoundly modifications can alter and improve any instrument. 'He also had a guiding principle: follow what the musician wants.'

Like Morel, Zygmuntowicz developed a pragmatic view of the past: 'I think tradition holds a collective wisdom, but its value lies in how we analyse it to extract the meaningful parts and repurpose them,' he says. 'As makers you're formed by what you've inherited, but at what point does that knowledge limit your ability to create your own reality? I'm not belittling the value of the past, but any student who respects their teacher holds a secret ambition to be as good as or surpass them.'

Today, Zygmuntowicz's workshop is lined with wood – 'two or three hundred instruments' worth' – and works in progress, but several shelves are reserved for plaster casts of favourite Strad and Guarneri backs and tops – part of an extensive archive that includes drawings, photos and measurements. 'With violins, the dimensions and archings directly influence sound colour,' he explains. He refers to his own work as much as to old instruments, maintaining comprehensive records of every instrument he has made, including model, wood properties and thicknesses, and analysing the acoustic response of his new violins as they develop over time.

His work today is a consolidation of two key strands of enquiry: empirical knowledge drawn from decades of commissions by string players, and the tantalising possibilities offered by new scientific approaches trialled in Strad3D. 'I am able to make informed choices about arch shapes and thicknesses, for example, and acoustic analysis is an extra tool to diagnose tonal problems and suggest structural strategies.

'The primary interaction is still with the musician,' he emphasises. 'You're creating an experience for someone, and



A surface-vibration image of the back of the 'Titian' Stradivari

A Polytec Inc. technician checks the 'Titian' Strad as it is scanned at East Carolina University, 2006

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you have to understand what the limitations of their current experience are.' Zygmuntowicz's study wall is decked with photographs of famous clients – Isaac Stern, Maxim Vengerov and the Emerson Quartet among them – and the stories behind these collaborations illustrate the meeting point between artistry and service that have been Zygmuntowicz's 'guiding orientation' throughout.

'The Emerson Quartet is a case in point. At one time all four players owned one of my instruments: four different personalities requiring different instruments for different goals. David Finckel, for example, has an exploratory personality. He played me his favourite recordings and I made a list of my favourite models, and we eventually settled on the "Duport" Strad, the instrument of David's mentor Rostropovich, who invited us to study it. It was a model of how I like to work: what sound did he want? What kind of player was he? As René said: follow what the musician wants.'

The practical value of the scientific investigations continues to emerge, but perhaps the most significant legacy of Strad3D has been to foster a multifaceted and exploratory view of violin function, free of outworn myths.

'I realised that violin makers work in one universe, with one view of reality of their world, which functions well but has only the most tangential connection to what's really happening; and physicists exist in another, in which they can see things violin makers can't but produce data we can't understand. These bodies of knowledge existed with no overlap, and I saw Strad3D as a way of bringing these worlds together. We're standing at that juncture right now.'

Zygmuntowicz points to Martin Schleske, Joseph Curtin and George Stoppani as just three examples of luthiers who are involved in acoustical research, adding that even the most sceptical makers have their ear to the ground because they're interested in making better violins. 'This hasn't always been the case, but it has been the story of our times: an optimisation race in violin excellence. The field is far more dynamic now.'

On a workbench inside Zygmuntowicz's workshop lie the top and back of what will become his bench copy of the 'Titian' Stradivari violin, commissioned by the instrument's owner, violinist Cho-Liang Lin. 'It has been fascinating to copy this golden-period Stradivari after all the work with Strad3D,' he reflects. 'Lately, I find myself returning to close observation and making copies, trying to use the research of the last few years to see things with new eyes. This seems to be the mission for now: not a radical redesign but using deep insight to close the circle of design, work style, function and sound.' ●

SAM ZYGMUNTOWICZ/GEORGE BISSINGER/POLYTECH INC