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Editorial for the special JSV issue in memory of Shôn Ffowcs Williams

Shôn Ffowcs Williams and his impact on acoustics



Shôn Ffowcs Williams
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1. Introduction by the Guest Editors

John Eirwyn Ffowcs Williams – known to his friends and students as Shôn – passed away in his native Wales on 12 December 2020 at the age of 85. He made ground-breaking contributions to several fields in acoustics, in particular aero- and hydro-acoustics, anti-sound, active control of flow instability and bioengineering. He was the longest-serving professor at Cambridge University, head of Engineering Division A and Master of Emmanuel College. In his long academic career, he supervised many PhD students, amongst them two of this issue's Guest Editors (MH & LH) and many of the contributing authors. Shôn was an inspirational supervisor, full of original ideas and scientific foresight, which he shared generously. His insightful presentations and publications inspired many other researchers around the world (such as REM, the third Guest Editor of this special issue, and others who contributed to this editorial) and had a hugely beneficial impact on their careers. Although his research methods were largely theoretical, involving elegant mathematics, he was primarily motivated by practical applications. He also advised a range of commercial businesses and was co-founder of the Cambridge-based start-up company Topexpress Ltd.

This special JSV issue is one of two special issues in memory of Shôn. The other one is in the International Journal of Aeroacoustics and was produced by Yueping Guo. The reason for the separation was the sheer number of authors who wanted to dedicate a research paper to Shôn. A total of 39 papers were submitted to both issues – testament to Shôn's scientific legacy.

Shôn also left a personal legacy. We tried to convey that by soliciting contributions of a personal nature from people who valued Shôn as PhD supervisor, mentor, colleague and good friend. We collected 17 contributions, between August 2021 and June 2022, which are given below in the order they were received. We are grateful to Shôn's wife Anne, who helped us to get in touch with people whose association with Shôn goes back a very long time.

This special issue is intended to reflect the diversity of Shôn's activities and research interests. It is also intended to reflect the large number of scientists whose lives he touched and enriched.

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2. Invited contributions

2.1. Fond memories of Shôn

by Xiaoyang Huang (Nanyang Technological University, Singapore, huangxiaoyang.xyh@gmail.com)

I really appreciate the editorial team and their great effort in preparing and publishing this special issue to honour Prof. Shôn Ffowcs Williams.

I can recall many good times with Shôn. Some of the best moments include the first time I met him in his Cambridge office when I started my research there, the following years in Cambridge, in Singapore, and in Florence in 2015 when we all gathered to celebrate his 80th birthday. Shôn was my supervisor, he inspired me not only in academic research, but also across so many other aspects of life.

Shôn will always be on my mind.

2.2. John “Shôn” Eirwyn Ffowcs Williams: Reminiscences on an extraordinary academic

by Kimon Roussopoulos (Engineering Consultant, Chesterton, Cambridge, U.K., <mailto:kroussop@gmail.com>)

Prof. Shôn Ffowcs Williams was my PhD supervisor in the late 80s. I first met him when summoned 120 miles to his house in Cambridge for 8am one Saturday morning: my CV had been shared by another academic. He had noticed that I was working for a rival of his firm “TopExpress”, and relished poaching me. Only after I started my PhD did I learn his then reputation, as a cigar-chewing, science park magnate professor who his students and colleagues almost never saw (although his Porsche was permanently parked at the department entrance). It was not really fair. He was indeed a man of enormous energy and wide interests, and I met him as often as I wished, if not more so. I was delighted to occasionally keep up my acquaintance with that extraordinary character until the end.

Others will recount that he was a visionary scientific polymath: more than enough of his ideas were brilliant to justify his renown (acoustic bullets, anyone?). But his other expertise was people and leadership. He unabashedly sought to work with the brightest he could find, and his students, fortified with his contacts and ability to write a killer reference, have headed departments all over the world. He’d known everyone who mattered in his field, from apprentices to Whittle, Lighthill and the Concorde team; defence research establishments, university leaders and his fellow “Silicon Fen” pioneers. He happily shared entertaining anecdotes that proved that he really understand what made them tick. The subtext of his “parables over a drink” was generally that it wasn’t sufficient to be a brilliant scientist (perhaps not even necessary); knowing what you wanted to do, and how to persuade people to go along with you, was his secret of success. A truism we “geeks” struggle to believe or accept! I remember only once asking him a purely technical question (the answer: put the hot wire at 45 degrees), but I learned an enormous amount about people, science and life from him. Among his advice: “all these small companies only ever make one person rich”, and “if you’re going to spend your time on consultancy you have to charge industry so much money they’re obliged to take your advice seriously”. Ideals and self-interest elided. He wasn’t always worldly. Arbitrating a dispute in the lab, he once sighed to me “people expect me to be a godfather”. I jokingly asked if he meant it in the “fairy godmother” or “mafia” sense. He didn’t understand what I meant. Others regarded him as both, but in fact he was a true gentleman, in the old fashioned style, and an occasional jester – never an establishment clone. He’d earned the right to live well, and was a generous host in college and at home. Few of us will ever be the natural leader he was: but hey, thanks to JEFW, I still know how to align a hot wire.

2.3. Shôn the visionary supervisor

by Ann Dowling OM DBE FRS FREng (University of Cambridge, U.K., apd1@eng.cam.ac.uk)

Shôn had a huge influence on me. It was the opportunity to be supervised by him for a PhD in Aeroacoustics that took me from mathematics into engineering, and set the direction of my future career. It was a pleasure to work with him over many years. His curiosity, insight and creativity were outstanding and exciting. A conversation with Shôn was always interesting and full of unexpected comments and ideas. More than anything, I appreciate his enthusiasm and his belief that ‘it is fun to do research on real things’. The wish to work across the interface between university and businesses has very much set the direction of my career, and I am very grateful to Shôn for his advice and guidance throughout my academic life. A fuller description of my interactions and memories of Shôn is given in my paper ‘Professor John Eirwyn Ffowcs Williams FREng: Engineer, educator, researcher and entrepreneur, Cambridge Professor and Master of Emmanuel College, 25 May 1935 – 12 December 2020’, International Journal of Aeroacoustics 2022, Vol. 21 (5-7) 291–306, <https://doi.org/10.1177/1475472X221107356>.

2.4. Personal recollections of Professor Shôn Ffowcs Williams

by Kenneth S. Brentner (Penn State University, USA, ksbrentner@psu.edu)

Professor Shôn Ffowcs Williams is one of the true pioneers of Aeroacoustics and while he is very much missed, his legacy – his work and the students he trained – endures. The purpose of this short note is to share some of my personal interactions with Shôn over 36 years in the hope that they reveal small glimpses of Shôn as a leader, teacher, mentor, and always curious.

The first time I met Shôn was at the Aeroacoustics Conference in Williamsburg, VA in 1984. I was a young engineer at NASA Langley Research Center, and I was not the only one that wanted to see and hear “the famous Professor Ffowcs Williams”. I remember he was actively asking questions, and everyone was listening intently, but I was surprised to learn how good natured he was. Feri Farassat, my mentor, and Shôn seemed to “liven up” the meeting by their jokes and probing (but respectful) questions. Before the dinner banquet at that conference, we toured a Jamestown museum and replicas of Columbus’ ships: the Niña, Pinta, and Santa Maria. The leaders of the conference and museum were fawning over Professor Ffowcs Williams, appropriate for the Aeroacoustics royalty that he was.

A few years later I took my family to Cambridge to study under his leadership for my Ph.D. At Cambridge, I met regularly with Shôn, as research students do, but I found these meetings to be very interesting, if not divergent from my own research. Much of our meetings had to do with some interesting aspect from the previous student’s meeting. Shôn taught me the joy of learning new things from others, thinking about my research in new ways, and relating that to important work that had come before. Studying at Cambridge also fostered those ideals. Shôn was also attentive to my work and had many suggestions, though sometimes they were not necessarily helpful. I spent about 3 months researching adaptive wall wind tunnels, which combined work of two of Shôn’s friends: Bill Sears and Ian Roebuck. Shôn wanted me to ghostwrite a paper by “Sears and Roebuck”. He thought that would be hilarious, but in the end, he forgot about it and my work in that area just faded away.

When I left NASA and started my career as a professor at Penn State in 2000, Shôn encouraged me and after he retired, we developed a much closer relationship. Some of the most memorable times were during our travels touring India with his family and a group of aeroacousticians before a conference in Goa celebrating his 70th birthday and then again traveling on the Bernina Express before a conference in honor of his 80th birthday in Florence. Shôn loved to hear about my recent work, but he also engaged with my wife Stephenie. Stephenie and Anne became good friends too. Shôn enjoyed life and challenged everyone around him to do the same.

2.5. Shôn Ffowcs Williams – memories

by Steve Furber, CBE FRS FREng (The University of Manchester, U.K., steve.furber@manchester.ac.uk)

It was a long time ago! I took the Maths Tripos at Cambridge from 1971 to 1974, and continued with Part III Maths in 1974-75 (for which I was finally awarded my MMath in 2010!). I think Shôn had offered a course on aeroacoustics in Part III in previous years, but not my year. Anyway, I had long been interested in aeroplanes, so I completed my Part III project under the supervision of Sir James Lighthill on “The intermittent flight of birds” and went to talk to Shôn in the Engineering Department about the possibility of taking a PhD under his supervision. He took me on (1975-78), with funding from the SRC, and he was keen to pick up on Lighthill’s work analysing the unusual flying mechanism of the chalcid wasp *encarsia formosa*, based on observations by the Cambridge zoologist Torkel Weis-Fogh. My PhD thesis had the title “Is the Weis-Fogh principle exploitable in turbomachines?”. (The answer was “yes”, though the thesis had a few more words to justify this conclusion.) After the three years of SRC funding I became Rolls-Royce Research Fellow (1978-81) at Emmanuel College, a Fellowship that Shôn had persuaded Rolls-Royce to fund at the college where he was a Fellow and, later, Master. So, for six of my ten years at the University in Cambridge I was under Shôn’s supervision and/or mentorship.

Shôn was not a typical Cambridge academic. He brought an infectious enthusiasm to everything he did, whether attacking an interesting research problem or playing bowls on the Fellows’ lawn at Emma. His energy levels were sometimes a little intimidating for his juniors! He had commercial interests alongside his academic work, such as founding Topexpress Ltd with Jack Lang, at a time when many academics were a bit sniffy about their colleagues (even Engineering colleagues) getting their hands dirty. He was extremely busy, but always found time for his research students (and bowls at Emma, of course).

Looking back, I greatly value the time I spent under Shôn’s watchful eye. Shôn’s research vision was very clear and far-sighted – a paper we wrote together (with the same title as my thesis) has earned more citations over the last decade, starting thirty years after it was published, than in any previous decade. Though my career took a change of direction after my Research Fellowship, and I took another decade to really begin to find my academic research feet, those years with Shôn were formative. I learnt from him the importance of identifying research problems that are really interesting, so that it is easy to commit your time and energy to them; the importance of attracting good students and colleagues who can share in those challenges; and the importance of maintaining a balance between academic interest, real-world relevance, and playing bowls!

2.6. When I first met Shôn

by Holger Babinsky FREng (University of Cambridge, U.K., hb@eng.cam.ac.uk)

I first met Shôn on the day of my interview in Cambridge. After a stressful morning of lectures and interviews, Shôn invited me to his College, Emmanuel, thereby suggesting that I had ‘made’ it (this being something of a breach of the rules, but he was never a fan of protracted bureaucracy). Over lunch he began what would turn into many years of mentoring. After learning a bit more about me, he moved on to the significance of the Cambridge College system. When I explained that I was completely ignorant of how Cambridge works, he asked me whether my wife (by then he had found out that she was English) had studied at “a place like this”. I laughed and said that “no, her degree is from Hatfield Poly” (now a University but in her days a polytechnic college), whereupon he replied “Ah yes, we sometimes get some of those, ... but not very often”. At the time I thought this a typical remark an Oxbridge Don would make. But as I got to know Shôn better in the years that followed, it struck me more and more as slightly odd and I put it down to his quirky sense of humour. It wasn’t until almost 25 years later, long after Shôn had retired to Wales, that the real joke revealed itself to me: Over dinner

at another Cambridge College my wife told this story to one of Shôn's oldest friends, who responded: "But what you must know about Shôn is that he himself attended Derby Technical College, so really, he was making a joke about himself". A 'slow-burn' indeed ... and I can almost hear him quietly chuckling to himself. I was extremely fortunate to have Shôn as my boss and mentor and there is no doubt in my mind that my career would have taken a very different turn if I had not met him.

2.7. *Memory of an old friend*

by Joe Liu (Emeritus Professor, Brown University, USA, jl7956841@gmail.com)

I first met Shôn at the Inter Agency Conference on Transportation Noise, which was sponsored by NASA and held, to the best of my recollection, in 1969 in Washington, D.C. He was the Rolls Royce Professor of Aeronautical Acoustics at Imperial College at the time. I told him that I had a paper just published in the journal *Physics of Fluids* on the compressible extension of the weakly nonlinear hydrodynamic stability theory due to his colleague J. Trevor Stuart. He said that I should send Trevor this information (which I eventually did). This sort of broke the ice between us and I gave him my coordinates in case he would come to the U.S. again.

Shôn was invited to give our Fluid Mechanics Seminar at Brown University in the winter of 1971, it was scheduled early enough to accommodate the showing of the Lighthill-Ffowcs Williams film "Aerodynamic Sound Generation", and both "sessions" were well attended. In those days, the Brown Faculty Club was still "BYOB", but we forgot; Peter Westervelt, a distinguished acoustician in our Physics Department saved our evening by jogging to his home on John Street (nearby) and retrieved a couple bottles of Bordeaux Cabernet from his cellar! I drove Shôn to Bob and Mary Newman's (BBN) house, I think in Lexington, Mass. Mary Newman was asking why my hands were so cold – Shôn had the passenger side of the window open during the entire journey, and it was cold!

In the fall of 1972 I took a one-year sabbatical in the Department of Mathematics at Imperial College. Shôn and Anne invited us to their house in Ewell (not too far from London); I also participated at one of Shôn's group lunches at Overton's, which included David Crighton, Michael Howe, Frank Leppington, Charles Ellen, ... That was the first time in my life that I had raw oysters, washed down with Chablis wine, together with the company and Shôn asking "more wine..." It was an experience to behold! We overlapped for about a month, and then Shôn went to Cambridge.

But that was not the end of our involvement(s). I had submitted a manuscript to the JFM, via James Lighthill. And when I showed up in Shôn's office at Cambridge, I was faced with his no-secrets-kept, "I am a referee of your JFM paper". We started "arguing", until Frank Marble (my Caltech mentor and advisor, who was visiting Cambridge) showed up. Shôn arranged for three of us to have lunch together. After lunch we went back to Shôn's office, and very soon our cigar smoke was filling the room; Frank said he has had enough smoke (but perhaps not enough of our somewhat semi-heated discussions).

A few days later I called James Lighthill's number and Celia Whitchurch, who was James' Assistant at the time, answered. I asked what was the disposition of my revised manuscript; she said the referee came by, retrieved his review and modified it and gave it a pass. That was my very first JFM paper under Shôn's watchful eyes, not unlike my first experience with raw oysters.

The rest of my most beneficial interactions with Professor Shôn E. Ffowcs Williams for more than the next half-century, as they say, is history.

By his friend Joe Liu.

2.8. *Recollections of Shôn*

by Frank Leppington (Emeritus Professor, Imperial College, London, U.K.)

Apart from Shôn's outstanding merits as a Mathematician and as an Engineer, he had a huge personality and many other interests, including some sport.

In addition, Shôn and Anne were terrific and generous hosts at their home, first in Ewell, Surrey, and then in Cambridge. As a young lecturer it was a treat to be invited to a few of these occasions.

One of Shôn's sporting interests was that of golf, and for a few months I used to have a weekly round with him at one of the local clubs. Being a big, strong man he had a massive swing and could propel the ball from the tee at very high speeds through large distances; unfortunately, his shots also had a pronounced slice that made the ball veer off to the right, away from its intended path; rather than attempt to modify his swing Shôn adopted a practical engineering approach and simply aimed the ball well to the left of where he actually wanted it to travel; this method worked well enough most of the time but had an unintended effect on other golfers walking towards us up the fairway to our left; from the point of view of such a golfer they would see a large, apparent maniac, deliberately propelling a golf ball towards them at high speed; the look of terror and disbelief on their faces as they took evasive action was a sight to behold and was mollified only when the ball took its inevitable swerve to the right.

Shôn also enjoyed the occasional game of croquet and had a pitch laid out in the back garden of his house in Ewell. Shôn usually won every game, partly because of his enthusiasm and considerable practice and partly because he was the only one who claimed to understand the labyrinthine rules of that strange game.

I will always remember Shôn for his joie de vivre and infectious enthusiasm and energy for whatever he was doing, academic or otherwise.

(Sadly, Prof. Leppington passed away on 1 October 2022.)

2.9. Memories of Shôn Ffowcs Williams

by Roger Kinns (University of New South Wales, Sydney, Australia, rogerkinns17@gmail.com)

I worked with Shôn in Cambridge in 1974-5 at the Noise Research Unit, when I was a research fellow at Pembroke College. Shôn and I had an additional shared interest in fine wine. It was a turbulent time in world markets when asset prices generally had become overheated. The great wine producers in France had been able to sell wine “en primeur” to speculative buyers who could taste the future profits to be made in a rising market. The Bordeaux vintages in 1970 and 1971 had been of good quality, which helped to reinforce the upward trend, but the weather there in 1972 was dismal and it soon became apparent that wines of that vintage were not going to give much future pleasure. The prices were still high and there was a devastating loss of confidence. The wine market crashed in 1974, taking down the value of wine that had been bought with debt. Huge quantities were dumped in order to raise cash for company survival. Much of it appeared on the London auction market at prices that sometimes barely covered duty and the costs of shipping.

It was too good an opportunity to miss and I bought a subscription for wine sale catalogues. Shôn and I scanned them for bargains and established any additional interest from colleagues in the Noise Research Unit. I used to go regularly to Christie’s armed with a list of potential auction purchases. Sometimes Shôn came with me. I think we bought over 1,000 bottles in all. I remember purchasing 120 bottles of Chateau Leoville-Lascases 1971 in a single lot. The cost came to about £2 per bottle after addition of extras to the hammer price. We shared them out at cost. I drank my last bottle in 2021, still in fine condition. You’d be hard pressed to buy a recent vintage of Leoville-Lascases for less than £100 a bottle!

Shôn liked to have some bottles of Chateaux Mouton-Rothschild and Latour for special occasions. £10 per bottle gave quite a choice of vintages. They used to arrive at Pembroke College in original wooden cases. The price now for a good vintage? You might get one bottle for £500.

My memories of Shôn and Anne have a special flavour.

2.10. Shôn – A little anecdote

by Jean Jacques (Nancy, France, noise-bruit1@outlook.fr)

It was in the early 1970s, as a little French man still struggling to understand the English spoken by the British, I arrived in Trumpington Street, Cambridge to join the Cambridge Noise Research Unit. That was my first meeting with Shôn. On the way to the pub where we were going to have lunch he said "Are you pleased to be here?". My answer was "No"! He turned to me and, with that amused and empathetic smile that was still on his face when I met him and Anne in Wales in March 2019, he said "The answer is Yes!". Time proved he was right.

2.11. Contribution to the Journal of Sound and Vibration Special Issue Editorial commemorating Prof. J E Ffowcs Williams (1935-2020)

by Christopher L. Morfey (Emeritus Editor-in-Chief, Journal of Sound and Vibration; Visiting Professor, University of Leicester, UK, cm740@leicester.ac.uk)

Shôn was multitalented, with political and diplomatic skills to match his mathematical and fluid mechanical ability. As a PhD student at Southampton University under Elfyn Richards [1] he learned much in all these areas from his mentor, and from him would have gained introductions to the key players in aeroacoustics at the start of the 1960s. At Bolt Beranek and Newman (1962-64) he learned how a high-tech noise consultancy was run. He returned to the UK to join James Lighthill at Imperial College London, where the Ffowcs Williams-Hawkings paper was written. Almost immediately Stanley Hooker [2], my former boss, persuaded Shôn to take over direction of the noise research programme at Bristol Siddeley Engines Ltd (BSEL) – the company responsible for developing the Olympus 593 turbojet that would power Concorde. The Technical Director’s inspired appointment enabled Shôn to assemble a stellar team of expert consultants on jet noise and theoretical aeroacoustics. Over the 10 years of its existence this group produced many fundamental advances in the field, although Concorde’s takeoff noise footprint was still an issue during the plane’s 27-year airline service (1976-2003). Hooker paid Shôn a handsome tribute in his autobiography *Not Much of an Engineer* [3].

It was my privilege to have known Shôn Ffowcs Williams since the mid-1960s. Although we never worked as colleagues together, he was a good and supportive friend in unobtrusive ways at key moments. He inspired and mentored his team members, defied bureaucrats, and was a master orator and persuader; while to witness Shôn in action at meetings – I served on the UK Aeronautical Research Council’s Noise Research Committee during his chairmanship in the 1970s – was something to behold. He will be greatly missed.

[1] Foundation Chair of Aeronautics 1950-64; founder and Director, Institute of Sound and Vibration Research 1963-67.

[2] Sir Stanley Hooker FRS, Technical Director BSEL 1960-66. Following the firm’s acquisition by Rolls Royce Ltd, he retired aged 63. He was re-hired as Technical Director, Aero Division to rescue the RB 211 engine.

[3] Shrewsbury, UK: Airlife Publishing Ltd, 1984

2.12. The special relation between Shôn Ffowcs Williams and the Acoustics team at Ecole Centrale de Lyon

by Geneviève Comte-Bellot, Jean Bataille, Daniel Juvé (École Centrale de Lyon, France, genevieve.comte-bellot@ec-lyon.fr, batailleje@free.fr and Daniel.Juve@ec-lyon.fr)

The long and fruitful collaboration between the Acoustics team in Lyon and Shôn began with a friendship which developed with one of us (G. Comte-Bellot) from their first meeting at the AGARD conference “Noise Mechanisms” held in Brussels in 1973. This collaboration continued throughout Shôn’s career in various forms:

- Research collaborations with M. Sunyach in Lyon and H. Arbey during his sabbatical stay in Cambridge on active noise and flow control in the 1980s. As an example of Shôn’s quick grasp of the problem, he suggested an experiment on active control of cavity noise. In four days the experimental apparatus was built and producing results. Then, in just one afternoon, Shôn wrote a four-page paper describing the experiment. It was published by the French Academy of Sciences. The experiment still operates today in the laboratory as a demonstration of the use of active control to reduce aerodynamic noise.
- Co-chairing several international conferences held in Lyon during the 1980s and 1990s. The most famous is the IUTAM symposium "Aero and Hydro-acoustics" held in 1985 with the participation of many of the world’s leading specialists of these fields.
- Numerous visits and stays in Lyon. Shôn contributed to formal technical discussions and other much more informal ones – in particular those around (good) meals. During two of his stays one of us (D. Juvé) was fortunate enough to be honored by the participation of Shôn in the jury of both his PhD and then his DSc thesis defense.

Of particular importance was Shôn’s help in establishing the ECLyon Acoustic Center in the early 1980s. One of us (J. Bataille) was the direct witness and reports the following elements:

“The first time I met Shôn in the flesh was around 1980, when the Acoustics team was going around various public institutions to obtain financial support in order to build an acoustics department around a large anechoic chamber, housing high-speed jets. A meeting with potential sponsors was organised to which Shôn was invited by G. Comte-Bellot, hoping that his commanding presence would help to rake in the amount of money needed. Which it did! After a few hours of tough negotiation, the representatives invited gave the thumbs-up to the erection of what would be the Lyon Acoustics Center. Shôn’s recommendations had loomed large as anticipated!”

Let us finish with some elements revealing Shôn’s wonderful personality and sense of humor.

On several occasions J. Bataille was given the opportunity to spend a few lovely days with him and Anne both at Cambridge and at Eglwysbach. Jean reports: “Those were the days when I could try to figure out the man and his true self when he was not in the spotlight anymore. He had « Leek » (national symbol of Wales) written all over his face, that was a dead cert! Welsh he was and Welsh he had spoken well before he had learned English! His next blindingly obvious character trait was a marked penchant for sports cars so much so that he managed to coax his Porsche into scaling the steep path leading to his pretty country seat. Likewise, he did not balk at the opportunity of temporarily living a high life while lavishly treating his guests, if I go by the gargantuan A-1 lobster which we washed down once with a superb Haut-Brion whose fragrances were to blend nicely with the scents of a Cuban cigar, lying in wait!”

When Shôn was awarded in 1989 the Foreign Medal of the French Acoustical Society, he started his thank you talk in Welsh! For a few minutes the audience remained stunned and silent ... but finally realised the joke and applauded vigorously!

During a sabbatical stay at ECLyon and having there a large apartment for himself and his family, Shôn finally said at the end of his stay, “this was fine, but reminded me of my youth when I was at a sport club!” ... on the floor above his apartment was the residence of the ECLyon soccer team, celebrating every victory!

Shôn was a brilliant mind and a very generous person. He will be long remembered by us.

2.13. Shôn Ffowcs Williams and Eindhoven

by Sjoerd Rienstra and Avraham Hirschberg (Emeritus Professors, Eindhoven University of Technology, The Netherlands, S.W.Rienstra@tue.nl and A.Hirschberg@tue.nl)

It is probably not known by many people that Shôn Ffowcs Williams had, among his many activities, a special relationship with Eindhoven, in particular the laboratory of Leen Poldervaart and Bram Wijnands at the Department of Applied Physics of the “Technische Hogeschool Eindhoven”, THE (now “Technische Universiteit Eindhoven”, TUE). Their unique experiments in the early 1970s on flow visualisation of jet screech and jet-sound interaction attracted Ffowcs Williams’s attention, as these experiments gave valuable insight into the difficult noise problems of the Concorde aircraft.

To see the sound-flow interaction with his own eyes, Shôn visited Eindhoven many times, always (as far as we can recall) during short trips by plane, arriving and returning the same day. This efficiency, so common among top businessmen, was virtually unthinkable in academia in those days and impressed us all. Although we, as young PhD students, were hardly involved, Shôn was always ready for a laugh and had words to cheer us up. He was interested in discussing any technical questions, and eventually these discussions led to the important suggestion of asking his former PhD student David Crighton to act as co-supervisor for one of us (S. Rienstra).

The work by Poldervaart and Wijnands was made available by THE in the form of scientific films, but, much to Shôn’s regret, not as refereed articles in international journals with the impact it deserved. Inventive as always, Shôn therefore wrote a review of these films

for the Journal of Fluid Mechanics [1], to make the work citable and traceable.

Moreover, a collaboration was established within the research framework of Shôn's PhD student Elisabeth Acton [2], who visited Eindhoven in 1976 for some time. Under the guidance of Bram Wijnands, Master's student Jos Beurskens [3] produced experimental data to validate the numerical work of Acton on the response of subsonic jets to acoustic forcing.

In 1984 Shôn visited Eindhoven again. He gave crucial advice on the role of vortex shedding in the problem of self-sustained oscillations in gas transport systems with side branches, and guided one of us (A. Hirschberg) to the vortex sound theory of Michael Howe. When studying this theory with colleague Rini van Dongen and PhD student Jan Bruggeman, we felt like "falling into a side branch", out of which we never completely managed to escape. Fortunately, the wonderfully didactic book [4] and later the lecture series [5] helped us to understand this subtle theory. Indeed, these texts were also our source of inspiration when writing our own lecture notes [6].

Although not as intense as in the 1970s and 1980s, our contact with Shôn remained. Unforgettable were the Acoustic Symposium, nicknamed "Shônfest", organised in 2002, Cambridge, to mark Shôn's retirement, and the special session held at the 22nd International Conference on Sound and Vibration (ICSV22) in 2015, Florence, to celebrate Shôn's 80th birthday.

We will forever be grateful to Shôn for his gently stimulating and inspiring role.

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2.14. Reflections of Shôn's colourful character

by Nigel Peake (University of Cambridge, UK, N.Peake@damtp.cam.ac.uk)

Shôn Ffowcs Williams was unique, in all the very best senses; I would just like to share a few thoughts about what I think made him so special.

First, Shôn was a person of immense determination who rose from difficult beginnings: his mother died when he was 5, he was packed off to boarding school in Yorkshire aged 11 when the rest of the family emigrated to Australia (at which point he could only speak Welsh), but despite leaving school at age 16 he managed to win a place at the University of Southampton, where he thrived (and where, most significantly, met Anne, his wife of 61 years).

Second, he was extraordinarily gifted, first evidenced in his emendation of Lighthill's theory as a student, for which, ever so characteristically, he was not at all put off by the initial skepticism of more senior colleagues. For me his physical insight and intuition were amazing, knowing the answer long before I had completed arduous calculations with heavy duty mathematics. It was sometimes said that when presented with a long and hard-won asymptotic series he was only ever "interested in the sign of the first term", but that was unfair because he had such an intuitive understanding already. He was certainly more than capable of doing really advanced mathematics himself (he had a particular soft spot for ultra-distributions...), but despite a lack of training in pure mathematics he always seemed to know what was and wasn't allowed.

Third, Shôn had amazing charisma. He was a captivating, if idiosyncratic, lecturer who would keep audiences rapt with anecdote and insight. One such anecdote involved Shôn's idea that severe snoring could be cured by drilling a hole in the patient's soft palate. To the surgeon's amazement this actually worked, and even continued to work after the hole had healed up! As Shôn gleefully recounted, it transpired that the resulting scar made the tissue stiffer. Shôn was an inspiration to people around him, and many of his students went on to spectacular careers of their own (his habit of sending his PhD students to the US on Concorde, all expenses paid, no doubt further contributed to his popularity).

Fourth, Shôn knew how to enjoy life! He was the obvious choice to be Master of Emmanuel College in 1996, where he hosted parties in abundance; at some of the parties only asparagus, one of Shôn's great food passions, was served, while at others oysters or lobster took the starring role, with wine flowing in abundance in all cases. In 2002 Shôn and Anne moved permanently to North Wales (up a long, often impassable track from which visiting cars often had to be rescued by the local farmer). There was much to enjoy, including a 1927 Rolls-Royce motorcar driven far and wide despite the farm track, and much-loved grandchildren.

Shôn made a huge contribution to our discipline, and enriched the lives of countless people around him. We have much to be grateful to him for.

2.15. Inspirational Shôn

by Lixi Huang (The University of Hong Kong, China, lixihku@hku.hk)

Since leaving Cambridge in 1996, I kept frequent contact with Shôn, and his continuous academic encouragement played an important part in my academic career. Shôn was not a usual supervisor who taught students by going through technical details each week, but an academic genius who inspired students to always focus on new ideas and possibilities. In the very early days he told me that most important papers were not those that quickly get cited but the ones which might attract attention decades down the line. This was a tall order for a fresh PhD student, but the impressions made during such conversations were certainly ever-lasting. As one of the last few students of Shôn, I had the chance to work on more exotic topics beyond aeroacoustics. Our story of collaboration with medical colleagues was reported in a BBC program in 1993. Friends of Shôn would definitely cherish fun moments when he shared about our work on human snoring. He might not bother to explain the connection between palatal vibration with aircraft wing flutter, but that was just a small portion of his deep physics insight in everything that he touched upon. When I made my way from Cambridge to Hong Kong, our work evolved from studies on pure mechanical system to neuro-mechanical coupling and we were very encouraged by the appearance of our only physiology paper in the cover page of a mainstream journal. Shôn did not just enjoy extending his reach beyond his usual habitat like *Journal of Fluid Mechanics* or *Royal Society transactions*, but thought rather seriously about things that could matter much later. In one email I asked him about what would he then consider to be the most worthy direction in research, which was quite some time into his retirement in his native Welsh mountains, he said brainwave should be considered more seriously than industrial noise! Well, I have not got a chance to pursue brainwave studies so far, but am still distracted by a much more modest fascination about what electromagnetic field can do to mechanical and acoustic waves. Right before he passed away, I shared with him an invention by my clever students who succeeded in converting audible sound to infrasound, and from a single tone to random noise, by spectral scattering. He was apparently intrigued and asked me for experimental evidence, which was eventually published in 2021 with a note to record our last conversation.

2.16. Dividend beyond acoustics

by Yueping Guo (NEAT Consulting, Seal Beach, CA, USA, yueping.guo@outlook.com)

Over the years I worked with Shôn, I learnt many things from him, mostly acoustics related but not always so. For some of the lessons, I only realised the values after years or decades. One day in his house, out of the blue, he gave me a lesson on the works of the stock market, saying that this was something I would need to learn if I would really want to achieve financial independence in the capitalist world. He explained to me how the capital market worked and introduced to me concepts such as capital gain and dividend. After all these, which mostly went over my head, he showed a dividend check that he received from the mail that day, for a grand total of 10 pennies! Even for a poor student like me, I surely knew how much 10 pennies were worth. I was wondering why he would go to such trouble for this tiny return. That aside, the introductory lesson has been well appreciated, if not right there on that particular day, and I am sure it helped me, years later, to become a hedge fund manager and to develop my own investment tools and expertise.

2.17. Memories from the Concorde age

by Marc Harper-Bourne (retired from Qinetiq, Farnborough, U.K. mharperbourne@hotmail.com)

I have fond memories of Professor Ffowcs Williams. He chaired the Concorde Noise Panel in the 1970s when I was undertaking research into broadband shock-associated noise at the ISVR in the University of Southampton. I would attend Panel meetings with my then boss Mike Fisher; a young Ann Dowling would also be present at these meetings.

At an AIAA aeroacoustics conference in the 1990s, Shôn asked me if the paper he wrote with Mike Howe on broadband shock noise had been helpful in my research. I wasn't sure how to answer without offending him as his paper was published in 1978 and I completed my research in 1973!

However, I do regret not mentioning how he had inadvertently helped me when I was developing the Polar Correlation Technique (PCT) for jet noise source location. In order to secure funding, Shôn had asked Mike Fisher for the details of this technique, which I gave to Mike and he communicated to Shôn. Shôn's reply included his own detailed interpretation of my technique. Upon reading his notes, I realised I was making a small but crucial error in my Fourier transform, which I immediately corrected in my Fortran program.

3. Closing remarks

The editors thank all contributors to this editorial for sharing their memories; we also thank the authors for their effort to produce technical papers for this special issue. We have thoroughly enjoyed the experience of working with all authors and with the JSV Editorial Office. We hope this issue will demonstrate the respect, gratitude and admiration we all feel towards Shôn Ffowcs Williams.

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