

David Stifler Johnson: A Tribute by Lance Fortnow

On the morning of March 9, 2016 I heard the terrible news from Zvi Galil of David Johnson's passing the previous day ending his struggle with cancer. I quickly wrote up a blog post that I reprint below. A decade ago I had plans to write a book on the history of the P versus NP problem and interviewed a number of theorists including David Johnson. I found my old notes from a phone conversation I had with David on August 2, 2005 about his early days. The notes aren't complete but I'll try and tell his story the best I can. I apologize in advance for any mistakes that follow.

David Stifler Johnson was born on December 9, 1945 in Washington, DC. He graduated with a bachelor's degree from Amherst College in 1967. He was interested in artificial intelligence and went to MIT to get a Master's degree. Theoretical computer science was just getting started back then and David was in the mathematics department thought he took courses in automata theory. A year and a half later he received his MS degree with a thesis on average case analysis of tree search algorithms.

While in Korea serving as an officer in the US Army, David read about Minsky and Papert's work on perceptrons and would return to MIT for a PhD in the fall of 1971. David talked about many of his fellow students at MIT: Terry Winograd was a fellow math student, Larry Stockmeyer, Nick Pippenger, Joel Seiferas, Nancy Lu. David, an avid runner even back then, had races inside around the corridors of MIT.

Albert Meyer and Patrick Fischer taught algorithms from the first two volumes of Knuth. From that class David Johnson learned about bin packing that led to his thesis on approaches to approximating optimal solutions for that problem. David Johnson also started thinking about online versus offline algorithms around that time.

David Johnson started his PhD studies shortly after Cook had his seminal paper on NP-completeness. David attended that IBM hosted Symposium on Computer Computations in March of 1972 where Karp presented his twenty-one NP-complete problems. David said that already at that point viewed NP-completeness as important but Karp "brought it home". Hopcroft during that meeting said, in what would be a massive understatement, that he didn't think P versus NP would

be solved in ten years. There was a workshop at MIT's Endicott house on NP-complete problems that really got David interested in the area.

In 1973, David Johnson received his PhD from MIT and went to work at AT&T Bell Labs. He worked for AT&T in its various guises for forty years until taking on his final position at Columbia. He fondly remembers 1980-81, the year he took visiting the University of Wisconsin in Madison working with Larry Landweber and others.

Karp didn't use the term NP-hard and NP-complete in his paper. Donald Knuth ran a poll to come up with good terminology. Knuth discusses the results of the poll in an essay in the January 1974 SIGACT News and after describing a number of humorous proposals

The "winning" write-in vote is the term NP-hard, which was put forward mainly by several people at Bell Labs, after what I understand was considerable discussion...This term is intended for use together with another new one, NP-complete, which abbreviates 'polynomial complete' and is the same time more exact.

So not only did David Johnson and Michael Garey go ahead and write their incredible book on NP-completeness, they actually helped name the field.

The rest is the text based on my blog entry

<http://blog.computationalcomplexity.org/2016/03/david-johnson-1945-2016.html>.

David Johnson, a leader and advocate for algorithms and all of theoretical computer science, passed away March 8, 2016 at the age of 70. A truly sad day for us all.

David's 1979 book with Michael Garey, *Computers and Intractability: A Guide to the Theory of NP-Completeness*, is still the best reference on the topic and perhaps the single most important resource in any computer scientist's library. David Johnson also wrote the NP-completeness column for the *Journal on Algorithms* and later the *ACM Transactions on Algorithms*, as well as "A Catalog of Complexity Classes" for the 1990 *Handbook of Theoretical Computer Science*. David founded the *Symposium on Discrete Algorithms (SODA)*, a conference that is now often mentioned with *STOC* and *FOCS* as a top theory venue. He created the *DIMACS algorithms challenges*. He led *SIGACT* from 1987-1991, really transforming that organization, and served as its face for many years thereafter. I'm only scratching the surface of what he's done for the community, and can think of no one who put more effort into making the theoretical computer science as strong as it is.

Of course David was a great researchers as well, working on NP-completeness and approximation algorithms.

He received an ACM Fellow in 1995, the first SIGACT Distinguished Service prize in 1997 and the Knuth Prize in 2010. He used his Knuth prize lecture to push for practical applications for our algorithms. Just a month before he died he was elected into the American National Academy of Engineering.

I worked with David Johnson closely on various SIGACT activities. David never missed a STOC and we always invited him to the SIGACT Executive Committee dinners, not because he had an official role, but because he was David Johnson. I truly respected and admired David and glad I could call him a friend. We'll miss him deeply. STOC and SODA just won't be the same without him.