# Dexter Kozen: An Appreciation

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I have known Dexter for 30 years, which, of course, means that I was 9 when I first met him. At that time, Dexter was already "the man". Although he was only a few years ahead of me, he had already made his name by independently defining the notion of alternating Turing machines, a deep contribution to complexity theory that made it possible to connect time and space complexity. The results were viewed as so significant that it was already being taught in a graduate course on complexity theory that I attended.[1] Of even more interest to me at the time was Dexter's work on modal logic, since a large part of my thesis was on dynamic logic. Finding a sound and complete axiomatization for dynamic logic had been an open problem for many years. Krister Segerberg had suggested an obviously sound axiomatization, but couldn't prove it complete. Rohit Parikh [7] showed that it was indeed complete, but his proof was rather complicated. Dexter then came up with a much simpler proof, one that got at the essence of Rohit's ideas; this version was published as [6]. The proof is truly beautiful. I have taught it often, and used the ideas in a number of subsequent papers (e.g., [3, 4]).

This was my first introduction to Dexter's ability to see into the heart of a problem. Perhaps the best-known example is Dexter's work on the $\mu$-calculus. Vaughan Pratt [8] had earlier suggested a logic with fixed-point operators. Dexter's version [5] was more elegant, and is the one that everyone focuses on these days.

I also soon learned about Dexter's breadth. Besides complexity theory and modal logic, he also produced major results on algebra, such as the complexity of the theory of real closed algebraic theories [1]. I remember visiting IBM Yorktown Heights in the mid 1980s; Dexter was working there at the time. I mentioned to him some graph-theoretic problems I was working on. The rest of the day, I could see Dexter scratching away at a notepad, thinking about the problems. (He is still scratching away at notepads, although the notepad and the problems occupying him are no doubt different.)

When I moved to Cornell in 1996, I saw a different side of Dexter. Dexter is a true department stalwart. He is well known to be a tremendous teacher. He can also always be counted on to play hockey or play music at a department function. (On top of everything else, Dexter is a terrific musician—I am

[1] Ashok Chandra and Larry Stockmeyer had also investigated alternation; they joined forces to produce a very high-cited journal paper [2].

jealous!) Now that I'm department chair, I appreciate Dexter's contributions to department life even more. Each year I ask department members what courses they would like and be willing to teach. Most people mention two courses; some people may even mention three. Dexter is willing and able to teach just about anything: theory courses, programming language courses, all of our introductory programming and data structures courses, the basic graduate courses in theory and programming languages, and, of course, specialty courses in his own area. Indeed, not only is he willing to teach them in principle, he has in fact taught just about all of them.

When one of our faculty members had a sudden emergency the night before the final exam in his core undergraduate course (a course with over 60 students), with the final exam only partially completed (yes, it was the night before the final . . . ), he called on Dexter. Dexter stayed up to the wee hours of the morning preparing the final, and helped grade it. I think this incident really gives a sense of Dexter—both the way he came through for someone else in an emergency, and that he was the one that was turned to in the first place.

Thanks for everything, Dexter.

## References


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