

## Richard Guy and Mentorship

Richard Kenneth Guy (1916 - 2020)

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### R. Scheidler, based in part on accounts by A. Fink and J. Salazar

Richard Guy was a dedicated educator and mentor to students of all ages. He considered his efforts in this area at least as important as his research contributions. He supervised graduate students until 2002, when he was 86, and undergraduates until the age of 101. Even as a centenarian, Richard participated in the weekly gathering of the Calgary number theory faculty and students, where he would pose problems, ranging from challenging to recreational, and gently but inevitably tempt at least one student into pursuing the problem further or crunching some numbers for him.

Until well into his 90s, Richard was a regular at Wednesday's Calgary *Math Nites*, a weekly enrichment program where faculty members and graduate students expose grade 7-10 students to mathematical discovery and engage them in problem solving. It was there that Richard met two of his most successful charges who kept in contact and collaborated with him until the end: Alex Fink, now a faculty member at Queen Mary University of London, and Julian Salazar, who obtained a BA in Mathematics and a secondary concentration in computer science from Harvard in 2017 and went on to embark on a career in machine learning with Amazon.

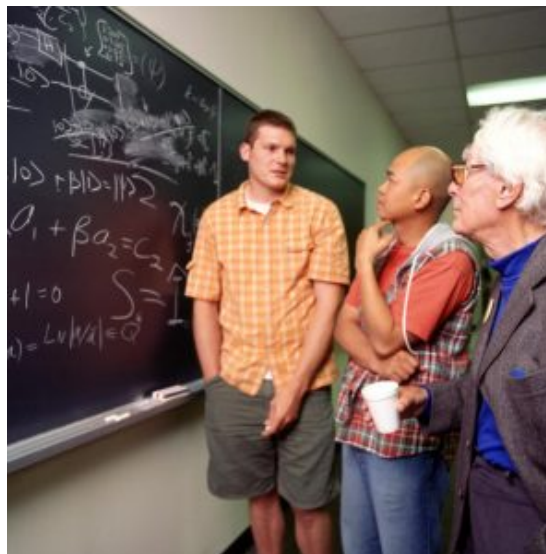
Alex Fink attended *Math Nites* starting in grade 4. While in high school, Richard invited him to attend his reading course in combinatorial game theory. Fink went on to train with Richard for the Putnam exam and, supported by two NSERC USRAs, conduct research under Richard' supervision. After completing his undergraduate education at the University of Calgary, he continued to keep in touch with Richard in person and online. "There was a lot to finish at that point", Fink comments. Between 2006 and 2017, he and Richard co-authored three research papers [Fink and Guy 07, Fink et al 08, Fink and Guy 17] and two expository articles [Fink et al 06, Fink and Guy 09]. Fink paraphrases some of the lessons learned from Richard early on:

*"Have multiple balls in the air: it's good to have somewhere to turn when you hit a wall on project A, and your subconscious will be chipping away at project B in the meantime anyhow."*

*"Write it all down. The easiest way to edit is to cut things out."*

*"Go to conferences even before you have the background: it won't be a waste, you'll absorb some of the language and be better prepared for the next one."*

*"Be careful of making (even implicit) assumptions that might alienate some of your audience. Hence never 'well-known', always 'well-known to those who well know it:'"*



Richard with two University of Calgary graduate students, 2003

Julian Salazar recalls feeling welcome from Richard's first e-mail reply and describes their meetings as socratic. "He [Richard] just patiently described what he was thinking about, I'd ask questions, he'd ask them back. After 1-2 years of casual chats, he asked a question which I proved (our Theorem 7) on the train home. That moment, of devising something new, has defined much of my adult life." The work Salazar refers to is [Guy et al 14], published when he was 20 and Richard was 98. Richard provided financial support for Salazar to attend and

present at MathFest and took him for dinner with Noam Elkies who later became Salazar's senior thesis advisor at Harvard. Salazar notes that Richard "pursued problems because they were interesting; not because they were technically challenging or trendy" and credits Richard with the lesson to "do what you enjoy, independent of the credentials or the default path".

Alex Fink is a Reader in Pure Mathematics at Queen Mary University of London. His research centres on algebraic combinatorics, with emphasis on applications of commutative algebra or algebraic geometry to the field, including matroid theory and tropical geometry. He obtained BSc Honours degrees in Pure Mathematics and Computer Science from the University of Calgary in 2006 and a PhD from UC Berkeley in 2010.

Julian Salazar is a Machine Learning Scientist at Amazon AWS AI, working on deep learning for human language, especially speech recognition (ASR) and natural language processing. Academically, he is interested in the intersection of pure math with other fields, including computer science, neuroscience and string theory. He grew up in Calgary.

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