

## **Remembering Keith Rayner: June 20, 1943 - January 21, 2015**

"Let's see the data." It is hard to accept that Keith Rayner will never say those words again. He succumbed to multiple myeloma on January 21, 2015, after struggling long and hard against the disease but never appearing to give up hope. The disease didn't change the way he interacted with people. He asked just as many direct questions as he always had, and delivered his blunt and helpful opinions in the same way. Neither did the illness slow the rate of his accomplishments. During the last year of his life, he published two dozen academic papers, delivered the APS William James Lifetime Achievement Award address, traveled to an academic conference in China, attended the meeting of the Psychonomic Society to receive the Outstanding Mentor Award from Women in Cognitive Science, and continued mentoring huge numbers of students. His professional accomplishments are substantial, but perhaps even more striking is the profound impact he had on others. Hordes of graduate students, postdocs, and fellow researchers flocked to his labs to work with and learn from him, and all came away with deep respect and affection for him.

Keith is widely acknowledged as the researcher who made eye movement measurement a major tool for the study of cognitive processes. His early work used eyetracking to probe the processes of how we read text, how we identify written words, how we parse sentences, and how we comprehend discourse. His interest in how people read extended to other domains, such as how people perceive scenes and how they search visual arrays, and he applied his knowledge of the reading process to important analyses of how reading is best taught. All his research was driven by the data. Theory, for him, was not something to be imposed on data. In Keith's view, careful examination of the data would eventually lead to sustainable theoretical generalizations.

He followed this data-focused approach in working on new research projects with students and colleagues. He had the nicest possible way of asking people to bring him the results or the write up without delay. He motivated students to work independently and efficiently and to use good judgment in all things. He had a remarkable ability to encourage students to produce publishable data in a minimal amount of time. But Keith's impact extended far beyond his own students: A Google Scholar search indicates that his publications have been cited more than 40,000 times, and he has over 100 publications that have each been cited 100 or more times.

After he received his PhD from Cornell University in 1974, Keith's career began at the University of Rochester. He soon moved to the University of Massachusetts Amherst, where we enjoyed him as a colleague for 30 years. In 2008, he took the Atkinson Family Chair of Psychology at the University of California San Diego. He received a great many academic honors, including the Division 3 Lifetime Achievement Award from APA, the Lifetime Achievement Award from the American Literacy Association, the Experimental Psychology Society's Bartlett Lecture Lifetime Achievement Award, and the University of Massachusetts Chancellor's Award, among many others. He gave back to the field as well, being Editor of the *Journal of Experimental Psychology: Learning, Memory, and Cognition* and the *Psychological Review*, serving on what seems like dozens of editorial boards and grant review panels, and working behind the scenes to help many others succeed in their careers.

Keith's friends and colleagues all valued his calm, even-tempered approach to psychology and, indeed, to life. He was a person who thought that one person's accomplishments did not diminish his colleagues', but instead, 'raised their boats'. His life raised all of ours.

## **Chuck Clifton and Caren Rotello**

University of Massachusetts Amherst

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I met Keith Rayner at my first “big” invited symposium after my initial sabbatical. I had heard about this wonderful mysterious “moving window technique” and was delighted that the two inventors of it, McConkie and Rayner, were presenting at the symposium. I was impressed by their talks and the potential of their techniques for a better understanding of how words are processed than the response time techniques I was using. Moreover, their work was clearly a major breakthrough in understanding reading processes more generally. The subsequent fall UMass had a junior faculty position open, so you can imagine my surprise and delight when I received a phone call from Keith asking whether the description of the position could be expanded to include a more senior non-tenured person like him. Needless to say, we did and we hired my Platonic ideal for the position. It was the best move the cognitive psychology program at UMass ever made.

As is emphasized in the other tributes, Keith was very much a data oriented man. While this was slightly limiting in some sense, in many other ways, it was a great strength. He didn't get hung up on theoretical debates, and instead pushed forward to discover new phenomena that were of great interest and that other researchers could debate the deeper meaning of. Also, Keith was not merely the co-developer of the moving window technique. He saw how this technique could be used for more than describing the area of the page that readers could extract information from (and how this differs across languages and writing systems). Instead, his research over the last 40 years in reading (with the collaboration of many people including myself and a large

number of students) has provided a wealth of data about the cognitive processes of readers on a moment by moment basis while they progress through the text. This has provided considerable information about the processing of phonological coding, syntactic construction, and even building of discourse structures during reading. Keith also wrote many important papers on object and scene perception using display change techniques. I should conclude by saying that Keith was an ideal collaborator. Not only did he make his laboratory available to me and most people in the cognitive area, but designing an experiment with him was an exciting and fruitful exchange of ideas. Cognitive psychology definitely is in need of more Keith Rayners.

### **Sandy Pollatsek**

University of Massachusetts Amherst

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About 30 years ago, a secretary left a message that Keith Rayner called and I should call him back. I initially thought it was Keith Rayger, a good friend at the time, but the area code was strange. Well, it was Keith Rayner offering me a Sloan postdoctoral fellowship. There was no real interview, Keith in his deadpan voice basically said something akin to "hey we like your application and would like you to do a postdoc here". I heard of Rayner and knew he did work in reading, but was pretty clueless beyond that. The Sloan postdoc was an amazing opportunity in allowing one to work with multiple outstanding researchers. Working with Keith was very special. Going from a t-scope to Keith's state-of-the-art eye-tracking lab felt like leaping into the future. Keith showed me his parafoveal preview paradigm, which allows one to magically replace a letter string in the parafovea after an eye-movement was initiated, without the participant knowing anything has changed. We ran a few studies with this paradigm and I still

remember Keith showing me how to code the data by hand from paper print outs. Keith had amazing patience and tenacity. There was no rush when doing careful science. To this day, I miss Keith's enthusiasm when going over data and discussing interpretations.

One of the amazing aspects of Keith was his ability to juggle so many balls, while keeping such a calm and steady demeanor. For example, while at UMASS, he ran probably the best eye-tracking lab in the world to study reading, was publishing influential papers at an amazing pace (which he kept up until the very end), seemed to be constantly reviewing papers, directing the cognitive science program, and also was a dedicated father and husband. How did he find time to do it all, especially with no caffeine? I blew a fuse when I found out that he also served as a Bishop in the local Church of Latter-day Saints. This apparently is not a full time job, but even so....

Keith's contributions to the literature in reading and visual perception are enormous, but many of us will remember Keith for his personal and professional advice and sage wisdom over the years. Keith will live on not only in the way in which he changed the field of reading, but also in the positive influence he had on so many students, colleagues, and friends. I was remarkably fortunate that it was, in fact, Keith *Rayner* calling 30 years ago.

**David Balota**

Washington University

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Keith Rayner was truly one of the giants of cognitive psychology. Before he published his pioneering research on eye movements in reading, researchers and the educated public did not appreciate how cleverly the brain had adapted the visual and attentional systems to the task

of allowing humans to communicate linguistic information visually. We did know that the eyes are constantly moving and then stopping as they take in information, that readers must fixate essentially every word in a text if they are to understand what they're reading, and that readers make progress by moving both backwards and forwards. But Keith's important contribution was to explain why, by identifying the tight link between eye movements and cognitive processes. His theoretical work helped the field better understand the links between attention, language comprehension, and eye movements, as well as the effects of increasing skill on the micro-processes of reading. These ideas were also extended to the field of visual cognition more broadly, enhancing our understanding of visual search, scene processing, and memory. The impact of Keith's contributions can easily be seen in standard measures such as publications, citations, journal editorships, and successful students and post-docs. Keith embraced his role as a scientific leader and worked to make professional organizations both in the US and abroad stronger and more responsive to the needs of the academic community.

Keith was a lifelong friend and mentor. Quite simply, he was always there. If you sent him an email, you got a reply right away. If you picked up the phone to call him, he typically answered on the first ring and said that sure, he had time to talk. At conferences and meetings, he always wanted to chat and find out what we were working on. He championed our work, applauded our successes, and supported us during the hard times. We owe him so much, and we will really miss him.

**Fernanda Ferreira and John Henderson**

University of California Davis

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Keith was my Ph.D. supervisor at UMass. He was a major force in my success. He was exceptionally patient, encouraging, and perspicacious. He also had a wonderful sense of humor and was a talented sportsperson, especially in basketball. He somehow managed to always find time for guidance and discussion (which he extended to my siblings and parents). For nearly three decades at UMass, Keith was the binding energy behind an outstanding group of colleagues whose synergy produced a remarkable academic progeny. Keith was an empiricist with an astute and open-minded stance. He was ruthlessly fair. It is rare to find such an authentic individual who, at the same time, is a monumental figure not only in their field of study, but in the discipline as a whole.

One of the attractive features for me joining Psychology at Glasgow was its eyetracking reading lab, one of the first such labs in the UK. As with most other UK eyetracking labs, Keith was the catalyst in getting Glasgow's lab up and running. People would meet Keith at a conference, visit his lab at UMass, then set up their own lab. And, over the years, Keith maintained a close connection with all of these labs via regular visits and research exchanges. Ultimately, Keith's influence became global.

Keith was truly one of the good guys. He was a fabulous person and scientist. I will always have fond memories of my times with Keith, and his voice (and eye movements) will always be with me.

**Sara C. Sereno**

University of Glasgow

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Keith Rayner succeeded me as editor of the *Journal of Experimental Psychology: Learning, Memory and Cognition* in the late 1980s. I did not know him well when he was appointed, but we became good friends over time. We discussed the editorial transition soon after his appointment. As part of my welcoming him to the job, I asked what I could do to help. Keith said I could do something, but he was a bit sheepish in asking: Would I consider a new paper by him for *JEP:LMC*? Sure, I said, puzzled. Why was he even asking? The reason, he said, was that he had never published a paper in *JEP:LMC*! He had published many papers in the *Journal of Experimental Psychology: Human Perception and Performance*, but not in *JEP:LMC*. Sure enough, he submitted the paper, it got excellent reviews, and it was published before he officially took over as editor.

Keith and I laughed about that incident later. He said he always hoped that someday he might be asked to be editor of *JEP:HPP*. However, the search committee for *JEP:LMC* asked first. One journal's gain was doubtless another's loss. Keith was an outstanding editor (from 1990 to 1995) and then later edited *Psychological Review* (2004-2010) with equal wisdom and efficiency. Keith had the remarkable ability to stay on top of the field of cognitive psychology, on top of his journal, and yet keep his lab and his research going at full steam throughout the process.

Keith and I talked about editing and many other topics over the years. I was never lucky enough to be in the same department with him, but in every conversation and every action letter I read, his great qualities shone through: Intelligence, perspicacity, excellent judgment, and even a quiet sense of humor – he was a master of the dry quip at the right time.

I last saw Keith at the Psychonomic Society meeting in November, 2014. He had lost weight and clearly was ill, but his spirit was undaunted. We had a brief, but intense, conversation. I had experienced a serious illness in 2007 and had come through OK. We talked about his situation, and he was quite frank. "I don't know that I will make it through this" he said. I tried to say the words of support that one says in these situations and he thanked me for my encouragement. We parted with an awkward hug.

I miss him.

### **Roddy Roediger**

Washington University

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I (Simon Liversedge) already knew Keith Rayner quite well before he arrived at Durham University in the UK to spend a year as a Leverhulme Visiting Professor in September 2001. Keith had influenced my PhD studies, I had visited and stayed with him at Amherst as a postgraduate student, and he had acted as external examiner for my thesis in 1994. From that time on Keith and I have collaborated on many research projects together. However, it was during his Fellowship year that Val and I became very good friends with Keith and his wife, Sue

At that time, there was a small team of researchers headed by John Findlay working in the eye movement laboratory in the Psychology Department. Everyone working in the lab recognized that Keith's visit was an incredible opportunity for us to learn from the leading figure in the field of eye movement research in cognitive psychology. Initially, we were concerned that we would not be able to meet the demands that Keith would have in terms of his research requirements and the academic environment. We needn't have worried. He shared the tiniest

office with a secretary, but he never complained. He'd happily shout up and down the corridor to people in adjacent offices asking them to come and take a look at something, and of course, provide their opinion. He made friends with everyone he came across (from the Head of Department to Denise the Caretaker), and he'd regularly troop down to the lab and chat to whoever happened to be in there about what they were doing, and what projects they were working on.

It's very rare that someone clicks together with others in the way that Keith did, but he fitted into the group perfectly, and from word "go" he made us more productive. Don't be fooled – Keith was a hard taskmaster. In the first six weeks he made us complete our backlog of unfinished papers. I didn't think it was possible to shift such an amount of work in so short a period. But we did it, in large part, because Keith was so uncompromising in this regard. In Keith's view, a project was not finished until every paper that could be published from the data was "in press" – he taught us the importance of publishing our work and submitting our grants. The year in Durham flew by, and both Keith and his wife Sue had a great time. The following year Val and I went to Amherst for our sabbatical to work with Keith and others at UMass. Just like in Durham, we had a terrific and productive time together, and we maintained our close friendship ever since, visiting each other during subsequent years when Keith left UMass to work at UCSD.

It's probably already clear that Keith was a person who had a genuine interest in others. He was sincerely curious about what they were doing in their work, and while ever he felt people were serious about their research, he would help them in whatever way he could. This made the people he came into contact with try harder. He gave them confidence and he caused them to strive to achieve even more in their work. More than anyone else we've met, Keith had the

ability to inspire researchers to achieve their full potential. Keith lifted colleagues to places they could not otherwise reach. He was strong in spirit, in tolerance and kindness, and in his support of others. He was a man of his word and he commanded respect. In these very fundamental ways, Keith affected people daily. We know we speak for many when we say that Keith was our friend and we will miss him dearly.

**Simon Liversedge and Valerie Benson**

University of Southampton

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I started to work with Keith in 2004 when I was a graduate student at the University of Massachusetts Amherst. Our collaboration started with a small project on Chinese reading, and after that, my research interests fundamentally changed.

I feel like I owe Keith so much. He always encouraged me to go ahead whenever I had new ideas, even when I was not sure whether they were good ones. For instance, a couple of weeks after I wrote a short research proposal for his class, Keith came into my office and told me that he thought I should do the experiments I suggested. His approval gave me great encouragement. During the past decade, we have published more than ten papers on that topic, which has become a hot area. Besides encouragement, Keith was always ready to provide valuable support whenever I needed it. When I started a new lab in China in 2009, he visited me to make sure everything about the new lab was correct. Five years later, when I hosted the Sixth Chinese International Conference of Eye Movements, he helped to make the conference a success. Even though he was fighting hard with cancer at that time, he traveled to Beijing, chaired the conference and even gave a lecture at a pre-conference workshop.

Keith was a great mentor. I learned so much from him. Besides his outstanding research skills, I saw his passion for research, his hard work, his fairness to collaborators, and his kindness. These great traits have influenced me a lot.

At present, I still cannot believe that Keith is gone. In just the five years since I started my current job in China, I received 480 emails from him! Receiving emails from Keith was always one of the most enjoyable things for me. But now I will never receive emails from him anymore. I will miss Keith forever!

**Xingshan Li**

Institute of Psychology, Chinese Academy of Sciences

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With over 400 scientific publications and over 40 years of research, it is no doubt that Keith was a giant in our scientific community. But I doubt he even knew these numbers. For Keith, it was all about answering questions using data-driven approaches and enjoying the process of scientific discovery.

I had the great privilege of working with Keith on my PhD at UMass. He was a superstar, for sure, but with his door always open and his feet propped up on his desk, he humbly made himself available to his students whenever they needed him. Although his office overflowed with journal articles, he could pull from memory the authors' names, the date of publication, and the pattern of means from hundreds of papers. He had a powerful but calm way of shaping his students into independent, careful researchers. He was incredibly generous with his time (I recall him giving me detailed feedback on my dissertation over Easter weekend). Even in my tenured faculty position, I relied on his expertise in interpreting reviewers' comments

and rewording discussion sections. I would not be where I am, what I am, or who I am without having had this man in my life.

When I was a student of Keith's, I bought a jade plant from the kiosk outside of the UMass bookstore. It was only about 6 inches tall when I got it, but over the following 12 years, it grew to an enormous size; at over 2 feet tall, with thick woody branches and plump green leaves, the tree required two strong adults to move it.

My jade tree died earlier this year. But one of the beautiful things about jade plants is the way that they propagate. Leaves and branches regularly fall from the healthy parent plant, take root, and form new plants themselves. Our closely-knit community is mourning greatly over the loss of the great Keith Rayner. But during his lifetime, Keith mentored and trained an impressive number of scientists including 28 PhD students, 33 post-docs, and endless visitors who came from all over the world to learn from the master himself. He revitalized the field, and connected his collaborators together as family. His impact was great and will continue to grow. His love of scientific exploration and the dedication that he had for students and their growth as scholars will live on in those he so graciously took the time to mentor. That's a lot of jade plants.

There are no words to describe his brilliance, his passion, his gentle smile.

There are no words to describe the extent of his influence on our scientific field.

There are no words to describe the greatness of Keith Rayner, the man who showed us the mystery and magic of words themselves.

**Rebecca Johnson**

Skidmore College

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Keith's name came up repeatedly as I was researching graduate schools. Everyone I asked told me "Definitely Keith Rayner. He's the guy." But I was too naïve to do my due diligence and study his work or reputation before I applied to work with him. This folly turned out to be the best mistake I ever made: because I was not sufficiently intimidated by his reputation, I got to meet the real Keith off the bat. We connected immediately, both intellectually and personally (although we've been told we were polar opposites).

While I was already excited to go to graduate school, meeting Keith lit a fire in me. He was jovial and inquisitive, put on no airs of self-importance, and was eager to hear my ideas and future plans. We joked and smiled while talking deeply about science. He described his work in a way that just made sense to me, even though I had never studied eye-tracking or reading research. He dropped me off at the airport after our two-day visit, and I immediately logged on to my computer to accept UCSD—I had found my advisor, a paragon of mentorship.

The greatest thing about Keith was how supportive he was of me and all his students as we pursued our own goals and took on our own responsibilities. This was evident from our very first interaction, when he picked me up at the airport and I realized that the clock in his car was an hour off. He didn't know how to fix it but was happy for me to try. I opened the glove box, found the user's manual and fixed it, winning him over on the spot. That part of his approach to mentoring pervaded the following 7+ years; the word "no" rarely passed his lips, and everything he did was for his mentees, regardless of whether it mattered for himself. I was a naïve 20-something, and while Keith never had a problem telling me when I was wrong, he always respected my opinion. He treated me as a colleague and friend from the very start.

It's strange to think back to when I didn't know him, to a time before the work we did together became my passion and before my ideas and words had the echo of his signature. Every day I miss him, every day I am grateful for the time we shared.

**Elizabeth Schotter**

University of California San Diego

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Keith Rayner had long been a visible and influential figure in the field when, in 2008, we recruited him to UC San Diego as the "Atkinson Family Endowed Chair" in Experimental Psychology. One half expects a professor of his caliber to be quite full of himself and to leave the mundane tasks of running the department to the little people. It therefore came as a surprise to me to discover that this man, who seemed to be publishing more highly cited papers per month than most of us do per year, was the exact opposite. He was unpretentious and pleasant to a fault, and he accepted every departmental responsibility that was assigned to him without complaint and with serious intent – as if it were his job to do so. I was intrigued. Before working with Keith, I had assumed that I was much too far along in my career to look upon anyone as a role model. However, after he joined our faculty, it did not take long for me to decide that, going forward, I wanted to be like him.

At last year's APS meeting in San Francisco, I introduced Keith for the 2014 APS William James Fellow Award. At the time, I did not know that we would lose him so soon, but I did know that he had been diagnosed with a serious illness. Partly for that reason, I wanted to make sure that he knew what I thought about him while I had the chance to say it to him directly and in front of others. Here is how I finished that introduction:

"It takes a lifetime to clearly show that you are among the leading experimental psychologists in the world, and Keith Rayner has certainly done that. But over the course of his life he has shown something else as well. A person's character is tested almost every day, and pretty much everyone fails that test at some point along the way. After all, we're only human. Except Keith Rayner. He appears to be superhuman because he never seems to fail any test like that, and everyone who knows him knows exactly what I'm talking about. His phenomenal work ethic, his profoundly good judgment, his unwavering honesty, his absolutely unquestioned take-it-to-the-bank integrity – that's just who he is, and you can't say that about every renowned scientist (or even most of them). When you consider the whole package, there is no doubt that Keith Rayner is one of a kind, and I cannot imagine anyone more deserving of a William James Fellow Award."

I am sad that he is gone, but one thing hasn't changed. Going forward, I want to live up to the example set by my friend and colleague, Keith Rayner.

**John Wixted**

University of California San Diego