

BIOGRAPHICAL PROFILE**Baruch Fischhoff: Creating, testing, and communicating theories about risk perception, public preferences, and communication****1 | INTRODUCTION**

Baruch Fischhoff has vivid memories of his early life in Detroit. His father was born in Budapest and came to the United States in 1922, which was just before the restriction of immigration through the Immigration Act of 1924. His mother was born in Detroit, and her family was from Lithuania. Life was very different for young Jewish children then than it is today. Boys had their bar mitzvah at 13 and went to work, and girls learned to read so that they could manage a household and pray.

Baruch was the first person in the family to go to high school. Most of his friends at James Vernor Elementary (named after the ginger ale magnate) came from similar backgrounds. Detroit's Mumford High was more diverse.

Baruch then attended Wayne State University in Detroit, which he characterized as serving a diverse population of students. During the 1960s, Detroit was an exciting place to live in and go to college. In 1960, it had 1.67 million people, fifth most populated in the United States and was the automobile capital of the world. Wayne State was located on Woodward Avenue, which was one of the dozen historical grand avenues of the United States. The city was politically pulsating with local, national, and international issues such as civil rights, nuclear weapons, union organizing (and busting), the Vietnam War, the Holocaust, and the environment. Baruch's deepest commitment settled on a group (Hashomer Hatzair) that saw kibbutz life as "self-actualization," with activities and adventures, including the summer camp where he met his wife, Andi. He delivered the keynote address about national education in an April 1965 at a HaShomer HaChadash meeting.

2 | MATH AND PSYCHOLOGY

Intending to live his life on an Israeli kibbutz, Baruch began college as a math major. Since "I was planning to spend my life on a kibbutz, it hardly mattered." With Professor David Jonah's mentoring, he focused on abstract algebra. Also, he earned a second major in psychology. While the math major was more demanding in course work (60 credits), it was through a psychology course with Francine Wehmer that he met Sam Komorita, who was doing early work in behavioral game theory.

From Sam's obituary, I learned that he had been interned during World War II, as a Japanese-American, then devoted his career to studying conflict and cooperation. He introduced me to the field and encouraged me to apply to Michigan's math psych program. Although I was heading for a kibbutz, I wanted to meet Anatol Rapoport, then on the Psychology faculty, and I asked to visit. Just about everyone there told me that, should I ever want to resume studies (which wasn't going to happen), I should look up Amos Tversky. A few years later, when Andi realized that kibbutz life was not for us, I found the piece of paper with Amos's name, asked to study with him, and had the life-changing good fortune of having him accept me.

3 | HEBREW UNIVERSITY IN ISRAEL

Baruch went for his doctorate to Hebrew University in Israel, with Dan Kahneman and Amos Tversky as advisors.

It was extraordinary. The faculty were young, in part, because older faculty had been killed in a convoy to the Mount Scopus campus, during the 1947–1948 war. The grad students were gifted, as psychology was one of the most competitive undergraduate majors. The department welcomed us as immigrants. Maya Bar Hillel was the TA in my first grad course, Amos's Foundations of Mathematical Psychology. She found me a badly needed job at the new University of the Negev (now Ben Gurion). She and Ruth Beyth-Marom became collaborators. Asher Koriat taught me how to write a scientific paper.

Danny Kahneman's seminar in "Applications of Psychology" helped me see how research could be a calling, as well as a job. A guest lecture by Amos began the conversation leading to their fabled collaboration. Academic Jerusalem was a small town, with a core of people who

had grown up together. As a result, Amos and Danny's seminar attracted an intellectually diverse crowd. Life experiences and low university pay, leading to side jobs, meant that academics had real-world perspectives to share. Our daughter, Maya, was born there and passed between us, as we juggled work and school. I was passed between Amos and Danny, as primary advisors, depending on who could help me the most. *Everyone should be so lucky.*

4 | CONNECTING TO RISK ANALYSIS

Paul Slovic visited Amos for the 1973–1974 academic year. The Yom Kippur (Arab-Israeli) War modified the plan for this visit. However, it gave Baruch more time to visit with Paul who proceeded to find funding for Baruch and Sarah Lichtenstein to come to Eugene, Oregon.

I was doing basic research (primarily on hindsight bias and confidence assessment), when Paul began getting invitations to meetings on risk analysis, which he generously shared with Sarah and me. I did some writing and, surprisingly, found myself part of the conversation, as the field took form.

Paul Slovic and Baruch Fischhoff have known one another for about 50 years. We asked Paul to talk about their initial meetings in 1974 and about Baruch's research:

Baruch arrived in Eugene in 1974 and collaborated with Sarah Lichtenstein and me on dozens of research papers during the next 12 years. The work we did was influential in shaping several disciplines that were just beginning to take form, including risk perception and risk communication, preference and values, and risk analysis. Baruch was more than a valuable collaborator and coauthor. He was the leader in many of these studies with a talent for choosing important topics and questions to study, creating clever experimental designs, and reporting the results with a breezy engaging style that made experimental psychology come alive on the page, not an easy thing to do.

Regarding the psychometric paradigm, an idea known to so many in risk analysis, Paul Slovic was profuse in his praise of his collaboration with Bruch's and Sarah Lichtenstein:

Baruch's contributions to what became known as the psychometric paradigm for studying risk perception were monumental. They showed how perceived risk could be quantified in ways that shed light on why people's concerns varied

greatly across different societal hazards and why public views differed from those of experts in ways that were not due to ignorance or irrationality but rather reflected richer, qualitative, and value-laden understandings that needed to be respected and considered seriously in risk management. He extended and amplified this important message about the complexity of expert vs lay differences in a superb tutorial with an equally superb title "Lay foibles and Expert Fables in judgments about Risk" (Fischhoff et al., 1982). Later he further advanced the methodology of describing risk perception through the influential concept of mental models, jointly developed with his student Ann Bostrom.

Baruch became involved in multiple projects. For example, an invitation from the Nuclear Regulatory Commission led to *Acceptable Risk* (Fischhoff et al., 1981), examining behavioral and ethical issues in risk analysis. He then collaborated with Chris Hohenemser, Roger Kasperson, Bob Kates from Clark University and Paul Kleindorfer and Howard Kunreuther from the University of Pennsylvania's Wharton School. The SRA and the journal *Risk Analysis* provided a regular place to meet and publish.

Paul Slovic: The book we wrote in 1981 for the Nuclear Regulatory Commission, with Baruch as lead author, was titled "Acceptable Risk" and I believe it is still one of the best treatments of this vital concept. Never content to rest on his laurels, Baruch recognized that broad brush health and safety standards were, nevertheless, widespread and important. They pass judgment on individual courses of action as opposed to choosing among alternative actions. In 1984, he wrote an article in *Management Science* in which he developed a general framework for the design, development, and implementation of safety standards. He demonstrated the sensitivity of a standard's effectiveness to the technical aspects of the ways it is drafted (Fischhoff, 1984).

Baruch Fischhoff recalled what it was like to discuss risk perception in the early years of the SRA. During the first years of the SRA, many members were persuaded that the public's views were wrong and needed to be fixed.

At the time, the presenting symptoms in these invitations was typically a variant on, "Laypeople are crazy, when it comes to risks. You're psychologists; do something." Our natural first move was to evaluate those claims empirically. Our approach reflected our branch of mathematical psychology, now called decision science (or

behavioral decision research), which combined analytical and behavioral methods in studies that tried to address expert concerns in terms meaningful to laypeople and lay concerns in terms meaningful to experts.



This work sought to build and test theory as well as build new theory based on case studies. Baruch notes that he and his colleagues had flexible funding that allowed them to test interesting ideas.

At the time, the scientific community was digesting Amos and Danny's work on heuristics and biases. Studying SRA-type risks provided perspective on how well heuristics worked, how much biases mattered, and what could be done when they did.

5 | FAVORITE PROJECTS

Baruch Fischhoff highlights three of his most interesting projects:

Reducing the risk of sexual assault:

I learned a lot from a project devoted to providing responsible advice on reducing the risk of sexual assault. It grew out of a conversation with Lita Furby, following a presentation to the Eugene Commission on the Rights of Women (which I had joined through an invitation from Sarah, who was a driving force in its creation). Lita is a gifted methodologist, who taught me a lot about qualitative behavioral research, analyzing heterogeneous evidence, and the perils of personal advice for societal problems. In terms of impact, though, I think that we hit a sour spot, with an account that was too messy for scientists and too analytical for practitioners.

Decision-making competence:

I also learned a lot from a project, led by Andy Parker and Wändi Bruine de Bruin, focused on individual differences in decision-making competence. We developed a measure, comprised of common laboratory tasks, that correlates with life experiences, affirming those tasks' external validity. Scores at age 19 to 30 are correlated strongly enough to suggest a relatively stable trait. These observations have been possible because Ralph Tarter included our measure in the longitudinal research panel (CEDAR) that he heroically sustained for 20+ years. In terms of impact, the project has had a good run of adoptions, despite its somewhat complex scoring.

How safe is safe enough:

I also learned something from seeing a paper cited widely for a secondary result, while its primary one was mostly ignored. Our 1978 "How Safe Is Safe Enough" was intended as an empirical test of Chauncey Starr's seminal "Societal benefit vs. technological risk," which claimed to observe a double standard for the acceptability of voluntary and involuntary risks (Fischhoff et al., 1978). To simplify the many risk attributes that might impel double standards, we conducted the factor analysis producing the risk space for which the paper is mostly known. That popularity seems to reflect both how robust that pattern has proven and how much interpretative freedom it leaves.

Michael Greenberg comments:

The topics Baruch spoke to us about are critically important and yet his presentation was so understated and his research portfolio is so broad that I consulted my "Baruch" file. It includes papers and studies about adolescent risk taking, alcoholism, cancer, cyber-risks, food-borne illnesses, HIV, use of mammography, national energy and security, nuclear war, seat belts, terrorism, and vaccination. Indeed, I am sure that I do not have a near complete file. The breadth of his interests and knowledge is amazing. Furthermore, his influence is enhanced by the fact that he has served on so many Institute of Medicine and National Academy committees, and on advisory committees of the FDA, EPA and others. His contributions to the literature and to informing public policy have been extraordinary.

6 | ADVISORY COMMITTEES AND BOARDS

Professor Fischhoff has been on about three dozen National Academies committees over the past four decades. He points to the following as the most satisfying because they required interdisciplinary challenges:

- *Improving Risk Communication* (NRC, 1989).
- *Toward Environmental Justice* (IOM, 1999).
- *Intelligence Analysis for the Future* (NRC, 2011).
- *Framework for Equitable Allocation of COVID-19 Vaccine* (NASEM, 2020).
- Three special issues of *PNAS* on the Science of Science Communication (2013, 2014, 2019).

Baruch's most satisfying federal committee service has been at Food and Drug Administration. He was the first chair of its statutory Risk Communication Advisory Committee, which was created in response to a critical NASEM report:

The Committee was shaped by staff who knew risk communication and knew me, through intermittent engagement over the years. Later, I got to help create the Benefit-Risk Framework that FDA now uses to structure its evaluations and reporting for pharmaceuticals and biologics – and whose design embodies principles familiar to SRA members.

7 | COVID-19 COMMUNICATIONS

Dr Fischhoff's perspective on the COVID-19 pandemic:

I first learned about the threat of asymptomatic transmission at a meeting of the National Scientific Advisory Board on Biosecurity, January 24, 2020. From work on H5N1 (Bruine de Bruin et al., 2006), I had a sense of how bad it could be. Soon after, I started getting calls from reporters. In my responses, I have tried to look empathetically at the decisions that people face, the information they need, and the difficulty that they often have finding it, given the failures of the institutions that should be serving them. I have also stressed distinguishing evidence (research) from speculation (folk wisdom) and distinguishing risk communication (just the facts) from health promotion (of officially desired behavior).

These conversations provided him and reporters with informal evidence regarding what is on people's minds and what they are being told. Both more and less informal interactions with

various groups, including WHO, Cochrane, the UK Cabinet Office, and the movie industry (on reopening sets), have been a big help. I've been on the NASEM committees on COVID-19, equitable allocation of vaccine, and reviving the federal agency meant to manage medical countermeasures for public health emergencies (vaccines, PPE, respirators, etc.). The SRA perspective seems uniquely suited to translating diverse forms of evidence into useful terms.

8 | THOUGHTS ABOUT RISK ANALYSIS

As one of the first members of SRA, Baruch Fischhoff offers the following reflections about SRA's vision of multidisciplinary risk analysis.

Risk analysis, as represented in the Society, is the kind of integrative field that is often sought and rarely achieved. It brings together diverse scientists, consultants, and practitioners in projects that can serve both science and practice. It provides opportunities to work with deeply engaged people on wildly different problems. Markedly important challenges have long occupied Society members. One is acquiring enough familiarity with the many, varied analytical and empirical methods to collaborate with colleagues who have mastered them. A second is finding satisfying positions in academic institutions that are structured by disciplines, consultancies with fixed products, or agencies with procedural inertia. A third is keeping the Society from becoming a victim of its own successes, with flourishing areas spinning off to create their own societies, reducing the interactions that have kept the field vibrant. The Society has meant a lot to me. I encourage others to support and be supported by it.

Favorite Papers by Baruch Fischhoff

Fischhoff, B. (1992). Giving advice: Decision theory perspectives on sexual assault. *American Psychologist*, 47, 577–588.

Fischhoff, B. (2005). Cognitive processes in stated preference methods. In K.-G. Mäler & J. Vincent (eds.), *Handbook of Environmental Economics* (pp. 937–968). Amsterdam: Elsevier.

Fischhoff, B. (2008). Assessing adolescent decision-making competence. *Developmental Review*, 28(1), 12–28. <https://doi.org/10.1016/j.dr.2007.08.001>

Fischhoff, B. (2011). Communicating the risks of terrorism (and anything else). *American Psychologist*, 66, 520–531.

Fischhoff, B. (2013). The sciences of science communication. *Proceedings of the National Academy of Sciences*, 110 (Supplement 3), 14033–14039. <https://doi.org/10.1073/pnas.1213273110>

Fischhoff, B. (2015). The realities of risk-cost-benefit analysis. *Science*, 350(6260), 527. <https://doi.org/10.1126/science.aaa6516>

Fischhoff, B. (2017). Breaking ground for psychological science: The U.S. Food and Drug Administration. *American Psychologist*, 72(2), 118–125. <https://doi.org/10.1037/a0040438>

Fischhoff, B. (2021). Making behavioral science integral to climate science and action. *Behavioural Public Policy*, 5(4), 439–453. <https://www.doi.org/10.1017/bpp.2020.38>

Fischhoff, B., & Broomell, S. B. (2020). Judgment and decision making. *Annual Review of Psychology*, 71, 331–355. <https://doi.org/10.1146/annurev-psych-010419-050747>

Fischhoff, B., & Kadavy, J. (2011). *Risk: A very short introduction*. Oxford: Oxford University Press.

Mohan, D., Fischhoff, B., Angus, D. C., Rosengart, M. R., Wallace, D. J., Yealy, D. M., Farris, C., Chang, C. - C. H., Kerti, S., & Barnato, A. E. (2018). Serious video games may improve physicians' heuristics in trauma triage. *PNAS*, 115(37), 9204–9209. <https://doi.org/10.1073/pnas.1805450115>.

Wong-Parodi, G., Krishnamurti, T., Davis, A. L., Schwartz, D., & Fischhoff, B. (2016). Integrating social science in climate and energy solutions: A decision science approach. *Nature Climate Change*, 6, 563–569. <https://doi.org/10.1038/NCLIMATE2917>

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REFERENCES

- Bruine De Bruin, W., Fischhoff, B., Brilliant, L., & Caruso, D. (2006). Expert judgments of pandemic influenza risks. *Glob Public Health*, 1(2), 178–193. <https://doi.org/10.1080/17441690600673940>. PMID: 19153906
- Fischhoff, B. (1984). Setting standards: A systematic approach to managing public health and safety risks. *Management Science*, 30(7), 823–843.
- Fischhoff, B., Lichtenstein, S., Slovic, P., Derby, S. L., & Keeney, R. L. (1981). *Acceptable risk*. Cambridge University Press.
- Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., & Combs, B. (1978). How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. *Policy Sciences*, 9(2), 127–152.
- Fischhoff, B., Slovic, P., & Lichtenstein, S. (1982). Lay foibles and expert fables in judgments about risk. *The American Statistician*, 36(3b), 240–255.
- Institute of Medicine. (1999). *Toward environmental justice: Research, education, and health policy needs*. The National Academies Press. <https://doi.org/10.17226/6034>
- National Academies of Sciences, Engineering, and Medicine. (2020). *Framework for equitable allocation of COVID-19 vaccine*. The National Academies Press. <https://doi.org/10.17226/25917>
- National Research Council. (1989). *Improving risk communication: Working papers*. The National Academies Press. <https://doi.org/10.17226/1709>
- National Research Council. (2011). *Intelligence analysis: Behavioral and social scientific foundations*. The National Academies Press. <https://doi.org/10.17226/13062>