

My Memories of Paul Samuelson\*  
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I feel very honored to be included in this distinguished group to speak about Paul Samuelson. Most of the others knew him much more closely and for much longer: as a colleague, as a coauthor, and as a friend. Therefore I don't have an absolute advantage to speak about any of his multiple dimensions as an economist and as a person. What little comparative advantage I have, is to remember him as my teacher.

Even on this somber occasion, the memories bring a smile to my lips. He always lectured at 9 a.m. We students were still fighting sleep, but he would walk in fresh, and carrying freshly prepared handouts. He wrote them out on blue spirit-duplicator masters in the hour before class – some said he wrote them in his car when it was stopped at red lights; that may explain the barely readable handwriting – and ran off copies himself in the department's machine room. They were still damp, and smelled so strongly of the spirit that one could get high on them. But our real mental high came from the material, and from Paul's unique delivery.

His lectures were not the best way to learn the basics. But if we came prepared with our advance reading, he showed us the subtleties and nuances of the subject in a way no one else could. We began to understand modern economic theory, in the context of its origins, and from its leading pioneer. Most importantly, we acquired a way of thinking about economics that would last a lifetime. In short, we learned all the research methods and skills that the cut-and-dried world of the textbooks left out.

All of this was interspersed with memorable and funny anecdotes about famous economists. Smith, Ricardo, Marshall, Edgeworth, Keynes, Schumpeter, Irving Fisher, and above all Frank Ramsey, came alive for us in a way that taught us to respect the history of the subject and to appreciate the height of the shoulders of these giants, while at the same time making us smile at their human foibles.

Irving Fisher's touching faith in the permanence of stock market valuations at the height of the 1920s bubble was matched by Joan Robinson's equally touching faith in everything Chairman Mao told her about the Chinese economy. Speaking of Joan Robinson, who can forget Paul's caricature of her visit to the United States: "She was taken in a sealed train from coast to coast – from Paul Baran to Paul Sweezy."

Paul's favorite was undoubtedly Frank Ramsey; he must have recognized in Ramsey a fellow precocious genius. He told us how, on his first day as an undergraduate at Cambridge, Ramsey met with his philosophy tutor Ogden, and started to discuss some of his own ideas about essence and being. After listening, Ogden said, "These notions are rather like those of Kant." "Kant? Who is he?" was Ramsey's reply. "Emanuel Kant was the author of this book I'll lend you, *Kritik der reinen Vernunft*." "But it's in German, sir,

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and I don't know any German." "That's all right, I'll lend you this dictionary." A couple of weeks later Ramsey came back to Ogden saying "Kant has it almost right, but ..." Paul clearly reveled in telling this story.

The single most important thing I learned from Paul, which I have tried to use throughout my research career, is a sense of unity of the subject – of economics, and of the mathematical methods used in economic analysis. From his own work and his teaching, I realized that all the "fields" into which economics is conventionally divided are intricately linked pieces of one big puzzle, with a common framework of concepts and methods of analysis – choice, equilibrium, and dynamics.

The same goes for intrinsic links between economics and mathematics. Paul's formulation of this came in the form of another anecdote: this one about J. Willard Gibbs, the famous mathematical physicist. Gibbs was renowned for never saying a word at Yale faculty meetings. Just once, when a proposal to let students choose either a foreign language or mathematics was being discussed, Gibbs rose and spoke up: "Mathematics is a language." Paul improved this to "Mathematics is language." It is particularly well suited to formulating and understanding the multidimensional complexities of economic interactions, where many entities are interconnected by mutual linkages of cause and effect, and randomness has a big role.

Today we find many popular writers, and several economists, too, assert that economic life is too complicated to be reduced to mathematics. Paul's work proves that the truth is exactly the opposite. Economic life is so complicated that the only way we can make any sense of it is to study it in the language of mathematics. Thus mathematics should be a tool for thinking as well as for communication. The dichotomy that many of us make between "economics" or "intuition" on the one hand and "mathematics" on the other is just as artificial as that between fields like international trade and industrial organization. Ideally, mathematics and intuition should fuse into one's overall *Weltanschauung* about economics. (And incidentally, we also picked up from him the penchant for sprinkling our speech and writing words from other languages – especially German: *Weltanschauung*, and in his impish moments, *Schadenfreude*.)

Paul Samuelson showed us, through his own research and teaching, the power and fit of mathematical language is for studying economics. Probably more than anyone else in the twentieth century, he transformed the way economists think and write.