

# What Are You Worth?

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When students look at my now rather lengthy career, they often assume that the experiences that I have drawn together on various projects stem from a well-thought-out and carefully pursued plan. They despair because they lack such a plan and ask for my help in formulating one.

In fact, any career in any creative field such as scientific research is inevitably the consequence of an uncontrolled series of almost random opportunities and decisions. The general outcome depends more on what happened *after* those decisions are made than on which decisions are made.

But first a digression: The focused competition of the academic courses they take biases students to think that success arises from becoming the world's expert about some topic. Because the odds of becoming the world's expert about any single topic are vanishingly small, the whole endeavor seems futile. But what makes individuals valuable is the unique combination of knowledge, skills and experience that they possess. One's ability to solve a problem often depends on being able to use that combination to see relationships and solutions that others with more domain-specific knowledge might have missed. In order to do that effectively, your knowledge, skills and experience must be deeply integrated into your understanding of the world rather than just a collection of dim memories of jobs you had to perform. That integration comes from being engaged in and inquisitive about everything in whatever environment you find yourself.

When I interview someone for a job, I usually ask them about one of the experiences that they have noted on their resume. Let's suppose that the applicant had a summer job in a famous laboratory pipetting different amounts of solution A into solution B. They might describe that in one of three ways:

A. I developed a cure for cancer.

B. I pipetted solutions in a research laboratory.

C. I learned how biochemical concentration affects reaction kinetics.

Description A is clearly over-reaching. If I ask the applicant to tell me how the cure works, he/she will almost certainly fumble. Description B is probably an accurate description of the job the applicant was hired to do and perhaps an accurate description of everything that he/she got out of it. Description C tells me that the applicant took advantage of the opportunity to work in an interesting place with intelligent people in order to advance his/her knowledge and skills. This person will never forget those experiences and will be able to integrate such knowledge and skills with other experiences for the rest of his/her life.

No one else in the world will have the same combination of knowledge, skills and experience as you have. The more items you have in that combination and the deeper and more accessible they are, the more valuable you are. If you can bring them to bear on the myriad opportunities and challenges that one encounters in life, you will inevitably succeed at something. Just don't worry too much about what that something actually turns out to be.

The higher your aspirations, the more difficult the challenges associated with the opportunities. This has important implications that a gambler would summarize as "Know when to hold 'em and know when to fold 'em" (Kenny Rogers tune). In my profession of scientific research and technological innovation, the odds of any project succeeding are similar to those of making a goal in ice hockey: ~10-20% of shots on goal, but each of my shots takes years. The probability of making a goal is optimized by some combination of the number and the quality of the attacks on goal. A well-thought-out and carefully executed play improves the odds somewhat but it also consumes time that limits the number of shots you can take before the clock runs out. Now scale this up to the duration of a professional career and the

number of times you “reinvent yourself” by tackling a new problem instead of continuing to work on an old one. At any given time there is no certain way to know whether a new success is just around the corner or will never happen. Staying with one opportunity should be based on its current probability of success, not its sunk costs in professional time and effort.

The gambler playing poker is constantly reassessing odds as new information becomes available (cards are drawn, bets are placed, etc.), but odds are just probabilities; sometimes you will complete an inside straight and sometimes sure winners are defeated by better hands. Going “all in” is a desperation play, not a strategy. Winners “manage the stack” by carefully playing the odds for a large number of hands, both in poker and in life. In a scientific career, one can fail by sticking with one project forever or never finishing anything. As I tell my students, “I have a short attention span. I can’t keep doing the same thing for more than five or ten years.”