



What I learned from [Dave Rumelhart](#) — the fundamentals of PDP:

Principles of Dave's Philosophy

— a personal view. Rough transcript of a contribution to the David Rumelhart Celebration held at Carnegie-Mellon University, October 15–17, 1999.

1. Simple, mathematical ideas can be spectacularly successful even in cognitive science.

As a recent refugee from physics, I early on found in Dave a crucial role model, much of his work demonstrating that the fundamental research method I had come to know and love in my physics training — mathematical-analysis-by-audacious-oversimplification — could yield tremendous results even in a field as ‘soft’, and as remote from physics, as cognitive science.

2. Just focus on the really deep problems.

A newcomer to cognitive science, I was paralyzed for a long time by the sheer depth and breadth of the mysterious unknown in this nascent field. Dave showed me that it was possible — at least for someone with *his* talent — to home in on the deepest and most general problems, ferociously cutting a path to the heart of difficult issues, sweeping aside in broad strokes myriad problems less critical for advancing our understanding.

3. In other's work, seek out the good — e.g., a good talk is one that gives you a good idea.

It happened over and over again. After a visitor's talk, people would stand around ‘discussing’ it: one by one, trashing, slashing, and bashing it. Until Dave spoke up. “Well, I thought it was really quite interesting ...” and he would proceed to pull out some truly insightful contribution, and leave us wondering how he managed to extract that from the talk we'd all heard. It didn't take long before Dave had forced upon me the realization that anyone can trash a research talk — it's shooting fish in a barrel. What takes training and skill is to extract the *good* in other's work, and put it to constructive use in your own work. And it doesn't matter much whether an insight was clearly present in someone's presentation: a talk that gives you a good idea is a talk of rare value.

4. It's possible to understand *both* equations and people.

Dave's rather shy style had me fooled for quite awhile. It was easy enough to take him for an egghead (all right, a *jock* egghead), a mathematician-type not exactly in his element in the world of real people. Dead wrong. Dave taught me almost as much about how people in cognitive science tick as he did about how cognitive science itself ticks — or ought to.

5. Profound differences divide the cognitive disciplines — e.g., “big theory” in linguistics vs. psychology

“You know, psychologists are mostly just experimentalists at heart. To them, a ‘theory’ is just an excuse to run more experiments.” “It’s important for you to keep in mind that while linguists have a penchant for ‘big theory’, psychologists are usually very skeptical about the existence of such theories of cognition: the mind is just too complicated.” For a novice, simple observations like these were truly eye-opening.

6. Linguists think backwards — e.g., learning methods can be *too powerful*

I remember Dave returning from a meeting at which he had encountered the force of nature known as Ken Wexler. “The skepticism about PDP didn’t surprise me at all. But I was amazed at the reason: it turns out that connectionist learning is just *too powerful*.” Dave was quite amused by this, of course, since he spent most of waking hours (and I’m not sure there were any other hours) trying to make connectionist learning powerful enough to do the cognitive work he needed it for. Dave helped me realize that linguists think very differently from the rest of humanity. I eventually learned to love the way linguists think, but before that could happen I had to realize that there was something majorly different there that needed to be understood.

7. One must often choose between being *right* and being *influential* — the high cost of taking positions that are not overly simplistic.

In my frustrations arguing cognitive architecture with philosophers over the years, Dave gave needed insight into one of the serious costs of complexity in one’s views. He observed that Dukakis never had a chance in a popular election against Reagan; it didn’t matter at all whether Dukakis’ positions were right or not: they were just too complicated to ever be popular. Of course, a talent such as Dave’s was able to craft elegant ideas that were not only powerful enough to be on the right track: they were simple enough to be influential. But in my case, when it comes to cognitive architecture, I’ve learned I have to settle for just being right.

8. When an analysis runs aground, keep on plugging — believe in your intuitions.

Dave’s tenacity with an idea was amazing. He’d come back to an idea every few years, trying again to make it do the work he *knew* it could do. One of the more dramatic cases was back-propagation, an idea he’d earlier put aside (a move Geoff Hinton took credit for at the Celebration), only to return triumphantly to it several years later.

9. A little encouragement from someone they respect can make a huge difference to younger colleagues.

No matter how absorbed Dave seemed to be in his current projects, he always found time to send a little e-mail message saying how much he enjoyed your presentation at the PDP group today. Who would have thought how much difference those few words always made. Later, at several times after leaving San Diego when I was seriously discouraged, Dave would send long, thoughtful messages of support that were invaluable in keeping me going.

10. [When you’re ready to quit your job immediately — remember:] You can blow off mundane responsibilities and the sky does not come crashing down on your head.

I don’t know how many times this cosmic fact has saved my sanity (ok, so maybe, saved my career). When I just can’t take the crap of academia another minute, I take a deep breath and say, “what would Dave do?” The answer is obvious from his priority ranking, which has been an inspiration to me for many years now.

Dave’s Academic Priorities

1. Ideas
2. Colleagues/students
3. Ideas

4. Ideas
5. Ideas
- ...
- ω. Crap

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