



Postdocs: What We Know and What We Would Like to Know

**Proceedings of an
NSF/CPST/Professional Societies Workshop
December 4, 2002**

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Postdocs: What We Know and What We Would Like to Know

**Proceedings of an
NSF/CPST/Professional Societies Workshop**

held

December 4, 2002

at the

**American Chemical Society
1155 16th St., NW
Washington, DC 20036**

Edited by:

Nathan E. Bell

About the Commission on Professionals in Science and Technology:

The Commission on Professionals in Science and Technology, founded in 1953 as the Scientific Manpower Commission, a participating organization of the American Association for the Advancement of Science, is a nonprofit corporation whose membership includes leading professional societies, corporations, institutions, and individuals concerned with advancing the public's understanding of professionals in science and technology, their roles, education, and employment.

The Commission is charged with collecting, analyzing, and disseminating reliable information about the human resources of the United States in the fields of science and technology; promotion of the best possible programs of education and training for potential scientists, engineers, and technicians; and the development of policies of utilization of scientific and technological human resources by educational institutions, industry and government for optimum benefit to the nation.

About the NSF/CPST/Professional Societies Workshops:

The NSF/CPST/Professional Societies Workshops were made possible with funding from the National Science Foundation, Division of Science Resources Statistics. The series of six workshops was designed to address topics of mutual interest to the National Science Foundation (NSF), the Commission on Professionals in Science and Technology (CPST), and the professional societies. All CPST members from industry, academia, and the professional societies, as well as NSF and CPST staff, were invited to participate.

The first workshop addressed the issue of women and minorities in science, engineering and technology; the second addressed NSF data sources and publications, as well as data needs of the professional societies; and the third focused on postdoctorates. A fourth workshop, on inter- and multi-disciplinary issues, is scheduled for April 23, 2003.

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INTRODUCTION:

The NSF/CPST/Professional Societies Workshops were made possible with funding from the National Science Foundation (NSF) Division of Science Resources Statistics (SRS). The series of six workshops was designed to address topics of mutual interest to the National Science Foundation, the Commission on Professionals in Science and Technology (CPST), and the professional societies. All CPST members from industry, academia, and the professional societies, as well as NSF and CPST staff, were invited to participate. The first workshop addressed the issue of women and minorities in science, engineering and technology. The second workshop, on *NSF Data Sources, Publications and Data Needs*, was held on August 28, 2002 at the National Science Foundation.

This third workshop addressed the issue of postdoctorates, focusing on what we know as well as what we would like to know about postdoctorates. These proceedings summarize that third workshop. A list of meeting attendees is included in **Appendix A** and a workshop agenda is included in **Appendix B**.

The workshop began with a presentation by Mark Regets of the National Science Foundation, who provided an overview of NSF data on postdocs. Maresi Nerad was also scheduled to speak during the opening session, but she was unable to attend the workshop. However, the presentation she had prepared is included in these proceedings. Presentations were also made by representatives of five professional societies (American Chemical Society, American Institute of Physics, American Mathematical Society, Federation of American Societies for Experimental Biology, and American Sociological Association) providing an overview of their data on postdocs in their respective fields. The morning session concluded with presentations by representatives from two federal agencies (National Institutes of Health and National Science Foundation) and the National Research Council on what information concerning postdocs they would like to know.

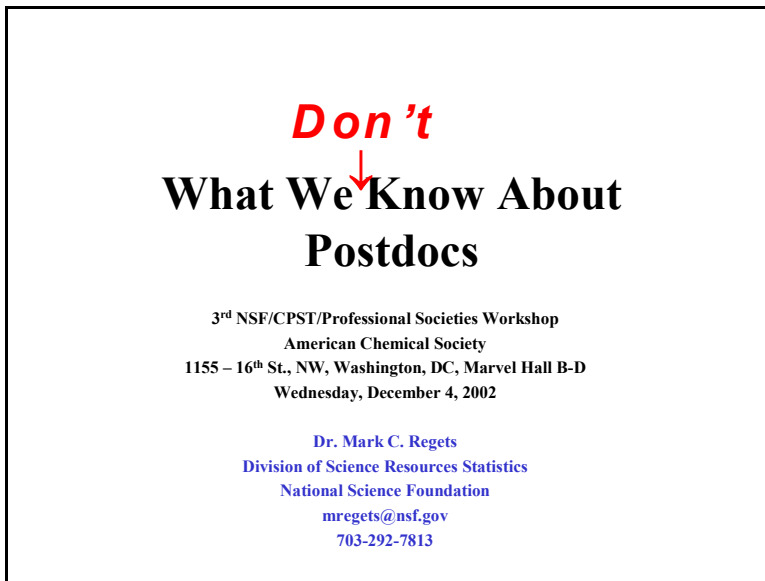
The afternoon began with a session on current initiatives under way. Crispin Taylor of the American Association for the Advancement of Science spoke about the Postdoc Network, Geoff Davis of Sigma Xi made a presentation on the recently-funded National Postdoc Survey, and Carol Manahan of Johns Hopkins University made a presentation on the recently-funded National Postdoctoral Association. The meeting concluded with a roundtable discussion and wrap-up on what further information on postdocs is needed.

Also included in these proceedings is a bibliography of postdoc resources. See **Appendix C**.

CPST would like to thank Lynda Carlson, SRS Division Director; Julia Oliver, NSF Program Officer; and the SRS staff for their assistance in preparing for this workshop. CPST would also like to thank Jean Parr and Mary Jordan of the American Chemical Society for hosting the workshop.

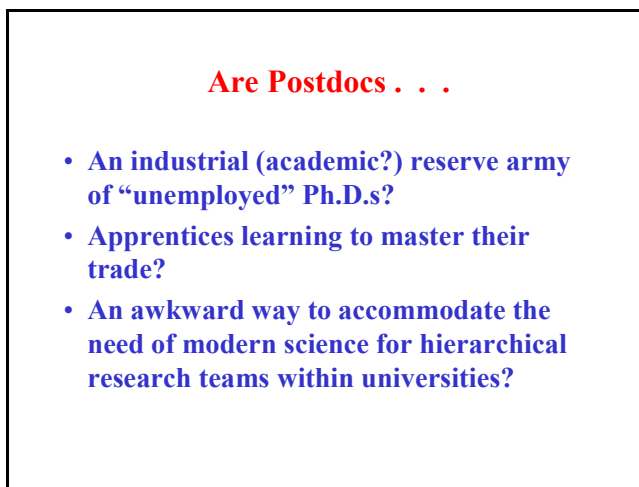
WHAT WE KNOW ABOUT POSTDOCS:

Presenter – Mark Regets, Senior Analyst, NSF Division of Science Resources Statistics



Most people have a good idea about what postdocs do, why they do it, what the implications are for society, and at least in passing, what the implications are for the postdoc. However, although everyone has such sure ideas as to what the answers to those questions are, those ideas are different from each other.

This presentation will provide data from some of the National Science Foundation surveys which gather information on postdocs, but first will explore what some of the discussions are.



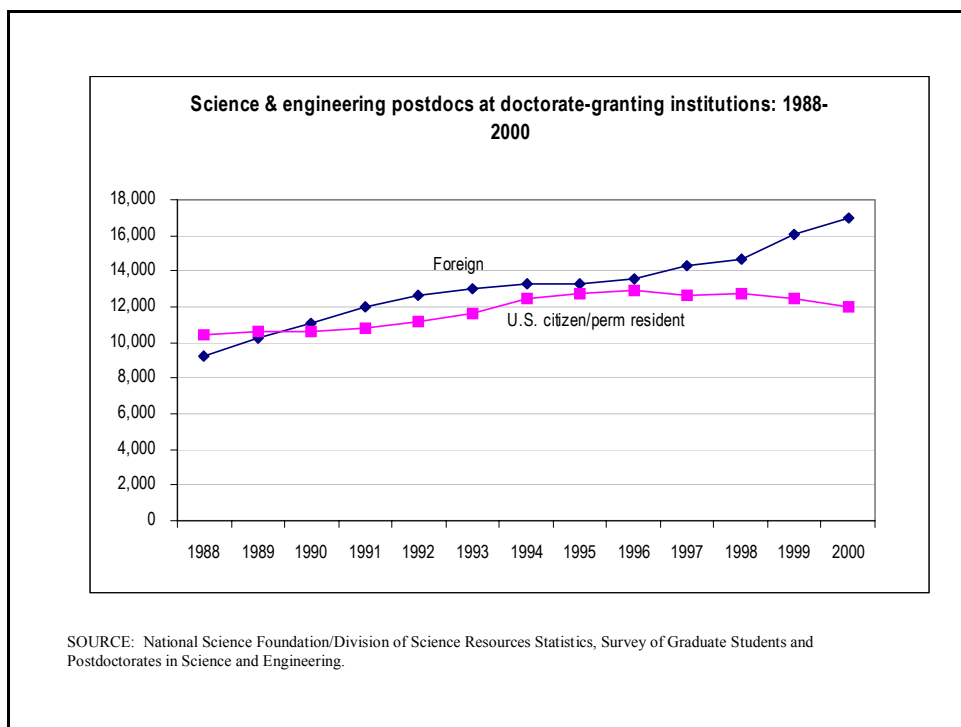
So what are postdocs? Are they an academic reserve army of unemployed PhDs? Are they just apprentices learning to master their trade, a trade that in many cases has become much more complex over the years, requiring more knowledge and practice? Has the nature of science changed in many fields? Are new, larger, hierarchical tools needed as an approach to do science? And is the proliferation of postdocs just a very awkward way for academia to fit this need into academic culture?

NSF Data Sources on Postdocs

- Survey of Graduate Students and Postdoctorates in Science and Engineering
 - Survey of graduate departments
 - Only source of data on foreign degree postdocs
 - No individual level data
 - Misses postdocs not in academic departments

One of the primary NSF data sources on postdocs is the Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS). Joan Burrelli is the director of that survey. The GSS is a survey of graduate departments which provides counts of people in various categories for both graduate students and postdocs by some basic characteristics. This is NSF's only source of data on foreign-degreed postdocs, because those individuals do not show up in other NSF studies.

The main weakness of the GSS is that there are no individual-level data, just data at the department level. The GSS also misses postdocs who are not in formal academic departments. The GSS also does not include any nonprofit institutions, government agencies, or postdocs in industry. It does however capture postdocs in medical schools and Federally Funded Research and Development Centers (FFRDCs).



The GSS is the only source of data on foreign degreed postdocs, and the graph above gives you some idea as to why that is important. Much of the growth over the past 12 years has been in foreign

postdocs. In these data, from the GSS, the non-citizen postdocs include those with degrees from U.S. institutions, but from comparing counts of this data with other data sources, the bulk of non-citizen postdocs are actually people with foreign doctorates who are coming to the U.S. to do a postdoc. Within the academic departments, there has actually been a decline in the number of U.S. citizen and permanent resident postdocs since about the mid-1990s.

NSF Data Sources on Postdocs

- Survey of Doctorate Recipients
 - Longitudinal individual data on individuals with Ph.D.s earned from U.S. schools who are resident in the United States
 - Detailed demographic, labor market, and educational information
 - No data on foreign earned doctorates

The other primary data source on postdocs is the Survey of Doctorate Recipients (SDR). The SDR is a sample survey of individuals who earned a doctorate from a U.S. institution. The survey follows them through age 75. It is a longitudinal survey, tracking individuals over time to find out about their career changes, the consequences of their actions, etc. It contains very detailed demographic information on the individual, the labor market, and educational histories. For the study of postdocs, the major weakness of the SDR is that it does not include data on foreign-earned degrees. As mentioned earlier, the GSS is the only source for that data. The SDR also does not include data on any U.S.-earned degree holders who go abroad for a postdoc. The SDR, like all of the NSF demographic surveys in the SESTAT database, is limited to people resident in the United States.

Data tell us that about 20% of those who take a postdoc do so primarily because no other job was available. That leaves 80% who take a postdoc for traditional reasons, such as more training in their field, or to learn a new specialty. It should be mentioned that if people are given the option of a very acceptable answer, such as doing it for more training or doing it to advance their career, and another answer that might perhaps be a little bit more embarrassing, they very often will gravitate towards the more conventional answer. So while 20% does suggest that people are taking postdocs for the other 80% of the reasons, 20% is still a high number, one that goes up in certain fields when labor market conditions are worse. It is also much higher for those individuals who have been in a postdoc for many years.

Implications of Growth of Postdocs

- **Earlier chance for independent research? (Europe)**
- **Delay the age of independence? (U.S.)**

- **Waste of human capital?**
- **Last chance to add to sum of human knowledge?**

- **A way to select the best of the best?**
- **A way to drive people out of science?**

Another area where people have different ideas concerns the implications of the growth of postdocs as part of a standard career path in science. A recent conference in Europe discussed the U.S. example where postdocs permit people to do research when they are much younger than they would be in Europe. At this conference, they talked about creating more postdocs in Europe in order to give people a chance to do independent research at a younger age. In the United States though, some people talk about a negative of the postdoc being that it delays the age of independence, i.e. the age at which a person can become an independent researcher.

Science though is done differently in different fields, in different labs, and in different places. There clearly are postdocs who appear to be doing very independent work with only some supervision and collaboration. There are other postdocs who claim to be spending too much time washing bottles. The role of the postdoc can be a very different thing in different places.

Is it a waste of human capital? In the washing bottles case, the argument is it would be cheaper to hire someone else to wash the bottles. In other cases, people emphasize that it is a last chance to do basic research before going on to some other field.

One thing to keep in mind in looking at career paths in science is that most PhDs do not end up in tenure-track positions in research universities. That is true in every field. In some fields, about 50% of PhDs end up in tenure-track positions at four-year institutions, but if you restrict it to the research universities, the percentages go down very fast. Most people use their degrees, and use them in ways that are very closely related to their degrees, but the path is not always to tenure-track at a Research I.

There is also a dispute over the effects of the postdoctoral experience. Is it a way to select the best of the best? Is it just something which drives people out of science? Or is it perhaps a little bit of both? The best of the best argument is particularly applicable for postdocs in industry, in that postdoctoral appointments allow industry the opportunity to observe the postdoc and decide whether they would want the postdoc as a permanent employee.

Postdocs in academia have more opportunity to publish and more opportunity to be observed and make contacts. When they eventually try for some other type of job, the academic institution has much more information about the postdoc than they would just after the individual came out of graduate school. At the same time, postdocs have made a very prolonged investment, particularly in terms of the opportunity costs of wages to be in graduate school in the first place. Continuing as a postdoc, there can be very high opportunity costs as well.

Incidence and Length of Postdocs: Selected High-Postdoc Fields: 1995

		Year of Degree					
		Before 1965	1965-1974	1975-1984	1985-1988	1989-1991	1992-1994
Biological Sciences	% Ever in Postdoc	39.9	51.2	66.3	71.8	71.5	71.0
	Months in Postdocs	24	28	38	45	46	23
Physics	% Ever in Postdoc	29.3	44.4	52.7	59.0	68.1	72.9
	Months in Postdocs	23	24	25	32	34	23
Chemistry	% Ever in Postdoc	30.5	50.6	46.1	55.2	57.7	63.0
	Months in Postdocs	16	23	22	24	22	19
Geoscience	% Ever in Postdoc	15.3	21.4	37.3	40.0	52.3	48.5
	Months in Postdocs	14	12	16	19	23	17
Agricultural Science	% Ever in Postdoc	14.0	19.2	27.6	35.0	43.9	43.9
	Months in Postdocs	12	25	25	22	20	20
Psychology	% Ever in Postdoc	22.5	21.3	25.3	27.3	23.6	31.8
	Months in Postdocs	19	13	20	16	15	12
All S&E Fields	% Ever in Postdoc	25.0	29.2	34.0	36.3	37.9	41.3
	Months in Postdocs	20	23	26	29	29	18

Source: NSF's 1995 Survey of Doctorate Recipients, Postdoc History Module

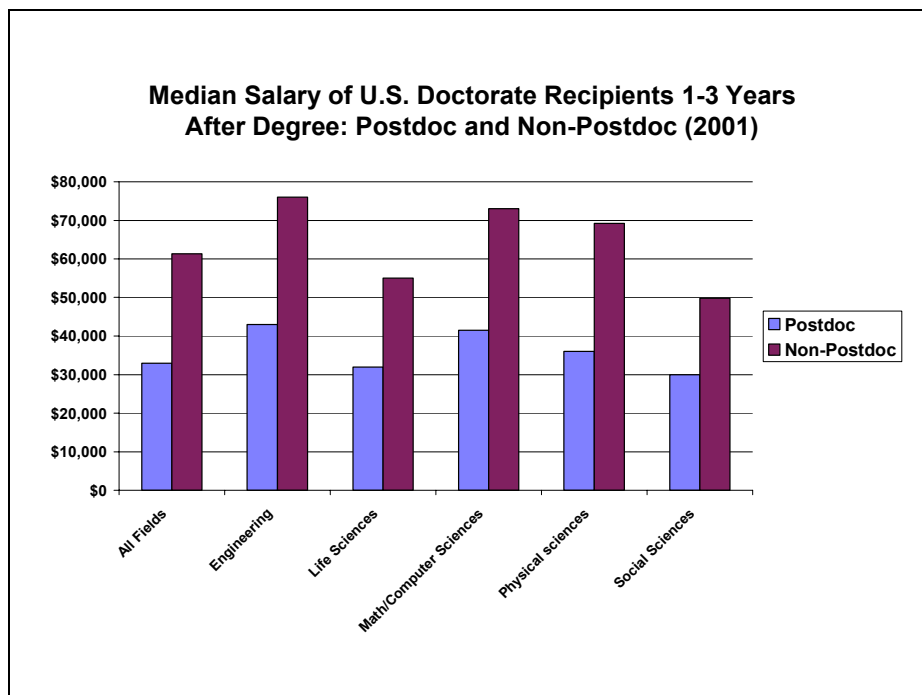
Note: Months in postdocs is the median of the sum of the lengths of each reported postdoc experience for those who reported having had a postdoc.

In 1995, NSF did a postdoc history module as part of the Survey of Doctorate Recipients. A history of postdoc experiences was captured for everyone in the survey up to age 75. The survey captured how long they were in each postdoc, where the postdoc was, when the postdoc started and ended, etc.

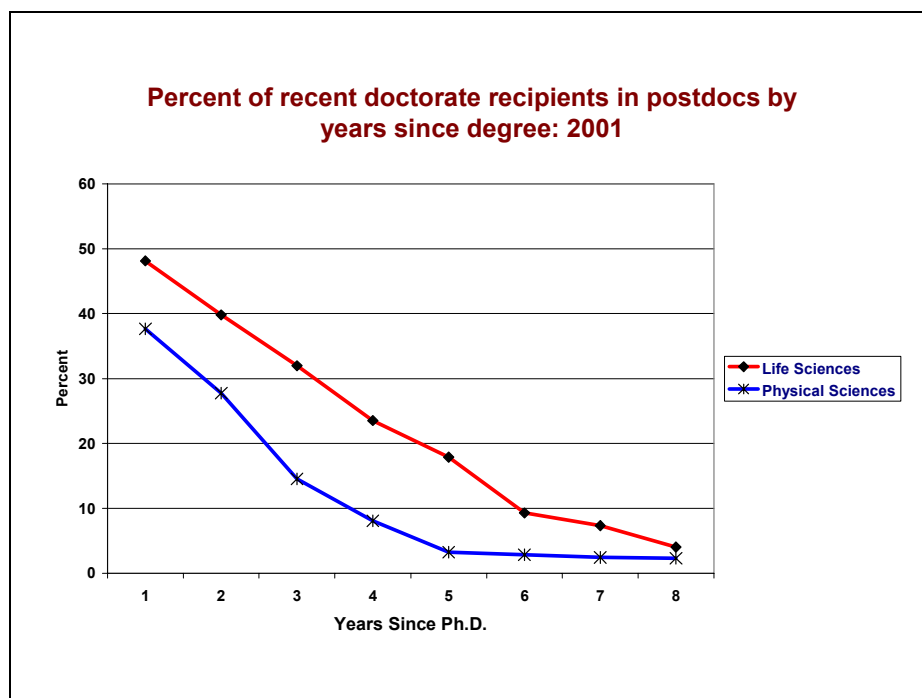
In biology, the survey found a striking increase in the percentage of people having at least one postdoc experience. For the prior to 1965 graduation cohort, about 40% of biology PhDs were going to postdocs. By the 1989-1991 cohort, that had risen to 71.5%. At the same time in biology, the median number of months spent in a postdoc increased. For the prior to 1965 cohort, among those who did a postdoc, the median number of months spent in a postdoc was 24 months. The median number of months in a postdoc increased gradually to 46 months as an average in biology for the 1989-1991 cohort. Although the table shows that the 1992-1994 cohort spent less time in a postdoc, they were still in postdocs at the time of the survey.

In physics, there was a similar scenario, with the percentage of people having at least one postdoc experience going from about 30% for the before 1965 cohort to nearly 70% for the 1989-1991 cohort. But in physics, there was a much smaller increase in the length of postdoc. It went from about two years to a little under three years during that same time period.

In geoscience, agricultural science, psychology, and chemistry, the proportion of people taking postdocs went up, but not as aggressively as in the life sciences. There also was much less of an increase in the average length of the postdoc.

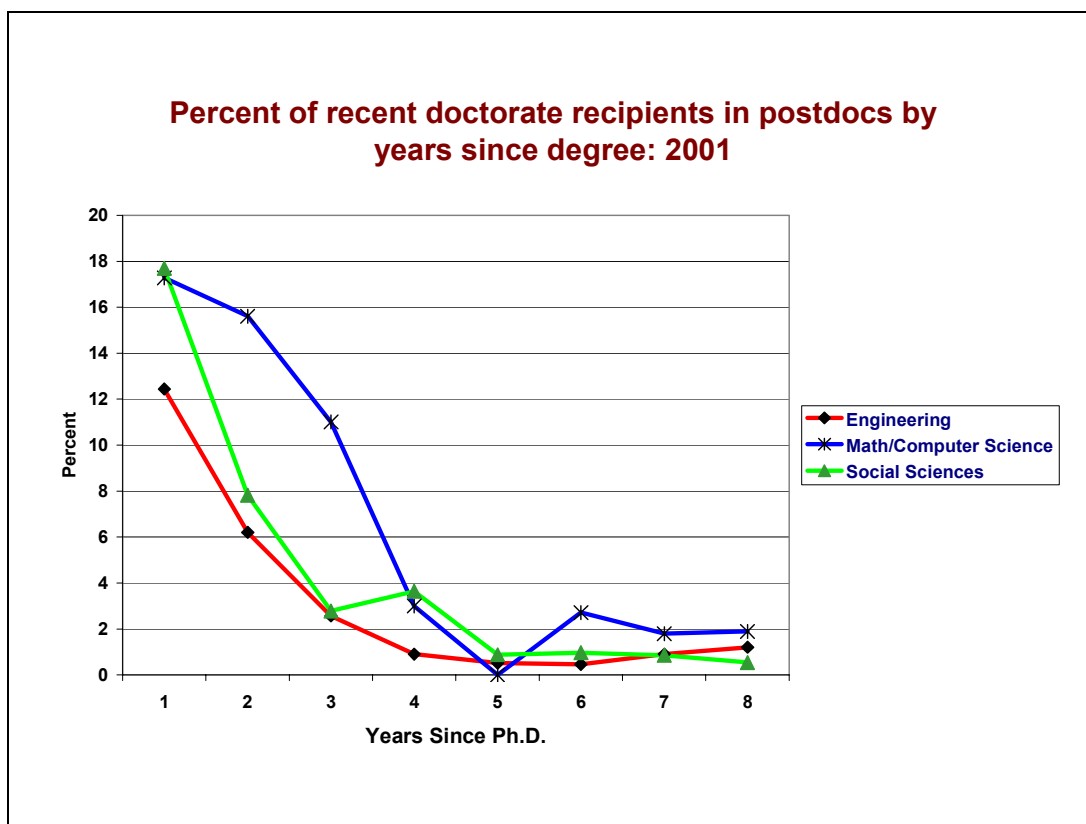


The chart above is a comparison of salaries for recent U.S. doctorate recipients, one to three years after degree, for postdocs and non-postdocs. It includes recent PhDs employed in all sectors, including academia and industry. The median salary across all fields for postdocs is \$33,000 versus, about \$62,000 for non-postdocs. Fields such as engineering and math/computer science have somewhat higher postdoc salaries, into the low \$40,000s, while median salaries in the social sciences are the lowest at \$30,000. It should be mentioned that \$33,000 is almost exactly the median salary for all workers in the United States, so in some ways, it is a living wage. But the opportunity cost is huge when you consider what people could be earning otherwise.

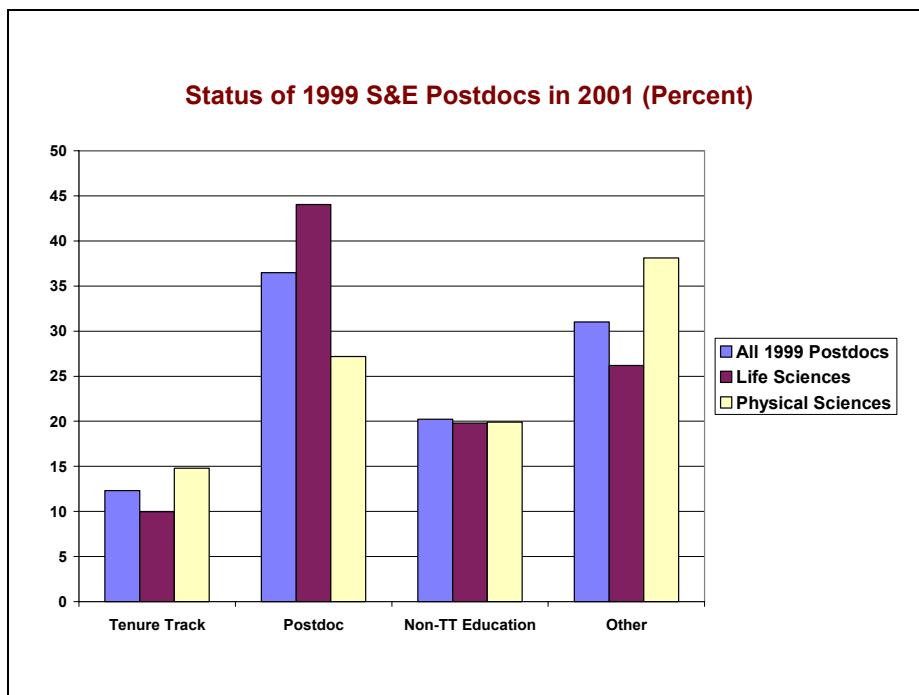


Life sciences and physical sciences are the two broad fields with the most postdocs. Even in the life sciences – which includes fields such as agriculture which has fewer postdocs – less than 50% of recent doctorate recipients are in postdocs even in the first year after their degree as seen in the preceding graph. Looking at all science and engineering PhDs, about 30% are in postdocs in their first year after their degree.

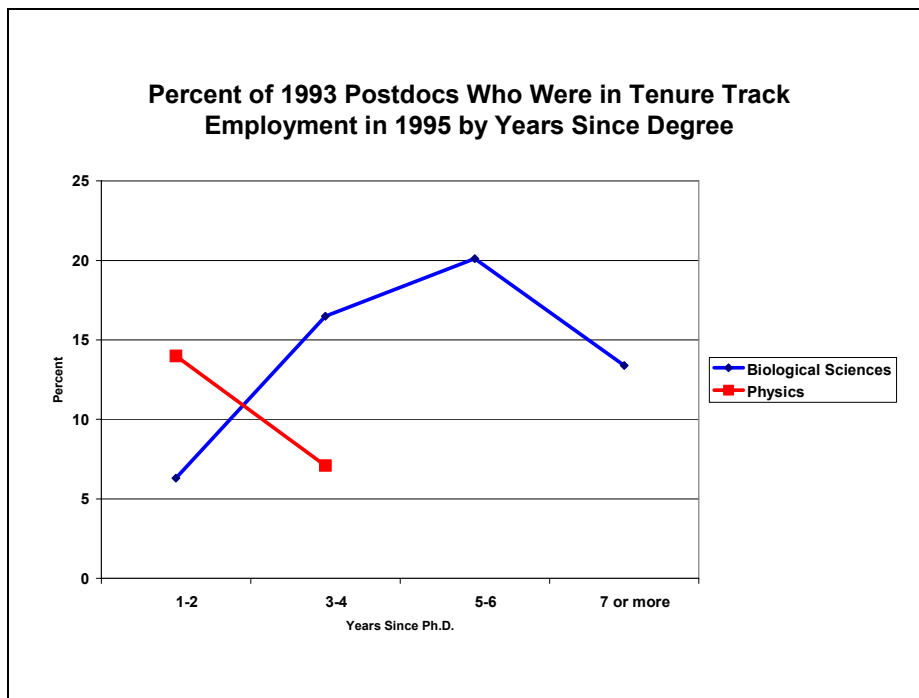
In the physical sciences, the numbers in postdocs declines fairly rapidly by number of years since PhD. In the life sciences, the number of people in postdocs even four or five years after their degree is quite substantial. This is a cross-sectional analysis. It is not a projection of any one person. It is the percentage of people in a postdoc within a given number of years since they received their PhD. Some of the people in a postdoc in year three may well have not been in one the previous year, since some people do postdocs fairly late in their career for various reasons.



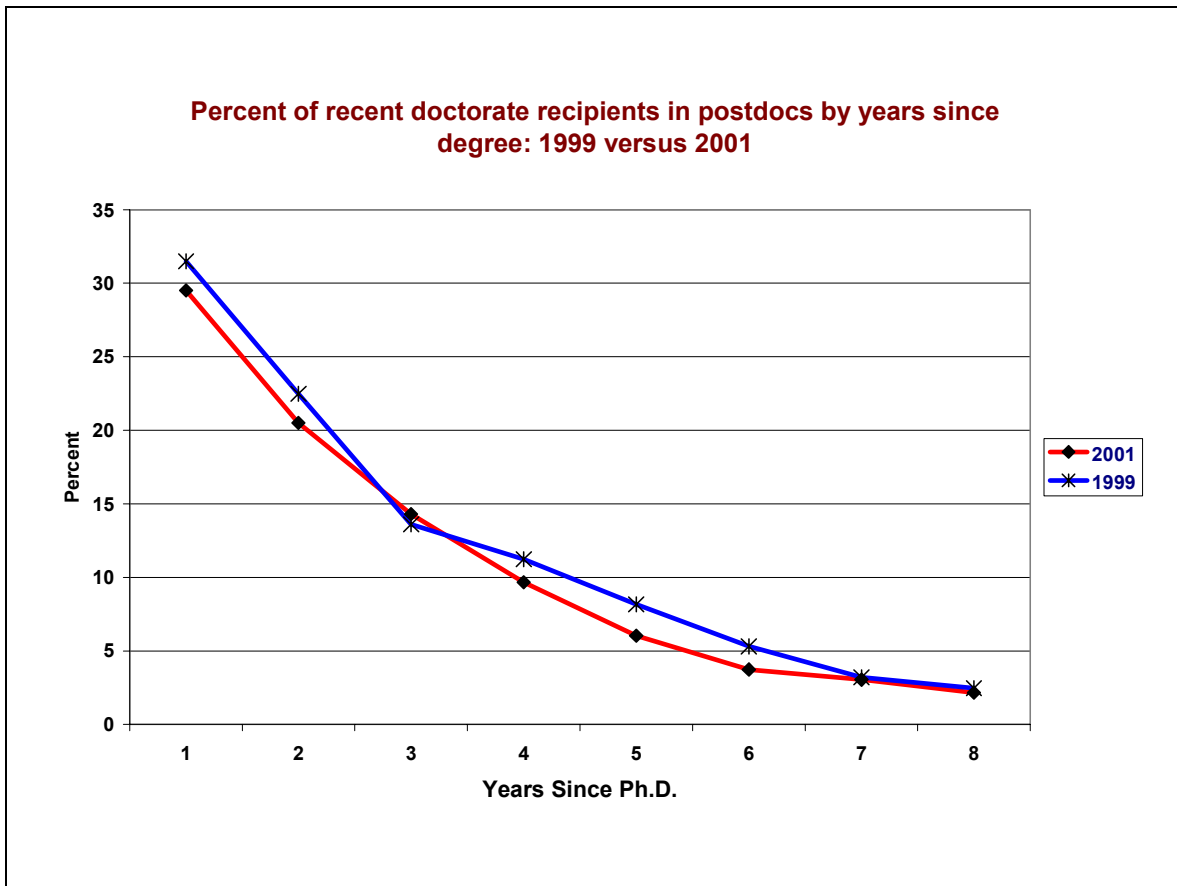
While there has been a big increase in postdocs in the traditional postdoc fields such as biology and physics, there has also been an increase in postdocs in economics, sociology, and mathematics and many other areas. The graph above illustrates that 18% of social scientists are going to a postdoc in their first year after receiving their PhD. This would have been unheard of in the past. In percentage terms, there has been a much more rapid increase in the use of postdocs in the non-traditional areas, but at the same time, those postdocs are early in their career and the percentage in the postdoc falls much more rapidly, even more rapidly than in the physical sciences.



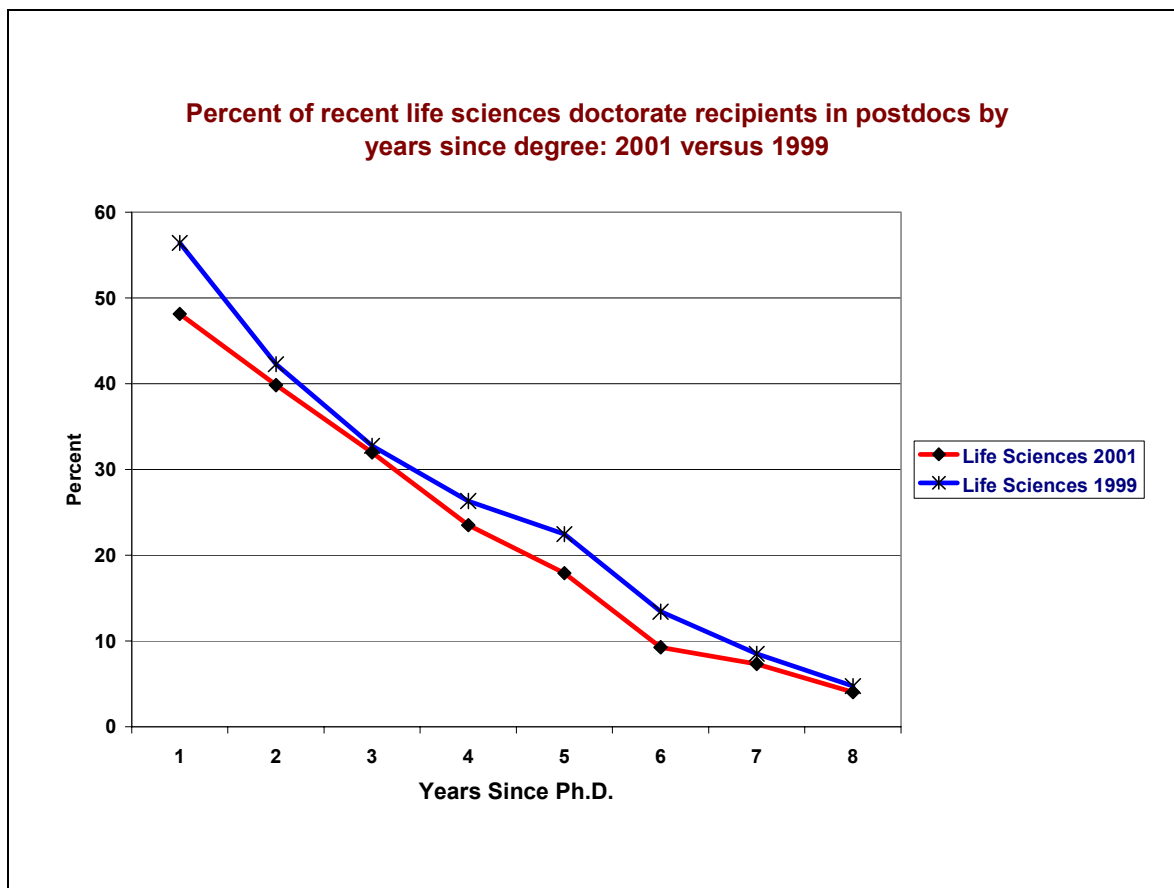
Because this is a longitudinal survey, one can look at the people who were in a postdoc status on one survey and see what happened to them two years later. Looking at the 2001 SDR to see what happened to the 1999 postdocs, one can see that a very small percentage went to tenure-track employment at any four-year institution. A larger proportion stayed in postdocs. About 20% went to some type of non-tenure-track position at an educational institution, and about 30% went into other nonprofit and for-profit institutions after their postdoc. And what is the purpose of the postdoc? Some people say that it is to help prepare postdocs for an academic career, but as seen in the graph above, that is not the transition that occurs in a given year.



The preceding graph looks at the percentage of 1993 postdocs who were able to transition to tenure-track employment by 1995. For physics, the percentage transitioning to tenure-track drops very rapidly the longer the postdoc is from their time of degree, suggesting that the longer they are in postdoc positions, the more it starts to become a negative signal for academia. In biological sciences, however, the probability of transitioning to tenure-track increases all the way to 20% five to six years after graduation. Only after that does the probability of transitioning to a tenure-track job drop. So different institutional cultures and different expectations as to what comprises a normal postdoc period lead to very different types of career paths in the two fields.



Finally, comparing the 1999 and the 2001 Surveys of Doctorate Recipients, there has been a slight decline in the propensity of people to go to a postdoc, as shown above.



As seen above, the decline in the propensity of people to go to a postdoc is particularly visible in biology.

Interestingly, U.S. native born PhDs had exactly the same propensity to be in a postdoc in their first three years out in 2001, as they did in 1999. Overall, about 20% of U.S. native born citizens went into postdocs for both 1999 and 2001. All of the change seen in 2001 comes from differences in the foreign born in each visa category, including naturalized citizens.

WHAT WE KNOW ABOUT POSTDOCS:

Presenter – Maresi Nerad, University of Washington

We have all heard stories about postdoctoral fellows prolonging their stays in temporary positions to assemble that last publication thought to be necessary to compete for a faculty position. Also, popular in recent years have been stories of disappointed postdocs who were unable to find permanent academic research jobs. Despite these stories, no recent comprehensive study on postdoctoral appointees and their experiences is available, given that the last national postdoc survey was published nearly 20 years ago.¹ Rectifying this situation was one of the goals of the *Ph.D.s—Ten Years Later* study, which collected data on the career paths of doctoral recipients in biochemistry, computer science, electrical engineering, English, mathematics, and political science including the role of postdoctoral appointments.

Addressing matters related to the educational and training environment of postdocs is a task complicated by the fact that few universities have a central authority overseeing conditions of postdoctoral appointments, such as duration, salary structure, benefits, and placement services. Although in recent years a number of universities paid more attention to postdocs, still few can provide a truly accurate count of the number of postdoctoral fellows on campus. These deficiencies exist due to the lack of a consistent definition among hiring units of what constitutes a postdoc, and because postdocs are compensated and/or recorded in several different ways—some are paid as university employees; some are paid through an entirely separate stipend account; and others are paid directly by foundations and foreign governments.

Absent from many of the recent stories and reports are empirical facts and an understanding of the different nature of postdoctoral appointments in the various science and engineering disciplines, as well as an understanding of the people who become postdoctoral fellows and why they do so. Does every life and physical science PhD recipient choose a postdoctoral appointment? How long do they work in postdoctoral positions and how many positions do they hold? What happens after they complete the postdoc? How do they go about searching for more permanent employment? What are their career outcomes? What effect does the postdoc have on women and men, minority and international PhD recipients? The absence of such essential information leaves a number of our present doctoral students confused about their career decisions and many universities slow to engage with their postdoctoral community. The findings of the *Ph.D.s—Ten Years Later* study answer these questions, thus providing information for present doctoral students and postdoctoral appointees.

Ph.D.s—Ten Years Later is a national study of the career paths of doctorates involving almost 6,000 PhD recipients from six disciplines (biochemistry, computer science, electrical engineering, English, mathematics, and political science) from 61 doctoral-granting institutions across the United States. The Mellon Foundation funded the study and selected analysis was funded by the National Science Foundation. The survey population accounted for 57% of the PhDs awarded at all U.S. institutions in the six selected disciplines between July 1, 1982 and June 30, 1985. The study had a total response rate of 66% from domestic Ph.D. recipients (U.S. citizens and permanent residents) and a 52% response rate from international PhD recipients (temporary visa holders at the time of their doctorate completion), as seen in the accompanying chart on the following page. The number of minority respondents was too small for a meaningful analysis.

¹ Zumeta, William, *Extending the Educational Ladder. The Changing Quality and Value of Postdoctoral Study*. Lexington Books, D.C. Heath and Company: Lexington, Massachusetts. 1984; See also earlier studies: National Research Council, *Postdoctoral Appointments and Disappointments*. National Academy Press, Washington, D.C. 1981; National Research Council, *The Invisible University: Postdoctoral Education in the U.S.* National Academy of Sciences: Washington, D.C. 1969.

PhD Recipients in 6 Fields at 61 Universities: July 1, 1982-June 30, 1985 <i>Size of Surveyed Population and Response Rates</i>						
Major Field	Men	Women	International	Total	% Response Rate	
					Domestic	International
Biochemistry	694	268	97	962	70	50
Computer Science	583	69	209	652	65	51
Electrical Engineering	966	36	417	1,002	57	48
English	567	650	72	1,217	67	65
Mathematics	1,005	187	395	1,192	67	57
Political Science	630	199	144	829	68	47
Total	4,445	1,409	1,334	5,854*	66	52


* Excluded :- deceased (63)

Data as of August 6, 1999
 Source: "PhD's--Ten Years Later" Study, Graduate Division, UC Berkeley

The study consisted of a 22-page survey, mailed at the end of 1996 and early 1997, and individual in-depth interviews. The study's questionnaire focused on the employment history of the participating doctoral recipients. It asked whether they took a postdoctoral position, and, if so, how many and how long; it inquired about their job-search process and the factors influencing their decision to accept their first and current positions; it asked for a retrospective evaluation of their doctoral programs and whether they have found the doctoral degree useful; and it requested information on spouses and children. There were also five open-ended questions. In addition to the survey, in-depth interviews were conducted with 56 people—about 8-10 from each discipline—to provide the context in which individuals make career decisions.

Taking a closer look at the variability of postdoctoral appointments by field, we see that the majority of biochemists (86%) undertook a postdoc for an average of nearly four years, as seen in the chart on the following page. About one third of all mathematicians (31%) were holding postdoctoral positions for an average of 2.5 years. Fewer than 10% of computer scientists (7%) and electrical engineers (9%) opted for postdoctoral positions following their PhD. And, unlike their biochemist and mathematician counterparts, they stayed in these postdoc positions on average for only 1.6 years. Similarly, few political scientists and English PhD recipients pursued postdocs (9% and 8%, respectively), and if they did, they left these positions between 1.5 and 2 years.

Postdoctoral Appointments by Field



Major Field	Doing Postdoc %	Mean Years
Biochemistry	86	3.8
Computer Science	7	1.6
Electrical Engineering	9	1.6
English	8	2.0
Mathematics	31	2.5
Political Science	9	1.5

Data as of August 6, 1999
Source: "PhD's--Ten Years Later" Study, Graduate Division, UC Berkeley

There exists an informal ranking of postdoctoral appointments that places portable appointments sponsored by NIH or NSF as the most prestigious, followed by university-sponsored appointments, followed by appointments funded by faculty grants. In mathematics an additional prestigious postdoctoral appointment is one undertaken in one of the few international mathematics institutes. The majority of biochemistry postdocs had a faculty-specific postdoctoral appointment. The majority of postdoctoral appointments in mathematics however, were university-specific. Appointees were, therefore, employed by the department rather than by an individual faculty member. In both fields, an equal small proportion (12%) held prestigious portable postdocs. This was true for the women in both fields as well as seen below.

Type of First Postdoctoral Appointment by Gender

	Biochemistry		Mathematics	
	♂	♀	♂	♀
Portable	12%	12%	12%	11%
University Specific	25%	20%	81%	67%
Faculty Specific	63%	68%	7%	22%

Clearly in biochemistry, taking a postdoctoral position has become the norm, the next necessary step after completion of the doctorate, as seen in the table below. It is the postdoctoral appointment(s), not the PhD, that is the general proving ground for academic excellence, scientific entrepreneurship, and ultimate independence. Given that the vast majority of biochemists undertake a postdoc, the mere completion of postdoctoral training in biochemistry was not an advantage when our respondents competed for a faculty position. The three most important factors for increasing the likelihood of securing a faculty position were (1) to obtain the PhD at a top-ranked research university; (2) to undertake the postdoctoral training at a laboratory with a national reputation; and (3) to have received one of the national prestigious (portable) postdoctoral fellowships from NIH or NSF as 12% of the biochemistry respondents did.

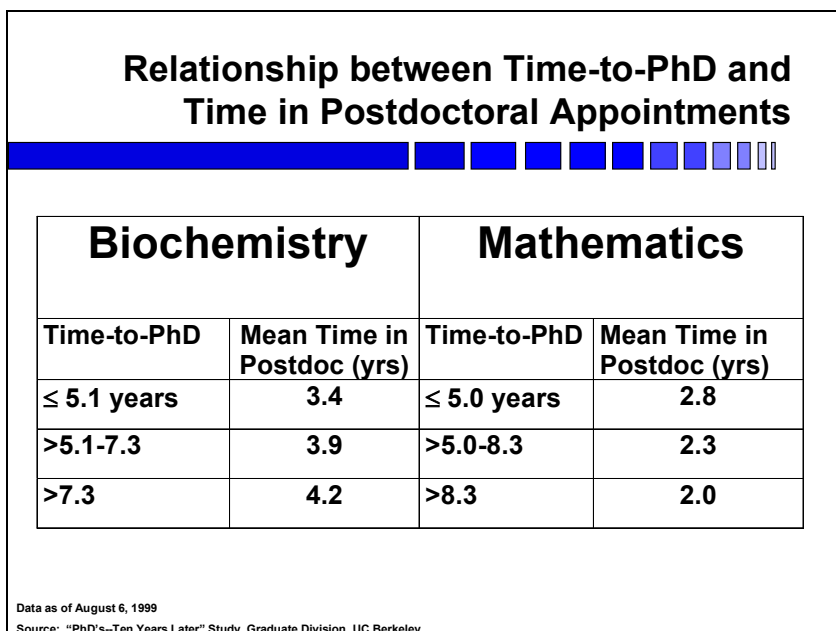
Number of Postdoctoral Positions and Average Total Time in Postdoctoral Positions				
Postdoctoral Appointments	Biochemistry		Mathematics	
	86% of PhDs do Postdocs	Mean Total Time (yrs) in Postdocs	31% of PhDs do Postdocs	Mean Total Time (yrs) in Postdocs
One Only	60%	3.0	60%	1.8
Two	31%	4.5	29%	3.1
Three	7%	6.9	8%	4.7
Four	1%	8.5	3%	3.8
Five	1%	-	None	-
	N=564		N=234	

Data as of August 6, 1999
Source: "PhD's--Ten Years Later" Study, Graduate Division, UC Berkeley

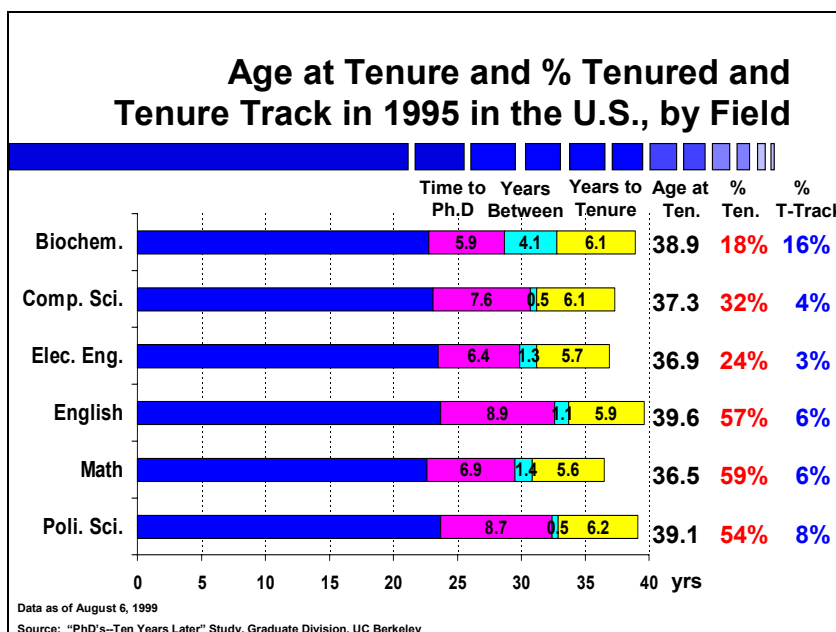
In contrast to biochemistry postdoctoral appointments, a postdoctoral appointment in mathematics seems to be a much-sought-after prize because fewer are available. Only one third of mathematics PhD recipients spent time in postdoctoral training. And, unlike biochemistry doctorates, 20% of mathematics PhD recipients spent some of their postdoctoral period abroad (domestic 14%, international 36%). The time invested in a postdoc significantly improved the possibility of gaining a faculty position at a research university, particularly if the mathematician had been among the 12% who received an NSF fellowship or had spent a year at one of the few internationally renowned mathematics institutes. However, this advantage was true only for men. The other positive outcome for mathematics PhDs is that time spent in a postdoctoral position in mathematics, often called a visiting assistant professorship, seems to count on the tenure clock, which is not true in biochemistry.

We found that the same percentage (60%) of biochemists and mathematicians took only one postdoctoral appointment. With those who sought two or three postdoctoral appointments, the percentage for biochemists and mathematicians remained similar (31% and 29% for two positions, and 7% and 8% for three positions, respectively). Not surprisingly, the greater number of postdoctoral appointments undertaken resulted in a greater number of years spent in postdoctoral positions. These years are marked by relative low pay, limited benefits, lack of permanent employment, and an unknown future. Therefore, for many postdoctoral appointees, particularly those with families, the postdoctoral years can end up being stressful.

Biochemists who completed their doctorates in five or fewer years spent less time in postdoctoral appointments as seen in the table below. The length of time spent in postdoctoral training did not seem to be a factor considered in the decision to appoint a postdoc to a faculty position in general. However, if the postdoctoral period was five years or less, those who became faculty did so at top doctoral institutions.



Biochemists, who on average completed their doctorates in six years, remained the longest in postdoctoral positions as compared to other science and engineering fields, as seen below. Predictably, biochemists contained the smallest proportion of those who were tenured 10 to 13 years after completing the PhD, making them the oldest at the time they received tenure. In fields such as biochemistry, it is not the time that it takes to complete the doctoral degree that we need to be concerned about, but the time taken to the first non-postdoctoral position.



Holding a postdoctoral position is not a standard component of an academic career in English, nevertheless, a small percentage (8%) of English respondents used this kind of position to stay in the academic “game.” Those who assumed a postdoctoral position moved in a much higher proportion (73%) to tenured or tenure-track faculty positions in 1995 than those who did not. Nonetheless, they tended to view postdoctoral appointments as another kind of “holding pattern.” Contrary to the expectation that English PhD recipients might choose a postdoctoral position in order to revise their dissertations, when asked to specify why they chose such an appointment, most respondents indicated that it was “the only acceptable employment” or a “necessary step.” While this holding pattern seems advantageous for those whose goal was a tenure-track position, the average 2.0 years spent in postdoctoral appointments did not seem to be reflected in shorter time to tenure.

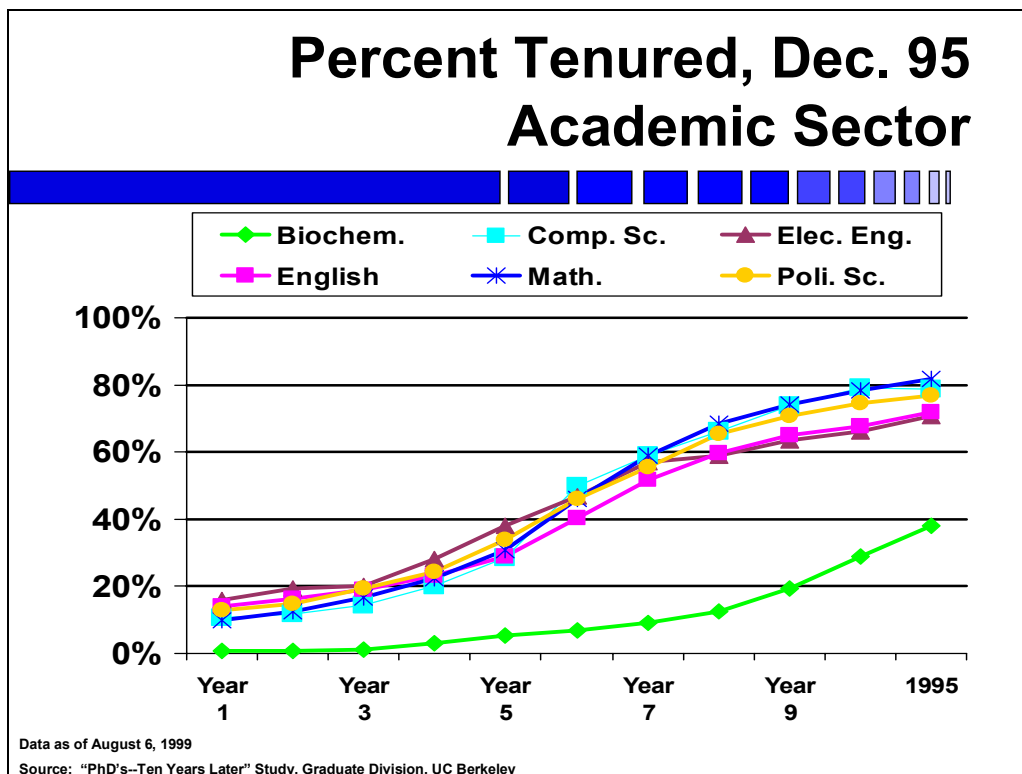
A large majority in all fields undertook postdoctoral appointments in university settings, as seen below. However, those who held more than one postdoc shifted away from university postdoctoral appointments. This move to postdoctoral appointments in non-academic research centers indicates a migration away from the university as a site of employment.

First and Last Postdoctoral Settings				
	Biochemistry		Mathematics	
	First	Last	First	Last
University	82%	74%	92%	85%
National Lab	3%	4%	3%	6%
Government Agency	5%	7%	2%	1%
Non-Profit Org.	7%	7%	2%	3%
Industry	3%	7%	(1)	4%

Note: “Other” type of employment is not shown in this table:
1% of Biochemistry Last Postdocs and 1% of Mathematics
First and Last Postdocs are categorized as such.

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The study found that ten years after degree completion (1995) the discipline that moved faculty from tenure track to tenured positions the quickest was mathematics, as seen on the following page. There are many factors that impact the relatively short tenure clock in mathematics, not just postdoctoral appointments. A full analysis of tenure achievement in mathematics is beyond the scope of this presentation.



By 1995, about half of all PhD biochemists who had held postdocs (49%) were employed in the business, government, or non-profit (BGN) sectors, and the other half (51%) worked in various jobs within academe, with 34% holding a tenured or tenure-track faculty position. Not surprisingly, biochemists outside academia earned almost \$22,000 more in median annual total salary (including consulting, overtime, summer research or teaching, and other income sources) than those employed within the U.S. in the academic sector (\$57,000).

Employment 1995 by Postdoctoral History and Gender

	Biochemistry				Mathematics			
	Postdoc		No Postdoc		Postdoc		No Postdoc	
Employment 1995	♂ N=376	♀ N=143	♂ N=63	♀ N=20	♂ N=180	♀ N=37	♂ N=395	♀ N=85
Tenured Faculty	20%	18%	21%	(2)	75%	46%	56%	54%
Tenure-Track Faculty	15%	16%	16%	(5)	9%	(2)	6%	5%
Academic Researcher	3%	8%	(2)	-	1%	-	2%	4%
Academic Other	9%	17%	(4)	(5)	3%	(5)	5%	3%
BGN* Researcher	35%	23%	32%	(2)	5%	30%	21%	18%
BGN Manager /Executive	12%	13%	13%	(2)	4%	(1)	5%	8%
BGN Other	6%	4%	(4)	(3)	2%	(1)	3%	8%
Both Acad. and BGN	(1)	1%	(2)	(1)	1%	-	2%	-

Data as of August 6, 1999
Source: "PhD's--Ten Years Later" Study, Graduate Division, UC Berkeley

* B = Business
G = Government
N = Non-profits

On average, the biochemists employed in 1995 in the academic sector had spent seven months longer in postdoctoral appointments than the 3.5 years of those employed in the BGN sectors. The length of time spent in postdoctoral training did not appear to be a factor in the decision to appoint a postdoc to a faculty position. However, if the postdoctoral period was five years or shorter, those who were hired into the faculty had a better chance to be appointed to a position at one of the top quarter² of doctoral programs. Individuals who received one of the national, prestigious (portable) postdoctoral fellowships from NIH or NSF, as did 12% of the first time biochemistry postdocs, were at an advantage when competing for faculty positions at the top quarter ranked doctoral programs.

For women the motivation to enter postdoctoral positions was often connected to the desire to live in the same location as the “significant other,” and to combine family and career. Sixty-one percent of the women in the survey were married to a spouse having a PhD, a JD, or an MD, but only 27% of the men in the survey had a spouse with such degrees. One consequence of this marriage pattern is that in order for couples to live in the same geographic area, one of them must often accept non-tenure track employment.

For a number of women in mathematics who did postdoctoral training in the hope of becoming a professor, the hope was unrealized. Unlike married men in mathematics who held postdoctoral positions, women who were married at PhD completion and spent time in postdoctoral training mostly ended up in research positions outside academe, rather than occupying a faculty position as was their goal, as seen in the following table.

Family, Postdoctoral Appointments and Career								
Did Postdocs	Biochemistry				Mathematics			
	Married at PhD		Not Married		Married at PhD		Not Married	
	♂	♀	♂	♀	♂	♀	♂	♀
Goal at End of Ph.D.	N=182	N=77	N=192	N=73	N=66	N=20	N=119	N=15
Wanted to Become a Professor	37%	26%	35%	32%	70%	55%	58%	40%
First Employment after Postdoc*	N=184	N=79	N=201	N=76	N=69	N=21	N=113	N=18
Tenure-Track Faculty	25%	23%	27%	18%	71%	29%	62%	72%
Academic Researcher/Other	24%	32%	20%	38%	16%	28%	19%	(2)
BGN Researcher/Other	45%	41%	47%	39%	(2)	43%	12%	(1)
Spouses' 1995 Education	N=177	N=73	N=159	N=48	N=64	N=19	N=85	N=10
Spouse had a PhD, JD, or MD	24%	75%	43%	56%	25%	84%	22%	80%
Employment 1995	N=179	N=77	N=197	N=66	N=69	N=20	N=111	N=17
Tenure-Track Faculty	15%	20%	15%	12%	(4)	(1)	11%	(1)
Tenured Faculty	21%	17%	19%	18%	84%	35%	69%	59%
Academic Research/Other	12%	23%	13%	29%	(1)	(1)	6%	(4)
BGN Researcher/Other	39%	26%	42%	29%	(5)	50%	9%	(2)
BGN Manager/Executive	13%	14%	11%	12%	(1)	(1)	5%	—

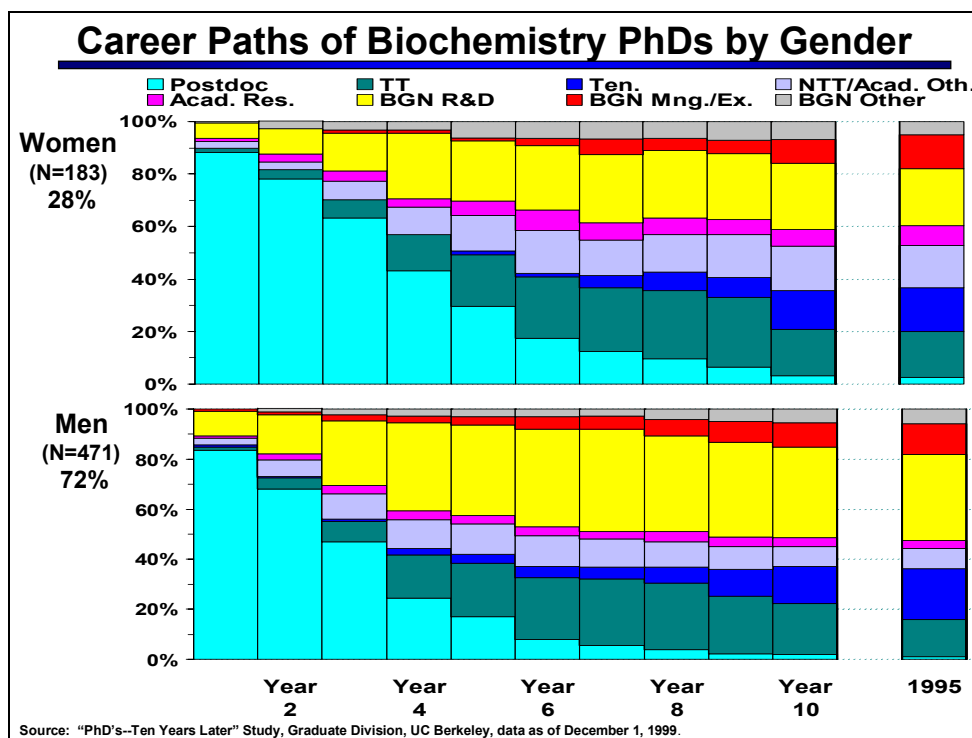
Data as of August 6, 1999

Source: “PhD’s--Ten Years Later” Study, Graduate Division, UC Berkeley

*First Employment after Postdoc may not total 100% because Tenured Faculty and BGN Manager/Executives are not reported

Women postdocs in biochemistry, whether married or not, held tenured or tenure-track positions in 1995 at about the same proportion as men, although women stayed slightly longer in postdoctoral positions and thus advanced even more slowly to tenured faculty positions than men did, as seen in the following graph. Furthermore, for women both in biochemistry and mathematics, the motivation to enter postdoctoral positions often seemed to be related to the desire to live in the same location as their partners and to combine family and career.

² As assessed by the 1982 NRC evaluation of the quality of research doctorate programs in the U.S.



There is a strong indication that after PhD completion women combine a committed relationship, family creation, and career with working in postdoctoral appointments that allow them to be in the same location as their partners. The study found that women PhD recipients in mathematics were especially impacted by the dual-career academic couple phenomenon. In mathematics, prestigious postdoctoral fellowships are a key stepping stone toward a faculty career in a research university. However, the kinds of postdoctoral appointments that married women in mathematics held appeared not to have that stepping stone character. Among women mathematics PhD recipients who wanted to become professors, their postdocs (or in some cases, organizing their careers around their husband's postdoc) served to shunt them away from a tenure-track trajectory. One of the women mathematicians, almost certainly married to a fellow mathematician, described the impact of postdocs on her career:

"My husband and I made the mistake that when I finished my PhD we went to a temporary position for my husband – a great postdoc. This was a mistake. Our second move was much more difficult, and may have cost me any career. We should have moved to permanent positions when we could. The two-body problem is hard to solve. We did not get this advice. Academia is not responsive to the problems of women. In particular there is little recognition of the problems of two careers, or of the conflicts of tenure and child rearing. It is easier to find two assistant professor positions than two associate professor positions. Couples in two-body situations should solve their problem early. This does limit opportunities, and women are disproportionately affected."

After winning two extremely prestigious postdoctoral positions, she was working in a non-tenure track position making \$12,000 a year. Her husband made more than \$100,000 a year. This case is a classic example of a more general finding: "For academic women, moves that advantaged their husband's careers have certainly disadvantaged their own" (Miller-Loessi and Henderson, 1997; Ferber and Huber 1979; Maxwell, Rosenfeld, and Spilerman, 1979; McElrath 1992, Brooker-Gross and Maraffa 1989). While it is true that postdoctoral positions in mathematics for women did not lead to proportionately as many tenure-track jobs as men, many women PhD recipients in math, unlike the women quoted above, were able to avoid a non-tenure track employment path by finding employment outside the academy, thus abandoning their career aspiration to be a professor. However, it is

important to note that job satisfaction for women who decided on careers outside academia was significantly higher than their female counterparts in either tenure-track or non-tenure track positions.

Less is known about the careers of international students who studied in the U.S. in both disciplines. The 1983-85 PhD cohorts comprised 10% international students in biochemistry³, but 33% in mathematics. International and domestic PhD recipients in both disciplines assumed postdoctoral positions in about the same proportions. Half of the U.S.-trained international mathematicians remained in the U.S. For them, postdoctoral training did not affect the odds of their holding a faculty position. With or without postdoctoral training, in 1995, 75% of these U.S.-trained international mathematics PhD recipients were in tenured or tenure-track positions. (Note that none of the prestigious U.S. postdoctoral fellowships are available to non-U.S. citizens.) However, the postdoc gave them a hiring advantage for faculty positions at the top quarter research universities.

The same proportion of international PhD recipients (temporary visa holders) who earned their doctorates from U.S. universities sought postdoctoral positions, as did domestic PhD recipients (U.S. citizens and permanent residents) both in biochemistry and mathematics. However, they spent slightly less overall time in postdoctoral appointments, and held fewer appointments than domestic PhD recipients, particularly in biochemistry.

In their search for more permanent employment, postdocs used various sources of help for the job search, but none of them seemed to be very useful. The postdoctoral mentor was certainly important for biochemists in the job search, but less so for mathematicians, who returned to their PhD advisors for this significant support, as seen below. Postdocs seemed to be left alone and mostly relied on answering job notices in the relevant journals. Universities could certainly extend the placement services that they offer to doctoral students to postdocs.

The Job Search: Most Used and Useful Sources of Help								
Sources of Help	Biochemistry				Mathematics			
	Postdoc		No Postdoc		Postdoc		No Postdoc	
	Used	Most Useful	Used	Most Useful	Used	Most Useful	Used	Most Useful
Postdoc Mentor	59%	41%	(4)	(3)	31%	16%	(2)	(1)
Answered Job Notice in a Professional Journal	57%	38%	22%	14%	51%	31%	47%	31%
PhD Advisor	42%	25%	36%	18%	60%	39%	58%	35%
Sent Unsolicited Vita	21%	7%	22%	13%	37%	13%	24%	11%
Other Faculty	39%	16%	35%	18%	56%	27%	40%	18%
Former Professional Contacts	25%	16%	30%	22%	40%	28%	19%	12%
Answered Job Ads on Campus	13%	3%	4%	2%	13%	6%	24%	11%

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Although there are many negative features to the postdoc and many biochemistry postdocs complained about being exploited as cheap labor, there are a number of biochemistry PhD recipients who

³ Before 1985 relatively few international students (temporary visa holders) studied biochemistry in the U.S.

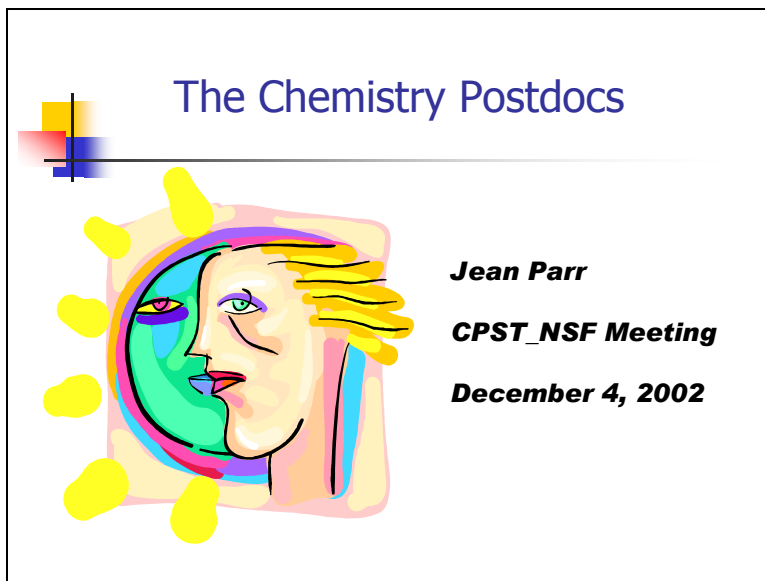
loved the time they spent in a postdoc. They were free from responsibilities and decision-making situations and they got a chance to be the pure bench scientists about which they had always dreamed. If they had been paid a little more, many would have stayed even longer in postdoctoral positions.

Are postdoctoral positions that last more than two or three years really necessary as additional training? What does one learn in a five-year postdoc that could not have been taught in a well-organized doctoral program and a two-year postdoctoral position under a thoughtful mentor?

Three years ago we recommend that universities designate a central authority for postdoctoral affairs – the Vice Provost/Chancellor for research or the Graduate Dean. This office should monitor the total length of time spent in postdoctoral appointments, allowing only a maximum of five years in this training position. Adequate salary and employment benefits should be assured for people doing postdocs. Finally, help should be provided to create a community for postdocs on campus to combat feelings of isolation, to provide training in the necessary skills to become professionals inside or outside academia (grant writing, presentation and communication skills), and to support career planning and job-search activities. Some of these recommendations have in the meantime been implemented.

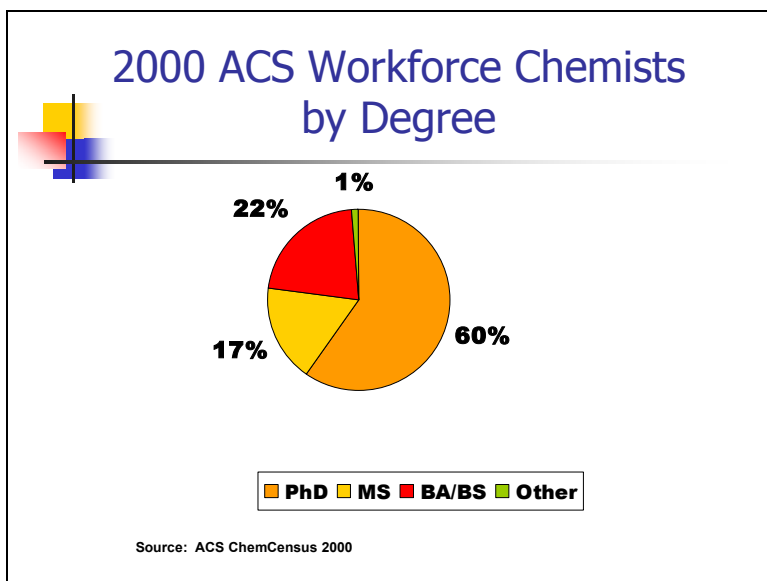
WHAT WE KNOW ABOUT POSTDOCS: PROFESSIONAL SOCIETIES

Presenter – Jean Parr, American Chemical Society

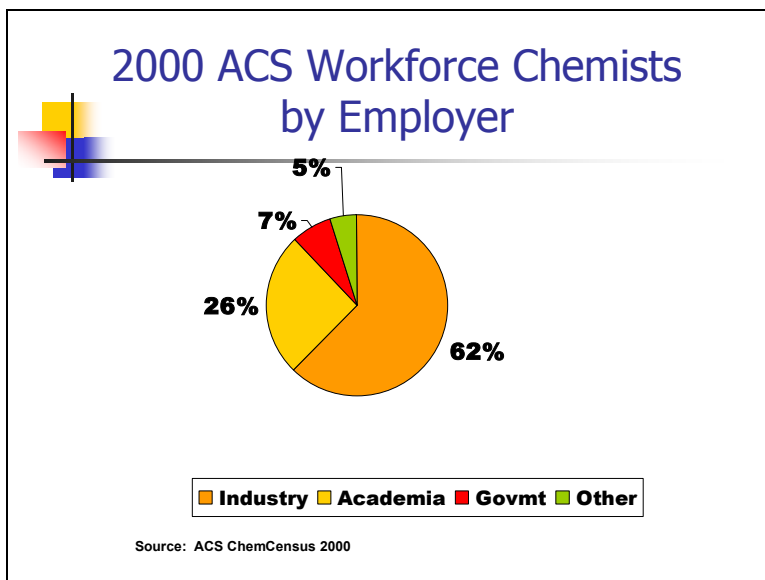


First, thank you to Mary Jordan who put together the figures for this presentation. Mary is the Senior Research Analyst in the ACS Department of Career Services.

The data to be presented come from two different types of sources. First, ACS conducts a salary survey each year in March of the working population of the ACS, and a survey of all new graduates in October of each year. Second, in the year 2000, ACS continued with an every-five-year census of the working population of the ACS.



ACS is a large society, with 163,000 member chemists. About 15,000 of them are international or are living outside of the United States at any given time. While ACS members predominately have PhDs (60%), there are many non-PhD members, which may be somewhat different than some other societies.



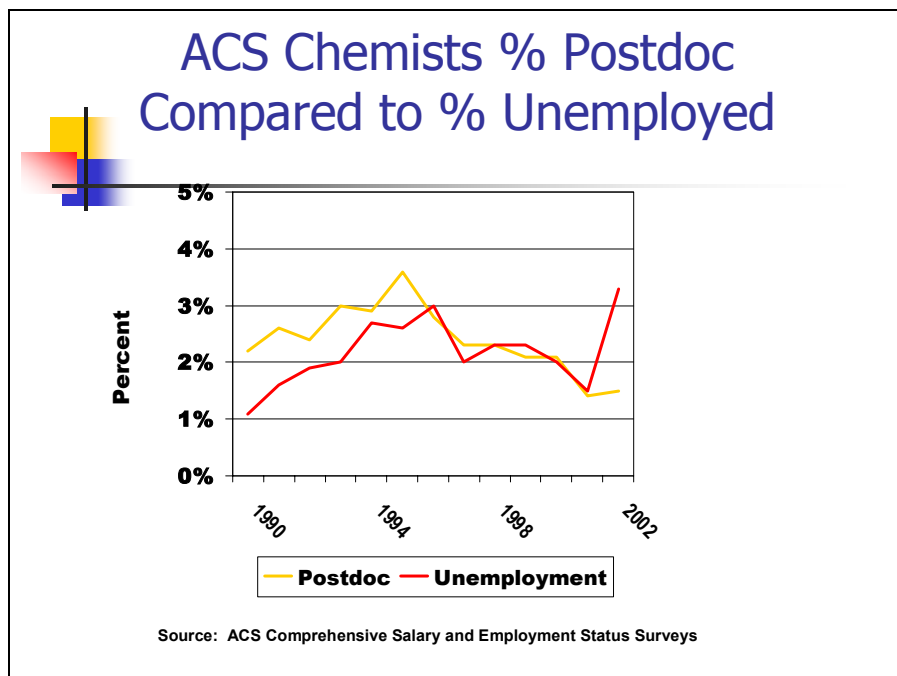
ACS members are predominately employed in industry (62%), and only 26% are employed in academe. Most of the growth in jobs for chemists is being seen in industry, particularly in the pharmaceutical and biotech industries. That has been growing over the years and is not expected to go down. Chemists have always been employed in industry, more so than other sectors.

Employment Status of ACS Workforce Chemists

	2000 %	2001 %	2002 %
Full Time	92.9	94.6	92.3
Part Time	3.0	2.5	3.0
Post Doc	2.1	1.4	1.5
Unemployed	2.0	1.5	3.3
Any Unemployment			
Previous Year	5.5	4.8	6.2
% in First Year			
Of Full Time Job	8.2	9.3	8.1

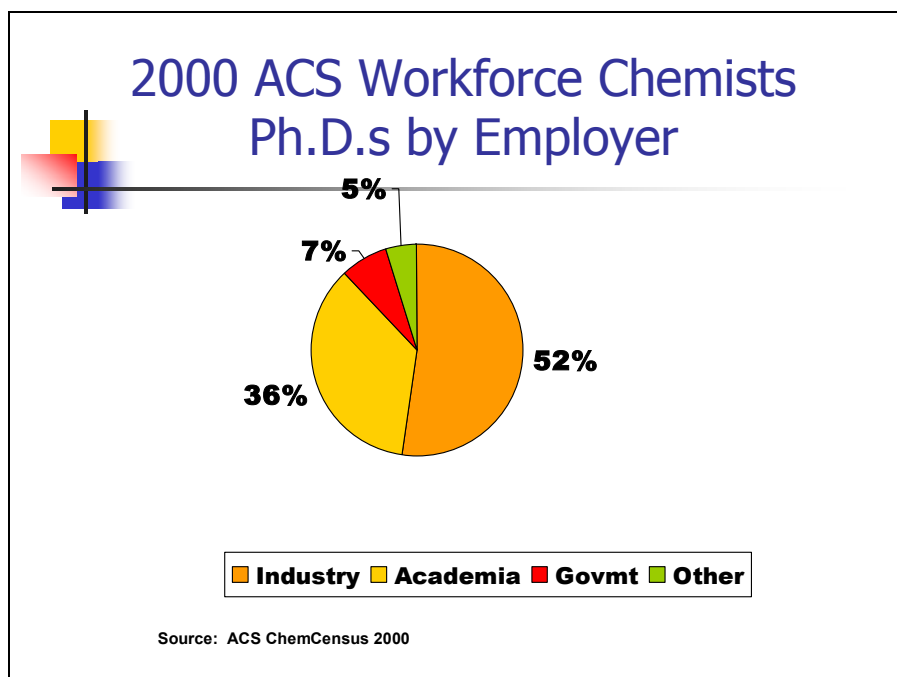
Source: ACS Comprehensive Salary and Employment Status Surveys

The employment status of ACS members shown above is from ACS's annual salary survey last conducted in March 2002. This shows everything except the new graduates, and includes ACS members up to the age of 69 who are working and who are not students. In 2002, among ACS members in the working population, 1.5% were postdocs.

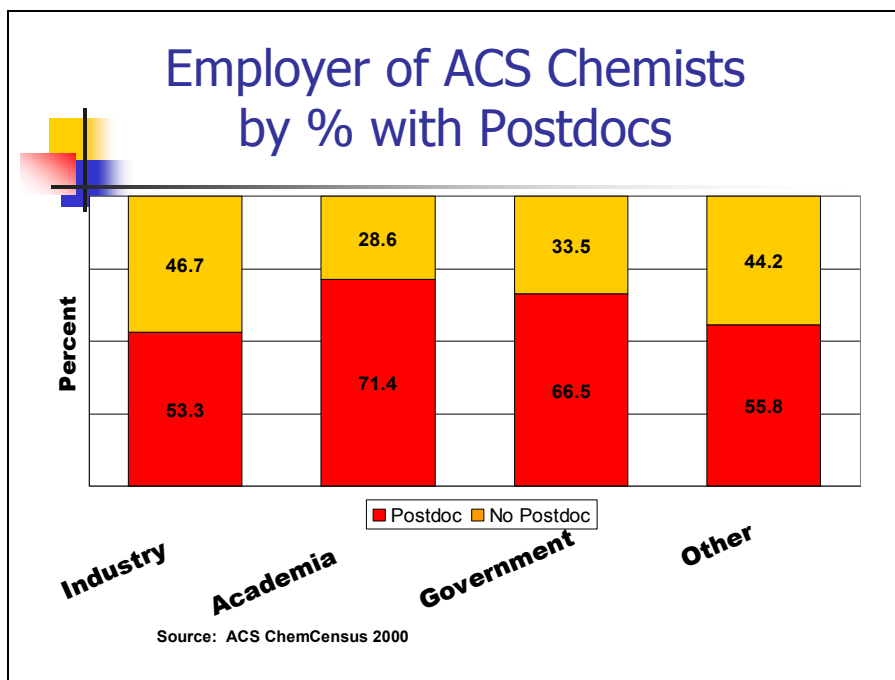


The yellow line in the chart above shows chemists who are in a postdoc and the red line is the unemployment rate for chemists. In 2002, the overall unemployment rate jumped significantly, from 1.5% to 3.3%, a huge increase. But the percent of ACS members in postdocs did not change significantly.

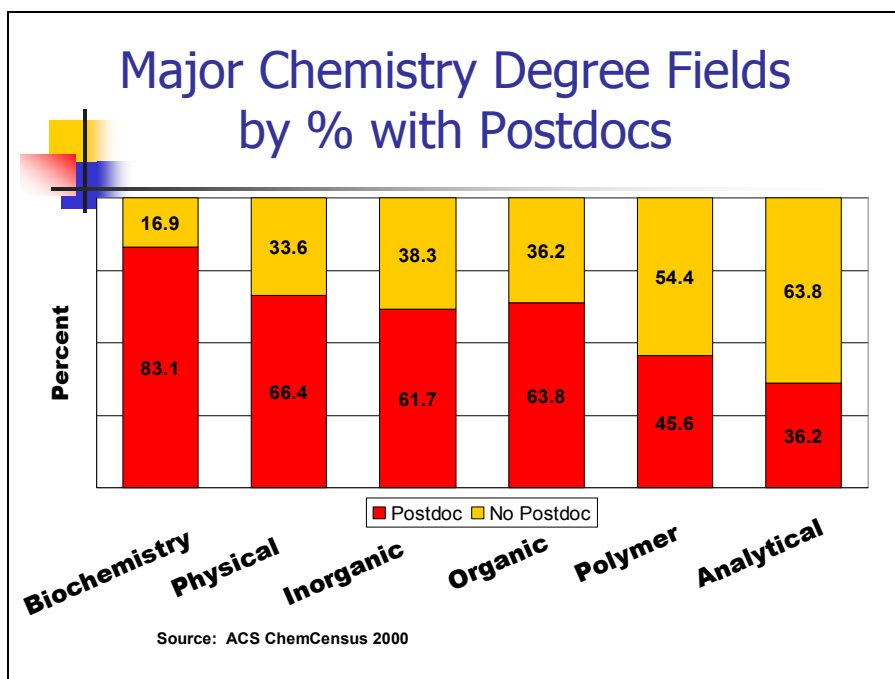
The unemployment rate though was much different depending on if you were looking at chemists over the age of 45 or chemists under the age of 45. For those under 45, about 1.9% were unemployed, while unemployment for those over 45 was about 4-5%, depending on which field of chemistry.



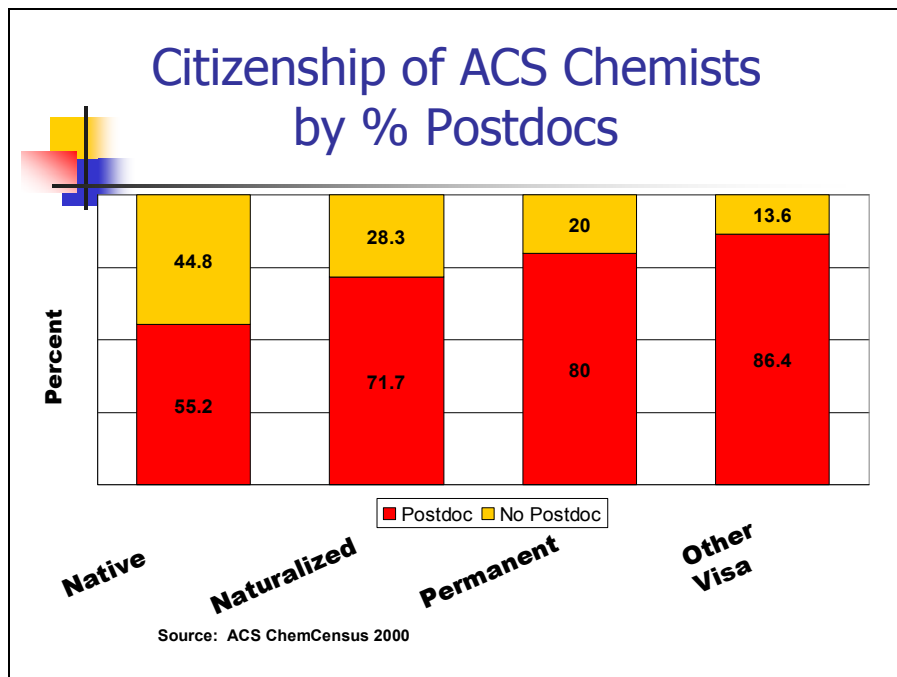
As mentioned previously, 62% of all ACS members are employed in industry and 26% are employed in academia. Looking just at the 60% of ACS members with PhDs, the percentage employed in industry is still a little over half as shown above, but it has decreased, and the percentage in academe has gone from 26% to 36%.



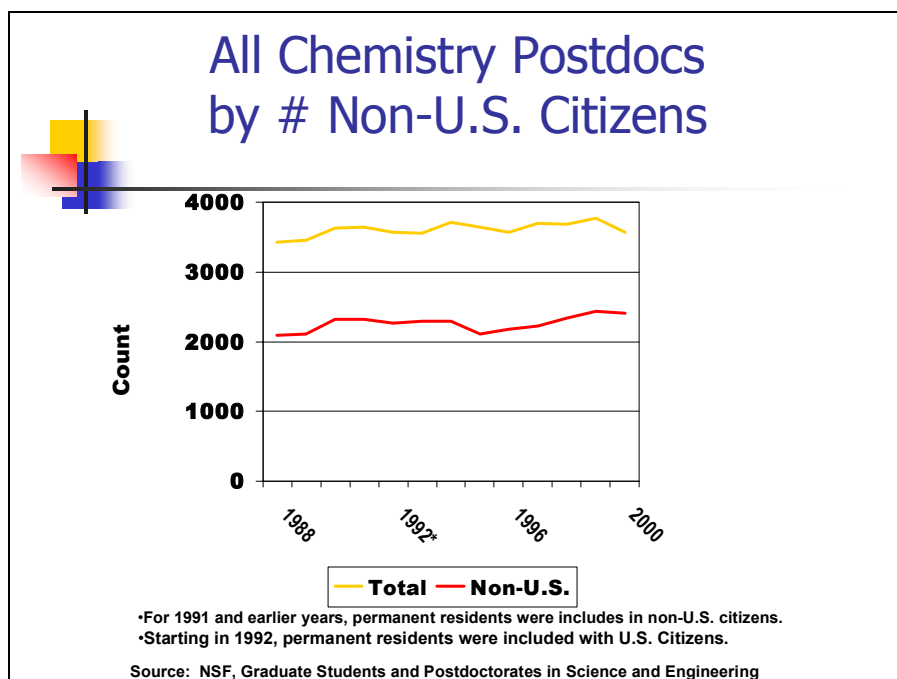
Data from the Chem Census 2000, which surveyed about 95,000 ACS members, show that overall, 60% of ACS members have had at least one postdoc in their career. By employment sector, 53% of those in industry had at least one postdoc, 71% of those in academe, 67% of those in government and 56% of those in other employment sectors.



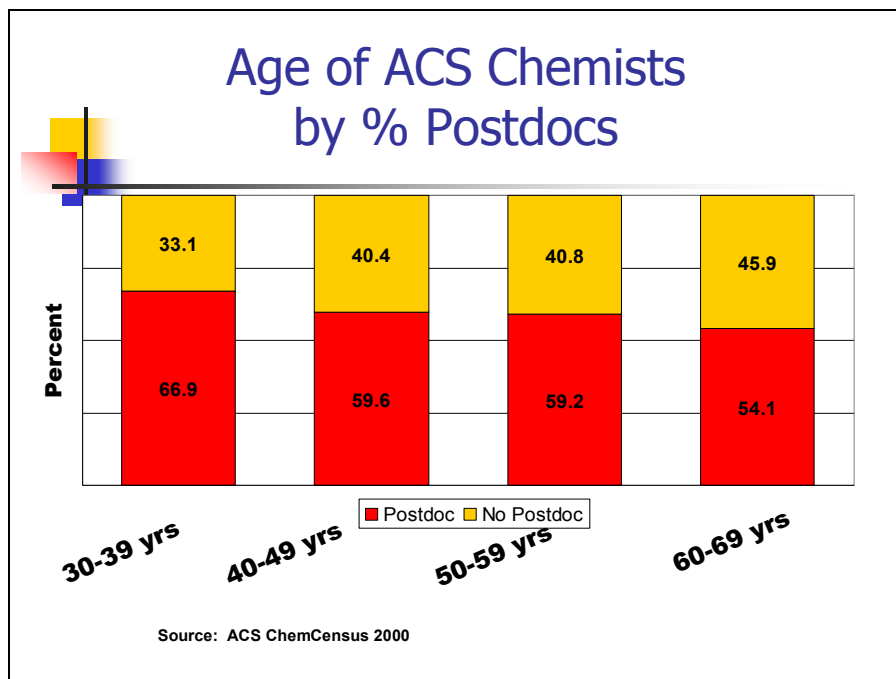
As seen above, for those who majored in biochemistry (about 17% of ACS members), 83% have had a postdoc. Fields related to health care have a higher percentage of postdocs versus other fields in chemistry, such as analytical chemistry.



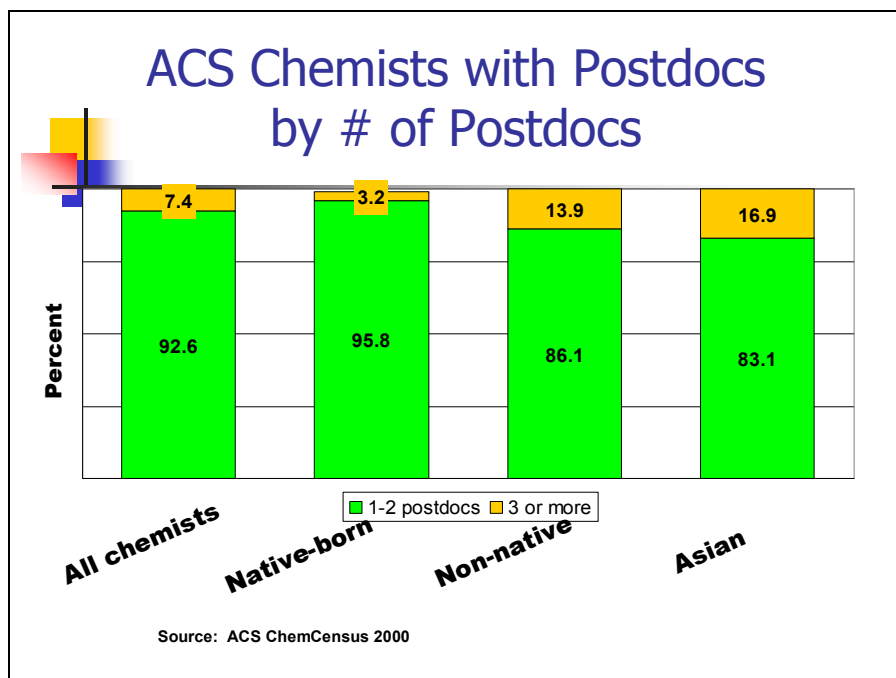
Looking at citizenship, 55% of native-born ACS members had at least one postdoc, 72% of naturalized ACS members had at least one postdoc, 80% of permanent resident ACS members had at least one postdoc, and 86% of ACS members with other visas had at least one postdoc as seen above.



The graph above looks at all chemistry postdocs, not just ACS members. The yellow line shows the total number of chemistry postdocs and the red line shows non-U.S. citizens.

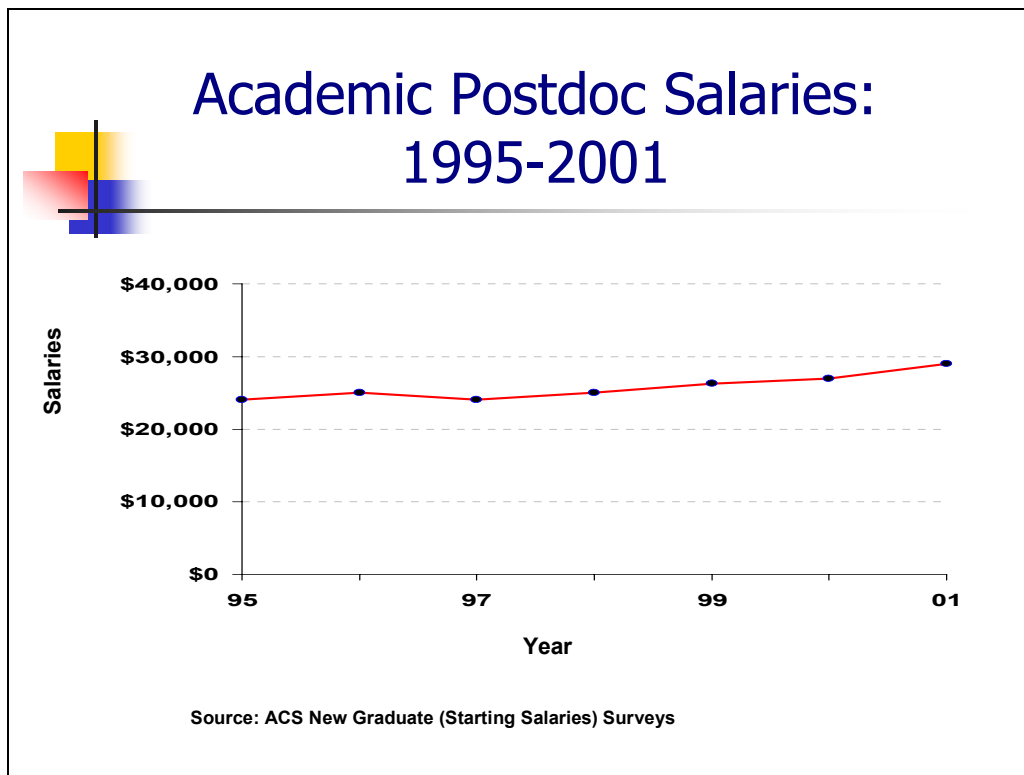


Looking again at ACS members and the Chem Census 2000 data, a greater percentage of those in the 30 to 39 age bracket have had postdocs than those in older age brackets as seen above.



The graph above illustrates the number of postdocs of ACS members by citizenship. The green bars show ACS members who had one or two postdocs and the yellow bars at the top show those who had three or more postdocs. Among all ACS chemists, 92.6% had one to two postdocs, and 7.4% had

more than two. Nearly 96% of native-born ACS members had one to two postdocs. Looking at non-native-born ACS members, about 14% had three or more postdocs, and about 17% of Asian ACS members (U.S. citizen and non-U.S. citizen) had three or more postdocs.



Salaries for chemistry postdocs have basically followed NIH guidelines. Academic salaries for chemistry postdocs are shown above. This is where the majority of chemistry postdocs work. Salaries for industrial postdocs are about two-thirds to 75% of what the salary of a starting PhD would be in industry in a non-postdoc position. And finally, for postdocs employed in government labs, salaries are nearly the same as for starting PhDs.

WHAT WE KNOW ABOUT POSTDOCS: PROFESSIONAL SOCIETIES

Presenter – Sam Rankin, American Mathematical Society

Mathematics does not have a tradition of having a lot of postdocs, unlike a number of the other sciences, especially the biological sciences and some of the physical sciences, but in the last few years, there has been an increase. One reason for the increase is the National Science Foundation's Division of Mathematical Sciences (DMS). DMS sponsors VIGRE, a grant program for the Vertical Integration of Research and Education. VIGRE provides reasonably large grants. About 30 universities have received grants to date, ranging from \$400,000 a year to \$1 million a year, and most of the funding in those grants goes to support U.S. citizen graduate students and postdoctoral students, as well as some undergraduate students. VIGRE has helped increase the number of postdoctoral positions in the mathematical sciences. Most postdoctorates in mathematics are for three years, while VIGRE postdoctorates are for two years.

Most postdocs in mathematics, including these VIGRE postdocs, do some teaching. This is usually necessary to obtain a tenure-track appointment. In mathematics, traditionally, about 80% of the new PhD graduates each year who found employment went into academia and 20% went into non-academic situations. That number has changed in the last few years and it is closer to 75-25 now, but most PhD mathematicians are still concentrated in academia. In the last ten years, there has also been more of an emphasis, even in the research-based universities, on teaching as an important part of faculty members' jobs, so the opportunity to gain teaching credentials is helpful in obtaining a job.

About 65% of the funding for mathematical research comes from NSF and the majority of the rest comes from the Department of Energy and the Department of Defense. At NSF there has also been some additional funding for postdocs on individual research grants, maybe more so than in the past.

The American Mathematical Society defines a postdoc as a temporary position primarily intended to extend graduate training or to further the research experience. This is the definition used in AMS' surveys. There are universities that hire a number of new PhDs in mathematics, but a lot of those hired are specifically teaching courses, and are not in positions called postdoctorates. It does not mean that these folks cannot do research. For example, the University of Michigan has a number of instructor positions for which they hire young faculty. These young faculty teach a lot of lower-level courses, but they are also able to and are encouraged to do research. AMS's survey is based on self-identification or department identification.

AMS does not have a postdoc policy. A few years ago however, AMS passed a resolution about hiring for temporary positions. AMS encouraged departments to hire faculty for more than one year. If they were going to hire a temporary person in a temporary position, AMS suggested they hire them for at least two years.

AMS conducts an annual survey of mathematics departments. The survey year starts on July 1 of one year and ends on June 30 of the next year. For 2001-2002, data are departmental data and not from self-identification. Data are for doctoral-granting departments of mathematics. As has been the case for a number of years, much of the data in these annual survey reports are presented for departments divided into groups according to several characteristics, the principal one being the highest degree offered in the mathematical sciences. Doctorate-granting departments of mathematics are further subgrouped according to their ranking of "scholarly quality of program faculty" as reported in the 1995 publication *Research-Doctorate Programs in the United States: Continuity and Change*.

Group I is composed of 48 departments with scores ranging from three to five. They include both public and private universities, as do all groups. Group II is composed of 56 departments with scores ranging from two to 2.99. Group III are the remaining doctoral-granting departments – about 177 doctoral-granting mathematics departments. Group IV contains departments of statistics, biostatistics, and biometrics with a doctoral program. Group V contains U.S. departments in applied mathematics and

applied science with doctoral programs. Prior to 1999, Group V was comprised of Groups Va and Vb, with Group Va containing Applied Mathematics/Applied Science doctoral departments and Vb containing Operations Research/Management Science doctoral departments. Response rates for Vb departments were always very poor, and many of the departments were inherently quite different from the other departments included in the Annual Survey. Beginning with the 1999 Survey, the Annual Survey Data Committee decided to no longer survey Group Vb. Hence, Group V now contains only Group Va departments.

Survey Year	Total Docs Granted	Total US Employ	Total US Acad Employ	Total Taking US Postdoc Position	%	Total US Non Acad Emp	Total Taking US Post Doc Position	%
1996-1997	1123	782	509	166	33	273	14	5
1997-1998	1163	830	547	165	30	283	21	7
1998-1999	1133	832	608	222	37	224	22	10
1999-2000	1119	853	589	225	38	264	14	5
2000-2001	1065	818	574	210	37	244	15	6
2001-2002*	948	664	503	209	42	161	17	11

The table above shows the total number of PhDs in mathematics for the given years. The third column shows the total number of these new PhDs employed in the U.S. The table is not broken out in terms of citizenship, so the number employed in the U.S. includes U.S. citizens and non-U.S. citizens. In each PhD class, the percentage of non-U.S. citizens was greater than the percentage of U.S. citizens getting PhDs.

The fourth column show those who were employed in academia, and the next column shows the number of those individuals who took a postdoctoral position in academia. Note that there was a jump between 1998 and 1999. That was when the VIGRE program started at NSF. About ten schools received funding that year. About 30 schools currently receive funding.

There is starting to be a decrease in the number of individuals getting PhDs in the mathematical sciences. Even though the percentage of those going into academic postdoctoral positions was greater in 2001-2002 than it was in earlier years, the actual number going into academic postdoctoral positions is decreasing.

The final columns in the table show the total number of recent PhDs going into non-academic positions and the number of those individuals taking a non-academic postdoctoral position. Non-academic positions could be government labs or industry, although there are very few postdoctoral positions for mathematicians in industry.

Survey Year	Total Docs Granted	Total US Employ	Total US Acad Employ	Total Taking US Post Doc Position	%	Total US Non Acad Employ	Total Taking US Post Doc Position	%
1996-1997	854	585	439	133	30	146	7	5
1997-1998	873	597	432	133	31	165	12	7
1998-1999	821	610	483	177	37	127	13	10
1999-2000	768	572	431	175	41	141	11	8
2000-2001	712	557	436	179	41	121	11	9
2001-2002*	645	455	380	176	46	75	8	11

The table above presents the same information, but just for Groups I, II and III. It does not include applied mathematics departments or statistics, biostatistics, or biometrics departments. It includes only the “traditional” math departments. Again, you see that there was a jump between 1998 and 1999 in the number of individuals taking an academic postdoctoral position. And again, because of the decrease in the total number of PhDs granted, the percentage of individuals taking an academic postdoctoral position is getting a little higher. As the table illustrates, most mathematics postdocs are in academia, most mathematics PhDs are in academia, and most mathematics postdocs are going into academic positions.

WHAT WE KNOW ABOUT POSTDOCS: PROFESSIONAL SOCIETIES

Presenter – Heather Rieff, Federation of American Societies for Experimental Biology

Addressing Professional Development Needs for Post-Doctoral Fellows

Heather I. Rieff
Office of Public Affairs
Federation of American Societies
For Experimental Biology

CPST/NSF/Professional Societies Workshop, December 2002

FASEB is a federation of 21 member societies, each of which represents a discipline in the biological sciences. FASEB does not conduct large surveys of its members in terms of looking at the numbers of postdocs or how long people stay in postdocs, but rather, FASEB relies on other data sources, such as the NSF data.

THE CHALLENGE

Equip postdoctoral fellows and graduate students for careers in a changing job market and research environment.

This presentation will cover some of the other postdoc-related initiatives FASEB has been working on, specifically the professional development needs of postdocs, improving the postdoc experience, and improving career development issues for postdocs. The job market for postdocs is changing, the research environment is changing, and there are implications both for postdocs and their advisors.

Changing Nature of the Scientific Workforce: Implications for Post-docs

- Age of post-doctoral fellows has increased
- Length of fellowship is increasing
- Changing career opportunities for scientists

In terms of postdocs, especially in the biological sciences, the length of postdocs is increasing. Postdocs tend to be older when they finish their postdocs, and many postdocs are not going on to research or jobs in academic research institutions, but rather have new career opportunities.

Changing Nature of the Scientific Workforce: Implications for PIs

- Increasing lab size: complex management structures of labs; changing personnel structures
- Other pressures on researchers' time: administrative, teaching, and grant-writing duties

From the perspective of the principal investigator, there are also changes or implications from this changing job market. Labs tend to be larger in size. There may be more complex personnel or management structures, and there certainly are many other pressures, such as time pressures on researchers' time, and administrative and teaching duties which take away from time that could be spent mentoring postdocs.

The FASEB Approach

- Define who is a postdoc
- Develop a planning process to help post-docs identify professional development needs and career objectives
- Ensure good mentoring practices
- Advocate for uniform benefits – health, retirement, other fringe benefits

FASEB is looking at a number of different initiatives. The first thing FASEB thought was important to do was to define who is a postdoc. The second thing FASEB did was to develop a planning process to help postdocs identify their career objectives and how to get there. FASEB has also looked at postdoc benefits, which is a very complicated issue and one that is hard to get a grasp on.

FASEB Definition of a Postdoctoral Fellow

- The appointee was recently awarded a Ph.D. or equivalent doctorate (e.g., Sc.D., M.D.) in an appropriate field; and
- the appointment is temporary; and
- the appointment involves substantially full-time research or scholarship; and
- the appointment is viewed as preparatory for a full-time academic and/or research career; and
- the appointment may be part of a clinical training program, if research training under the supervision of a mentor is a primary purpose of the appointment; and
- the appointee works under the supervision of a scholar or a department in a university or similar research institution (e.g., national laboratory, NIH, etc.); and
- the appointee is expected to publish the results of his or her research or scholarship during the period of the appointment, in consultation with his or her mentor.

The FASEB definition of a postdoctoral fellow is based on the American Association of Universities' definition. FASEB looked at a number of definitions, including the NSF definition, and felt that this definition fit best with its membership. FASEB thought it was important to indicate that this position was temporary and that people should not stay in postdocs for indefinite periods of time. One change FASEB made from the AAU definition was that FASEB's definition includes clinical fellows as long as their main responsibility is research and not clinical duties. Another important part of the definition is the idea of mentorship.

The changing nature of the post-doc experience:

- Post-docs may have different career objectives and changing professional development needs than in the past
- PI's may have less "face time" with their post-docs
- Career development goals can be given less attention than research objectives

Postdocs today have very different career objectives from the postdocs five or ten years ago and it is important to have some sort of formal structure in place for postdocs to use in trying to reach their career goals.

THE NEED

- Open and honest communication between post-doc and advisor at all stages of the fellowship
- Advisor = mentor
- Mentoring needs to be conducted at the level of the individual – one size does not fit all

FASEB recommends that all institutions involved in the training and career development of post-docs maintain a well-defined mentor program

The idea of mentoring is extremely important and one which is often overlooked. Many postdocs do not feel that they get mentoring from their advisors or from other faculty members in their department. FASEB also realizes that mentoring needs to be done at the level of the individual – one-size-fits-all does not apply here – and that different postdocs have different needs and different career goals.

WHAT IS AN IDP?

Each of the three component words in the IDP link to the definition of an IDP.

Individual:	Emphasizes the need to consider the unique training and career goals of each fellow.
Development:	Outlines the identification of steps needed to achieve the goals.
Plan:	Stresses the specific steps needed to reach career goals, rather than relying on the more traditional random walk.

FASEB's Science Policy Committee developed an individual development plan (IDP), which is available on the FASEB website, <http://www.faseb.org>. It is a formal planning process for postdocs and their mentors. One key component of it is that both parties are involved in developing this document. Again, it should be done at the level of the individual since each postdoctoral fellow has unique training and career goals. It should be a concrete, formal plan rather than a random one, and it needs to be done in conjunction with their mentors.

GOALS OF AN IDP

- Enhance communication between postdocs and their mentors -- the steps involved in the development, implementation and revision of an IDP are an interactive effort and so both postdoctoral fellow and mentor must participate fully in the process.

Help individuals identify:

- Long-term career options they wish to pursue and the necessary tools to meet these.
- Short-term needs for improving current performance.
- Clearer sense of expectations.
- Milestones along the way to achieving specific objectives.

The goals of this plan are to enhance communication between postdocs and their advisors, both in terms of the development of the plan and the subsequent revision of it. The other goals include helping postdocs identify their long-term career options as well as their short-term goals, give them a clear sense of expectations, and set milestones for achieving these goals.

BASIC STEPS		
Basic Steps	...for Postdoctoral Fellows	...for Mentors
Step 1:	Conduct a "Self Assessment"	Become familiar with available Opportunities
Step 2:	Survey opportunities with mentor	Discuss opportunities with postdoc
Step 3:	Write an IDP Share IDP with mentor and revise	Review IDP and help revise
Step 4:	Implement the plan Revise the IDP as needed	Establish regular review of progress Help revise the IDP as needed

There are basic steps that postdocs and mentors should follow in terms of developing this plan. The first step for postdocs is to conduct a self-assessment. You need to know where you want to go in order to end up there. For mentors, it is important that they are familiar with the changing job market and the changing opportunities for postdoctoral fellows.

The next step is for postdocs to discuss these opportunities with their mentor(s). For example, if a postdoc is interested in teaching, perhaps there are things that individual can do in their fellowship to help them achieve that goal. The third step is to actually write down this plan. The last step is to implement the plan, to start achieving these goals, revising it as needed. The document needs to be as flexible as possible in order to be effective.

FASEB hopes that this document can be used at institutions as part of a broader mentoring program, and hopes that postdoc offices and postdoc associations will publicize and encourage the use of a document like this.

Encouraging Good Mentorship

- Encourage the use of formal tools like the IDP -- Role for post-doc offices and post-doc associations.
- Make mentoring seminars and other tools available campus-wide.
- Award outstanding mentors and recognize mentorship in faculty evaluations, appointments, and tenure decisions.

Other ways to encourage good mentorship are to make mentoring seminars and other mentoring tools available campus-wide. Many seminars and resources are found at education schools, and sometimes the basic science departments do not even realize that these resources exist. It is also important to recognize good mentorship among faculty members.

IDP "Field Tests"

"It helped my postdoctoral fellows think about the most direct paths to accomplish the objectives of our research projects. And it helped me better appreciate their career goals, the range of experiences they wanted to acquire, and the time frame."

Al Merrill, Smithgall Institute Chair in Molecular Cell Biology at Georgia Tech.

"One of the most useful aspects of the IDP is that it provides an opportunity for the expectations of both postdoctoral fellows and their advisors to be explicitly stated and for a structural framework to be laid out for achieving the desired goals. I've observed in the past that those things are too often left to casual verbal exchanges, which can produce a lot of misunderstanding and leave both parties frustrated."

Steve Linn, a postdoc in Merrill's lab.

Shown above are two quotes from the chair of FASEB's Science Policy Committee and one of his postdocs, both of whom have used this plan.

Post-doc benefits

- Post-doctoral benefits – health, retirement, other fringe benefits:
 - Complicated issue
 - Different policies at different institutions
 - Depends in part how post-docs are classified and by what mechanism they are compensated

The final issue that FASEB has started to work on is the issue of postdoc benefits. FASEB feels very strongly that benefits such as health care, retirement benefits, and other fringe benefits should be available to postdocs. FASEB was involved in a survey done by the Postdoc Network on benefits to

postdocs at different institutions and found that a lot of how postdocs receive benefits depends on how postdocs are funded or how postdocs are defined. This is something FASEB will continue to work on.

Once again, copies of the individual development plan are available on FASEB's website, <http://www.faseb.org>.

Discussion:

During the question and answer period following the presentation, the following questions/comments were made:

- A question was asked concerning the time frame for the IDP. Rieff responded that it should be reviewed at least annually for the duration of the postdoc.
- The issue of and implications of unionization on campuses was raised. Rieff responded that it was not an issue that FASEB has looked at, although the National Bureau of Economic Research has.
- It was noted that the IDP was a very formal process and almost the industry standard similar to a work and development plan which looks at what the employee did last year and where he/she wants to go in the next five years. How will this IDP ever be implemented in academia? Rieff noted that postdoc offices, which are springing up at many institutions, will play an active role in trying to get this plan or something similar to this plan implemented, and agreed that it should not be left up to tenured professors to do.
- A participant asked if the 21 societies federated with FASEB are taking the IDP on as something that they are pushing, and if FASEB tried to interact with the funding agencies, since the funding agencies have the biggest leverage for trying to change the culture of the departments and faculty. Rieff responded that FASEB's member societies have certainly bought into this idea and hopefully are disseminating it through their departments. FASEB has not gotten to the funding agency idea yet.
- When asked how FASEB is proposing to encourage its members to use this plan, Rieff responded that they are distributing it through the Postdoc Network, to get it into the hands of department heads. It has been distributed through FASEB member societies, which altogether represent about 60,000 biomedical researchers. In addition, there have been some articles in *The Scientist* and other publications.
- Representatives from the Burroughs Wellcome Fund (BWF) noted that BWF requires individuals receiving postdoctoral faculty bridging grants to have a plan similar to the IDP in place and that anyone supported through the grant as a postdoctoral trainee or as a laboratory member must have a plan in place. In addition, BWF supports training grants for interdisciplinary researchers, and tracks the progress of those programs by asking all trainees to complete an online survey. Among other questions, the survey asks them if their mentor enquired about their career goals. The results of the survey are fed back to the program directors so they can see themselves benchmarked against the other programs, thus getting them to pay attention to those issues.

WHAT WE KNOW ABOUT POSTDOCS: PROFESSIONAL SOCIETIES

Presenter – Patrick Mulvey, American Institute of Physics

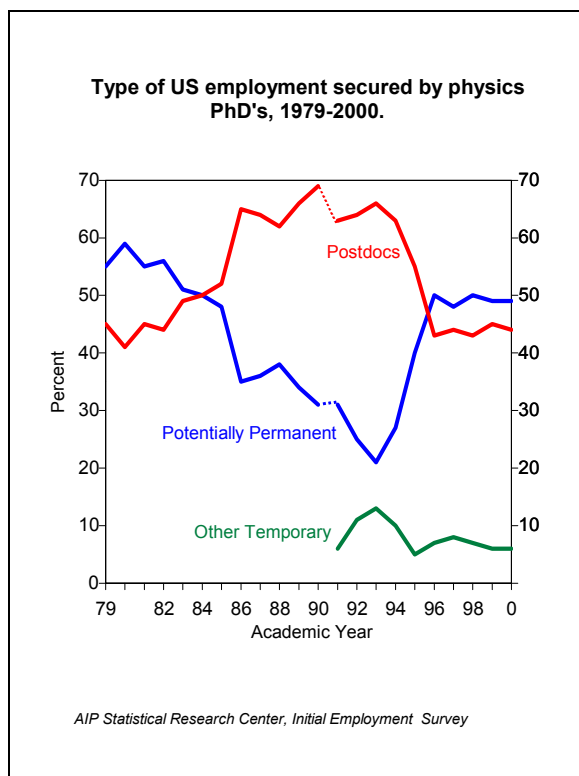
The American Institute of Physics' Statistical Research Center collects data on all aspects of the physics community from high school through retirement. Although AIP's surveys are not directly focused on postdoc issues, much of the data and information collected has an impact on postdocs since a large percentage of physics PhDs take a postdoc.

Looking at data from the degree classes of 1999 and 2000 (2001 data are not yet available), 69% of new astronomy PhDs take a postdoc, 45% of physics PhDs take a postdoc and 41% of geosciences PhDs take a postdoc. The data come from a survey that is conducted about six months after the end of the academic year in which the PhD got their degree.

Similar to some of the NSF studies, this only includes people who got their degrees in the U.S. About 6% of the U.S. citizens who get PhDs in physics leave the country to work abroad. Many of those are actually postdocs, and perhaps 20% of the foreign citizens who get PhDs in physics in the U.S. immediately leave.

The 69% of astronomers taking postdocs are from astronomy departments. For astronomers who receive degrees from physics departments or for astrophysicists who receive degrees from physics departments, the percentage taking postdocs falls about halfway between the physicists and the astronomers – about 51% of the new grads go immediately into a postdoc.

AIP has found that women take postdocs at about the same rate as men. A greater proportion of foreign citizen PhDs take postdocs than do U.S. citizen PhDs. That was even more true a few years ago. As of late, the numbers have gotten much closer, although it used to be that foreign citizen PhDs dominated in the proportion taking postdocs.



Over time, the percentage of physics PhDs taking postdocs right after receiving their degree has changed quite a bit. Currently, it is about 45%, but in the early 1990s, it was considerably greater as seen in the graph above. About 500 people initially are taking postdocs right now. Interestingly, the curve of those PhDs taking postdocs matches fairly closely to the shape of the curve for PhD production in physics. So as more and more PhDs were coming out, a greater proportion of them were actually also taking postdocs. In the early 1990s, the economic situation and employment situation in the U.S. for PhD scientists, as well as for many other people, was fairly poor.

This curve probably tracks a couple different things. It tracks people being forced into postdocs who did not want it. It also may track career expectations. Maybe a lot of these people expected that there were going to be shortages in academia, and were going into a postdoc because that was the traditional path for someone to get such a position.

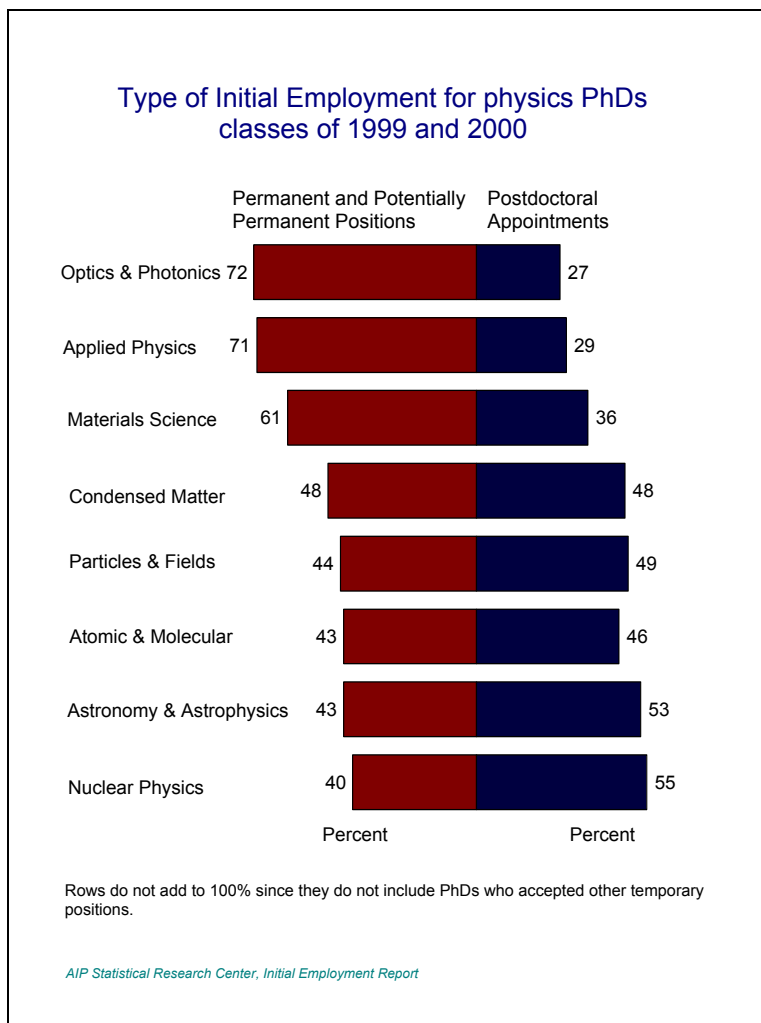
The “other temporary” line in the graph above was added in 1991 because a lot of respondents were not sure which category to put themselves into. Although a lot of them appear to be postdocs and some of them are even doing research at universities, they have identified themselves as “other temporary,” meaning that they did not meet AIP’s criteria for what a postdoc is. Many of them are sabbatical replacements and lecturers, and some are actually in industry.

For a PhD physicist, the average length of a postdoc is initially about two years. Physicists do not traditionally stay in postdocs as long as some of the other disciplines. Very few physics PhDs are in a postdoc five years after degree.

In the early 1990s, the physics community heard a lot of complaints about postdocs and the number of people in postdocs and that it was a holding pattern. As of late, not much is heard about that anymore.

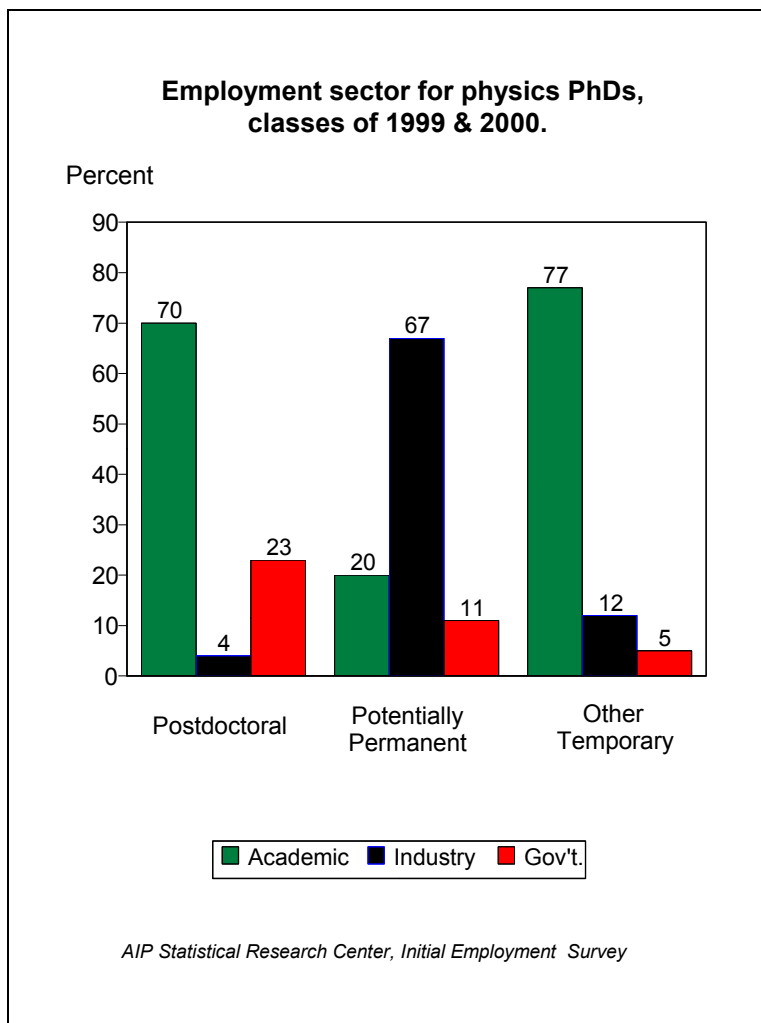
Over one third of the U.S. citizens who are in a postdoc said they took it reluctantly, and for foreign citizens, about two-thirds took it reluctantly. When those same individuals were asked what their long-term career aspirations were, interestingly, half of the U.S. citizens who were reluctantly taking that postdoc said they aspired to a university research/teaching type of position, and the postdoc is obviously the traditional track for that type of job. So, although one third said they took a postdoc reluctantly, it may be that they would have preferred just to jump right to that position to begin with, although that really is not an option for them in the current employment market.

What else do we know? Not all postdocs were created equal between fields or even within a field, as we saw with chemistry. Depending on the subfield, different proportions of people are taking postdocs.



The blue bars on the right are the percentage of people taking postdocs and the red bars on the left are the ones who accepted potentially permanent positions. Subfields are shown down the side. Physics PhDs in the more applied fields, such as optics, applied physics, and material science, are much more likely to initially go right into a potentially permanent position than the PhDs who are more theoretical, such as nuclear physicists, astronomers, and astrophysicists. This graph ignores employment sector and just shows who took a postdoc and who did not. However, there are very few industrial people in the blue side in physics and a tremendous number on the red side.

The number of people in each one of these fields makes a difference in how many postdocs there actually are in each one of these fields. The number of optics/photonics postdocs is actually similar to the number of nuclear physics postdocs only because of the discrepancy in the number of people coming out in those fields.

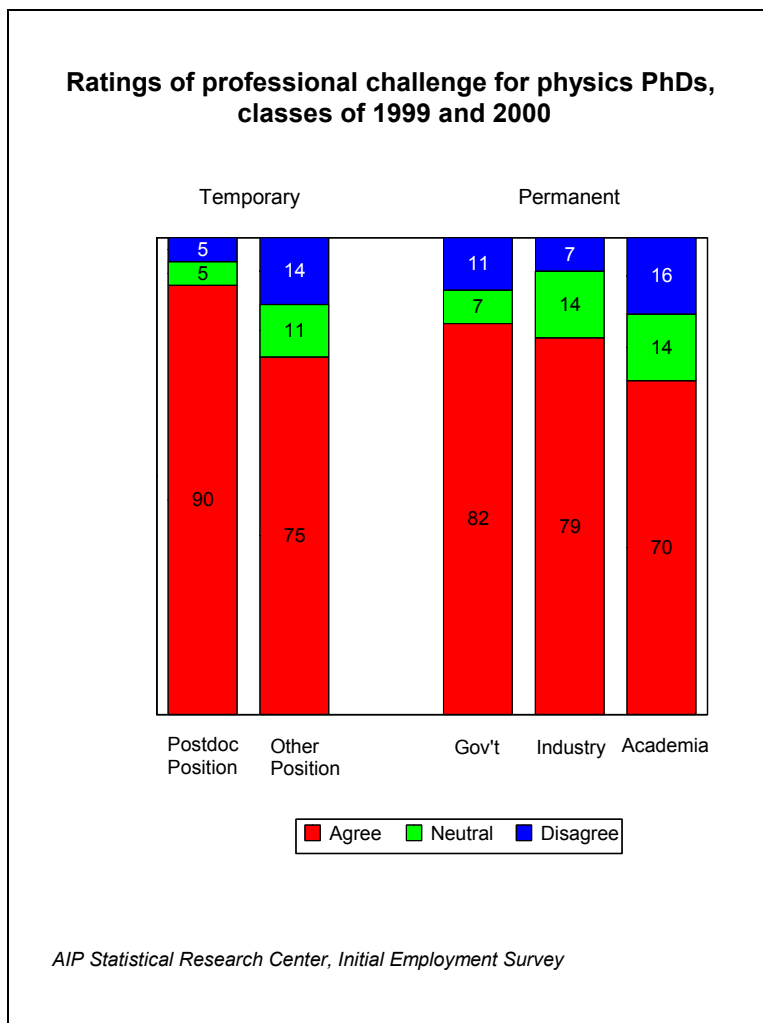


Postdocs in physics are primarily in academia, with a fairly sizeable chunk in government, and a negligible group in industry as seen above.

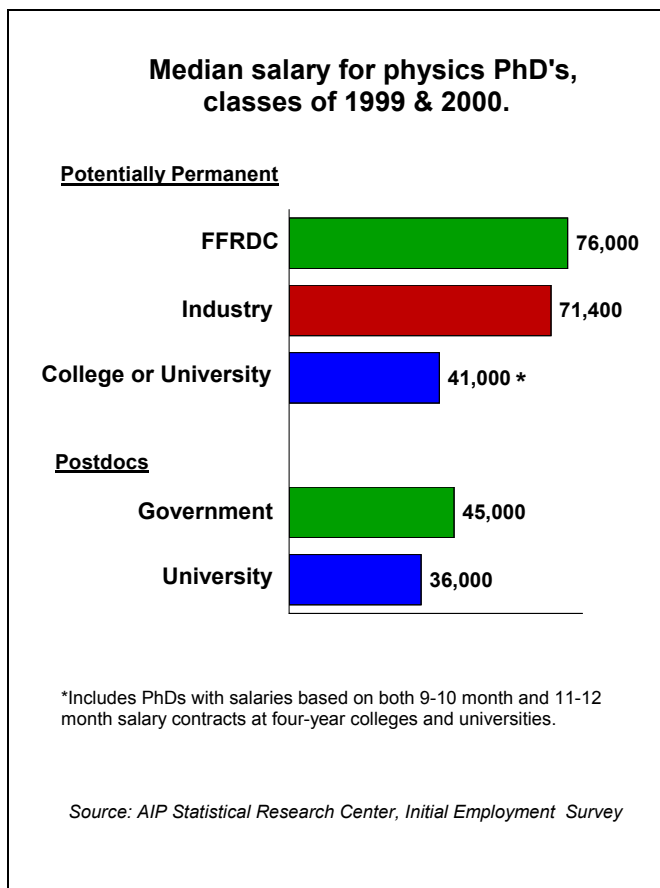
Interestingly, when you compare postdocs to potentially permanent, three-quarters of the postdocs indicated that they were working in the field of their dissertation. They went from their PhD to very similar research in their field. Another 20% said they were still doing research in physics, but they had switched to another subfield. And only 5% said they were in a related field, meaning they did not consider it directly to be a physics subfield. However, 50% of potentially permanent people said they were working in a related field.

For a physicist, a postdoc in a sense serves to expand their training, enabling them to gain more research experience. They are expanding and continuing their education or their research experience. Even though it is in the same specific field, they may be continuing their thoughts of what their dissertation was about or in other aspects of the same field.

In the survey, everybody, including postdocs, was asked if they considered their position professionally challenging. In addition, they were asked if they are using their education, if what they are doing is what they expected to be doing, if they are satisfied with their position, and if their position involves problem solving.



The graph above shows that, in terms of the professional challenges of their position, postdocs rate the highest for agreement. The red bar says they agree with the question. The blue bar at the top says they disagree. Only 5% of the postdocs did not consider their position professionally challenging. If that question had been asked in the early 1990s, there may have been a different spectrum of answers. Postdocs either had the highest score or very close to the highest score for all the different aspects of how they rated their position, indicating that in general, postdocs are very happy or content with the type of work that they are doing.



Physics postdocs in academia earn a median salary of \$36,000. Some people may say that after spending ten-plus years in the higher education system, somebody who earned a PhD in physics should command a salary greater than \$36,000, but compared to postdocs in other disciplines, \$36,000 is not that bad.

Postdoc salaries are not much worse than starting salaries for potentially permanent positions in colleges and universities. However, these college and university salaries are for new PhDs primarily going into four-year teaching positions. Most of them are not at Research I universities. The college university salaries are a mix of 9-10 and 11-12-month salaries. The industry, FFRDC, and government salaries are 12-month salaries.

Discussion:

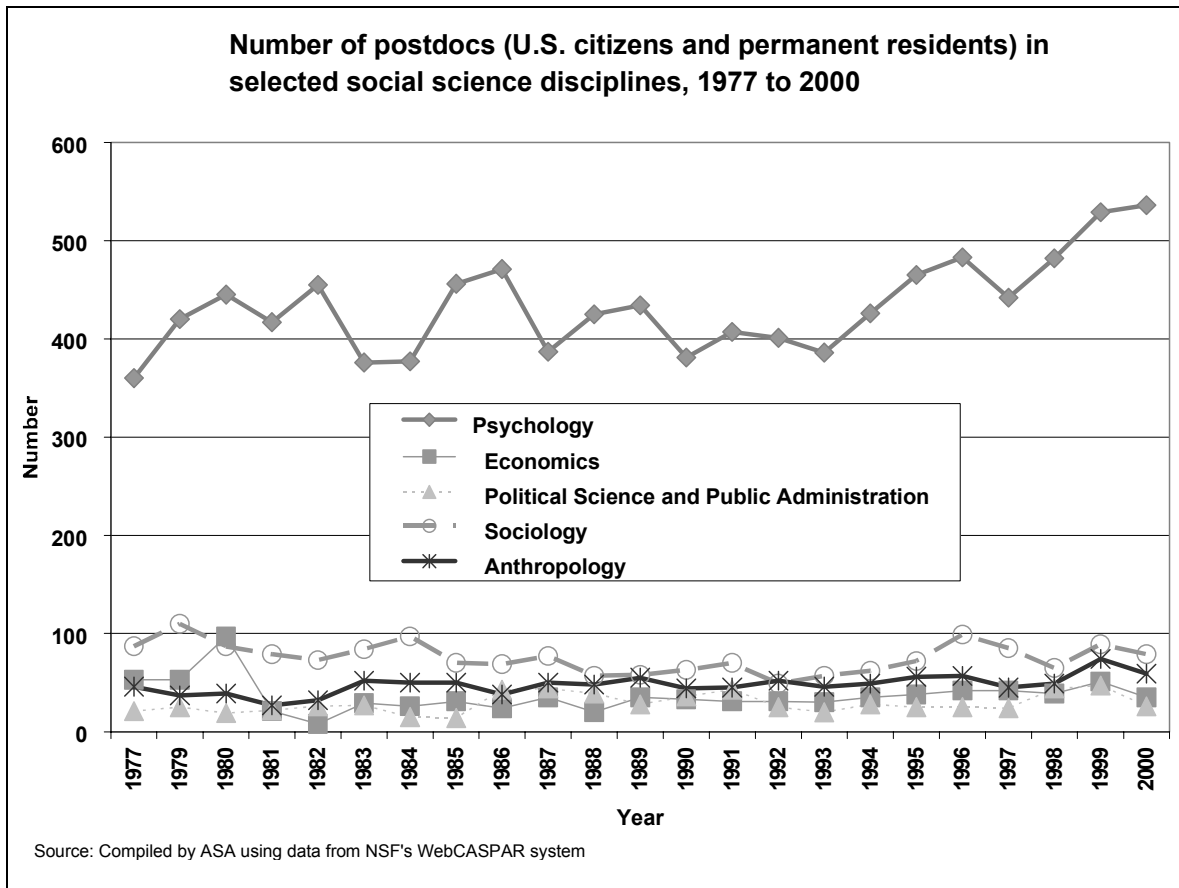
During the question and answer period following the presentation, the following points were made:

- For the last slide, could you ask people what the time period the salary is for? Mulvey responded that AIP asked them whether it was a 9-10 month salary or an 11-12 month salary. AIP used to try to adjust the salaries, but it was not the simplest thing to do.
- In biology, the U.S. postdoc pool includes those with U.S. degrees and foreign degrees. Is there a similar trend of people getting physics PhDs abroad and coming to the U.S. to do postdocs? Mulvey responded that there are a sizeable number of PhD physicists who come from abroad to work in U.S. universities. It is a great resume-builder for them and it is a great resource for U.S. universities.

- Do we know what proportion of the total physics postdoc pool goes on to tenure-track positions? Mulvey responded that only about one third of the new hires in Research I universities come from recent U.S. degree recipients. So if 500 were hired, only a third of those are going to be hired from the postdoc pool.
- On AIP's survey, did it ask about satisfaction in terms of challenging research, satisfaction with their working conditions, salary and benefits, and whether or not they get credit for their work? Mulvey said that a lot of questions like that which are more pointed toward issues concerning postdocs were not addressed. The data from the survey is coming from a general survey that went out to everybody and did not have a postdoc component that focused in on things that would have actually addressed issues for postdocs.

WHAT WE KNOW ABOUT POSTDOCS: PROFESSIONAL SOCIETIES

Presenter – Roberta Spalter-Roth, American Sociological Association



The data shown above come from WebCASPAR, NSF's online database on enrollments, degrees, postdocs, etc. The graph shows the number of postdocs in economics, political science, sociology, and anthropology, as low and relatively stable, although not that low when compared to the number of PhDs produced in those fields. Psychology is at the top of the graph, and most of those postdocs are clinical.

The postdoc in sociology is now a phenomena, and it appears to work well. It appears to be something that one might want to think about as a model for postdocs. A postdoc in sociology lasts one to two years. It gives you interdisciplinary training. And the result is that postdocs are more likely to get a tenure-track job at a Research I institution.

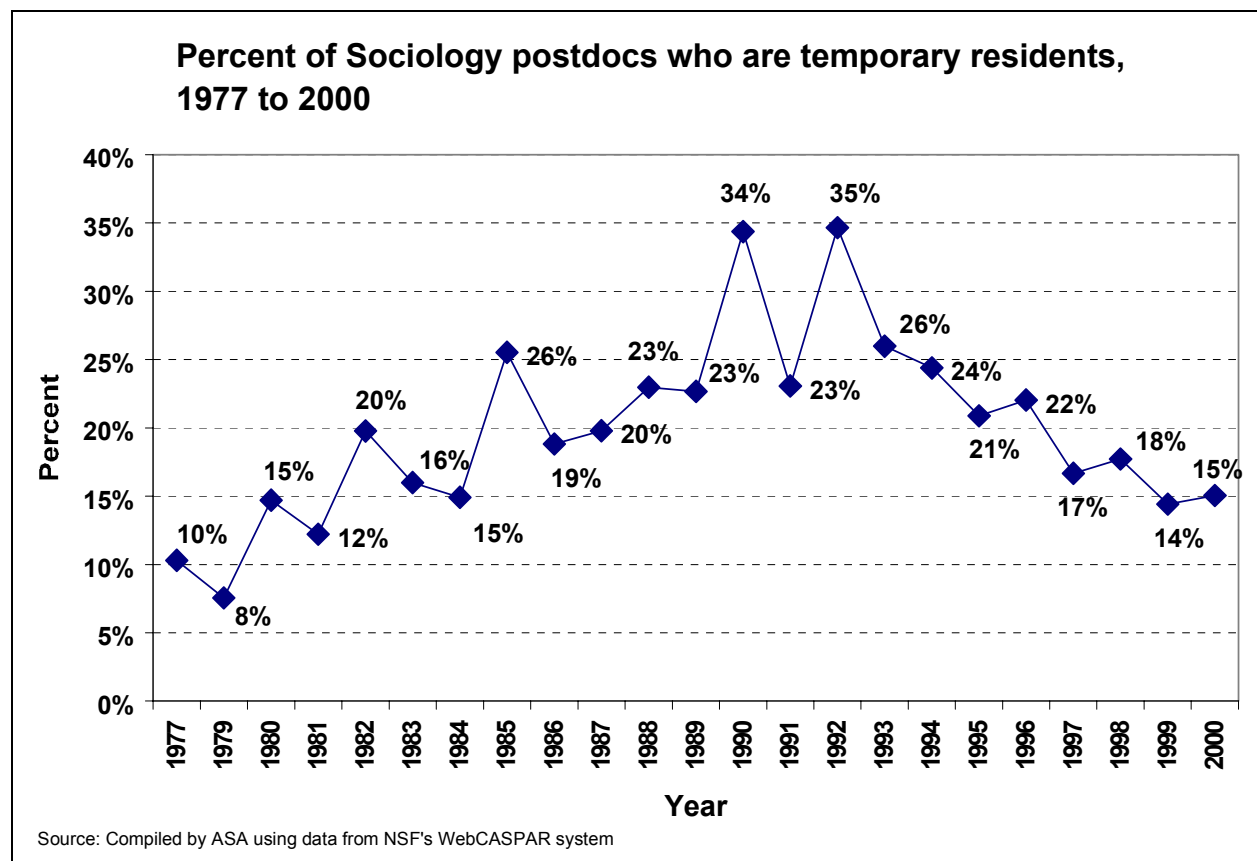
There was an increase in the number of postdocs in the early 1990s. There was an increase again in '95-'96. Both of these times were poor job market periods.

A higher share of women in sociology do postdocs than men. Why is that? There are a couple of hypotheses which need to be tested further. One is the "precious man" theory. The majority of sociology PhDs are women. Is it the case that men are getting grabbed up? This is true for African Americans in sociology. They are getting grabbed up as ABDs (all-but-dissertation) and getting jobs at Research I institutions. Their trajectory after that is not as fabulous. They get stuck on numerous committees, and they do not get mentored enough to publish.

Men may be picked up quicker in part because they have more publications than women. During graduate school, men are more likely to be mentored to produce publications than are women, so they have more publications. And “publications” is the biggest predictor of whether or not you are going to get a job at a research university in sociology. Conversely, women may use the postdoc as a period to publish more, or as a chance to get more specialized research training.

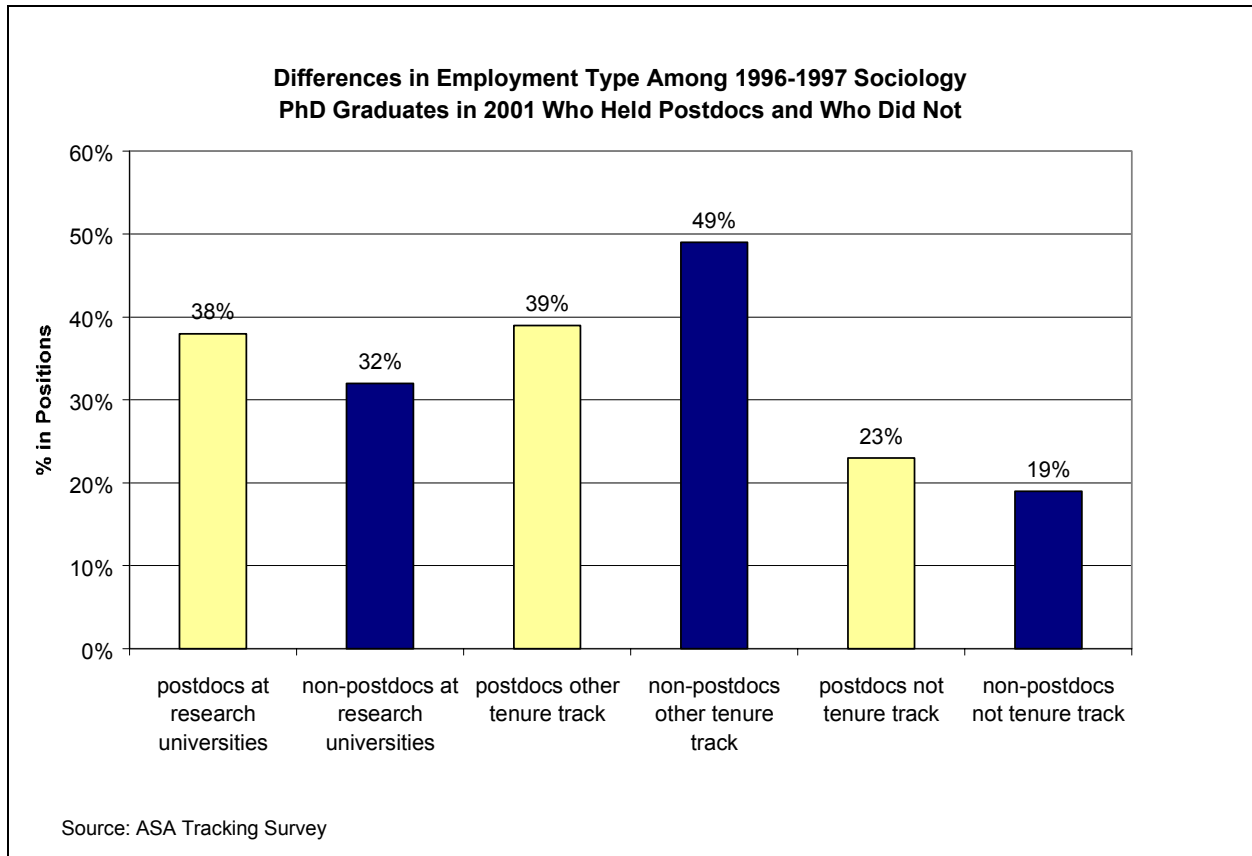
Employment bulletins advertising postdoc positions are saying that, basically, what postdocs are about is “interdisciplinary.” That is in part, no doubt, because of how they are funded. A lot of them are NIH funded. For example, sociologists are looking for the social causes, or the social context of AIDS or drugs or alcohol. Sociologists are working with life scientists and perhaps economists and political scientists to answer more applied questions.

Postdocs also do some teaching – about three courses a year. They are also encouraged to do research. The majority of postdoctoral positions appear to be very research focused, with the postdocs working on interdisciplinary teams and collaborating with mentors. Some are, in fact, very research focused and very isolating, where the postdoc is paid to do someone's research, but the majority are not like that. They seem to be something other than a cheap teaching or number crunching position, where the postdoc is sitting and doing runs day and night. They seem to be one or two years long. They emphasize formal training and informal collaboration, access to resources, and developing a ten-year research agenda.



The percentage of sociology postdocs who are temporary residents went up in the 1990s as seen above. About 15 to 25% of temporary resident PhDs go into postdocs. While this is certainly lower than physics, it is not insubstantial and it is a method for moving along the career trajectory.

Dr. Spalter-Roth did a study looking at people who had a one-year temporary position or a postdoc position in 1997, 1999, and 2001. Two years later, she looked at whether they were employed in a tenure-track job versus a non-tenure-track job. The postdocs were more likely to have tenure-track jobs than the people who had one-year temporary teaching appointments. Fifty-six percent of the postdocs who graduated in 1997 had a tenure-track job in 1999, compared to 48% of those who had temporary positions. The cohort was tracked again in 2001 and ASA received a small grant from the Sloan Foundation to track them again in 2003.



By 2001, 38% of the people who experienced a postdoc had a job at a research university, as seen above, compared to 32% of those who did not have a postdoc. While not overwhelming, postdoctoral appointments tend to do what they were supposed to do in the past – train the people who would do the heavy research in the field and prepare them to go on to research universities.

That might also be a function of the kinds of people who are selected for postdoc positions versus the kind of people who end up using temporary positions. The people who end up in postdocs tend to come from more prestigious research or doctoral universities. Whether that is a measure of merit or not is not known. Some merit measures may be merit, but network shows up over and over again in every regression, so that the people who get postdocs are the people who have very good networks in graduate school and expect to have lifelong bonding with their faculty mentors and with their fellow students.

Discussion:

During the question and answer period following the presentation, the following question was asked:

- In mathematics, some postdoctoral positions are highly selective, whereas if a department is just out looking for somebody to teach calculus, the selectivity might be different. Is that the case in

sociology, as well? Spalter-Roth responded: I printed out a list of all the postdocs available in January '02. The postdoc at Princeton is clearly for someone who will never see the light of day – for someone who will just number crunch. And then there's a postdoc at Amherst in which they will be teaching. But, again, the majority of postdocs seem to be research oriented, collegial, one to two years, and mentored, and so that it does seem that this IDP model is, in fact, being used at least in sociology and that it does seem to have the impact one would expect and hope that this model has, assuming one believes that the mission of research universities is to produce a lot of research and that is what should be emphasized.

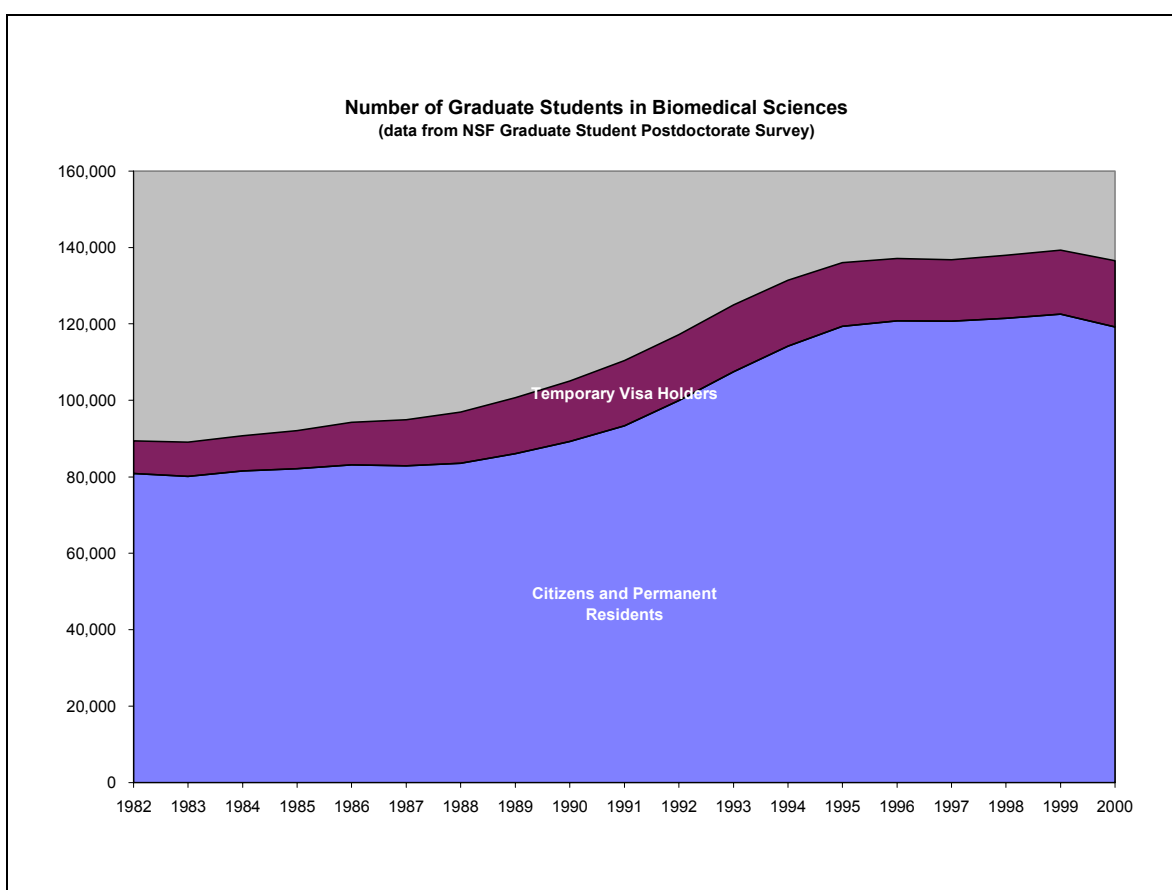
WHAT WOULD WE LIKE TO KNOW ABOUT POSTDOCS?

Presenter – Walter Schaffer, National Institutes of Health

This presentation will identify data needs for the NIH and will not just be limited to postdocs, but will include more about how NIH uses data and what gaps are in the available data.

NIH uses data primarily in three different ways. First, NIH uses data for the administration of large programs it runs. Secondly, data are used to try to get a handle on the labor market for individuals in NIH's training program. NIH asks the National Academy of Sciences to look at those types of issues, and is into the 12th personnel needs process right now. Thirdly, NIH uses data to do an evaluation of its' training programs.

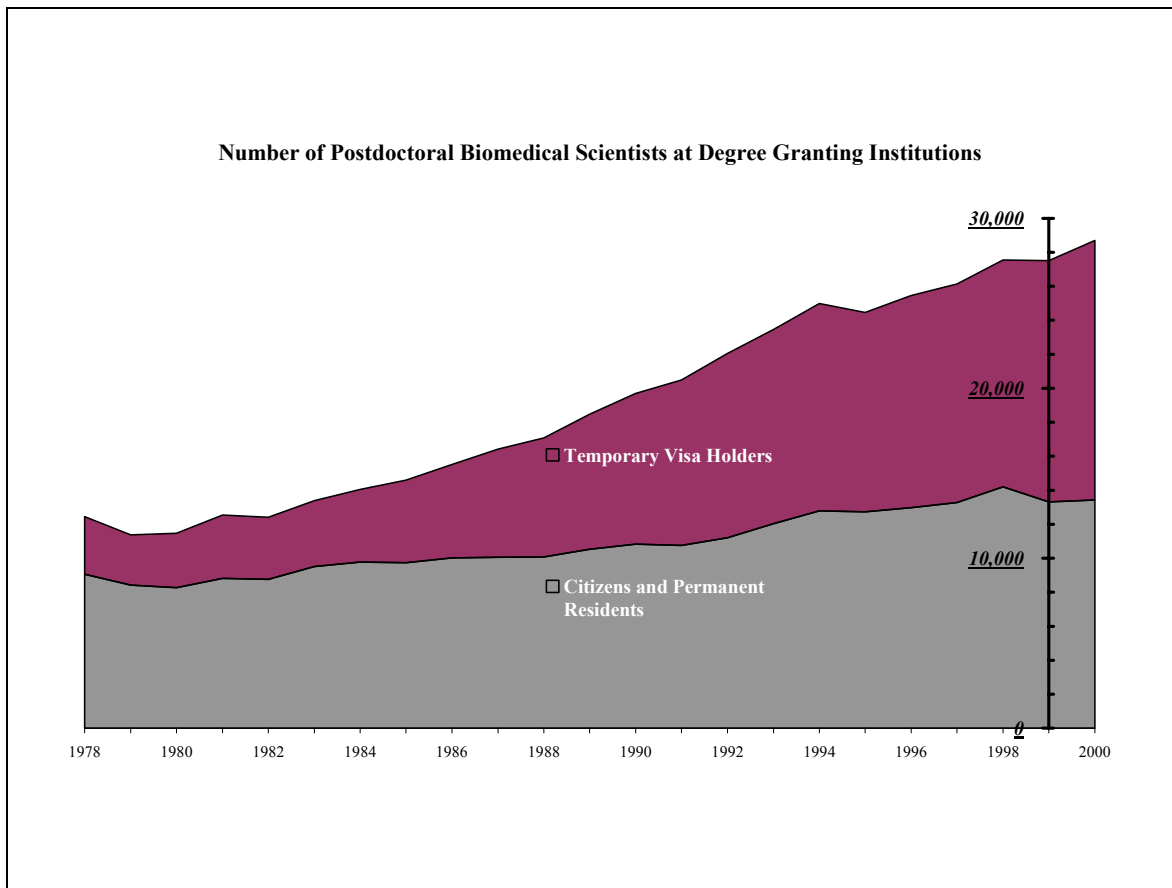
Thanks to the National Science Foundation, we know a fair amount about the number of students and the number of postdocs who are training in the life sciences. This presentation will provide a picture of the biomedical sciences and not the behavioral and social sciences, which are a totally different story.



For the biomedical sciences, there are about 140,000 students, about 20% of which are in the U.S. on temporary visas. As seen above, there was a plateau that began in about 1995, and there may be some drop in the number of graduate students in the pipeline right now.

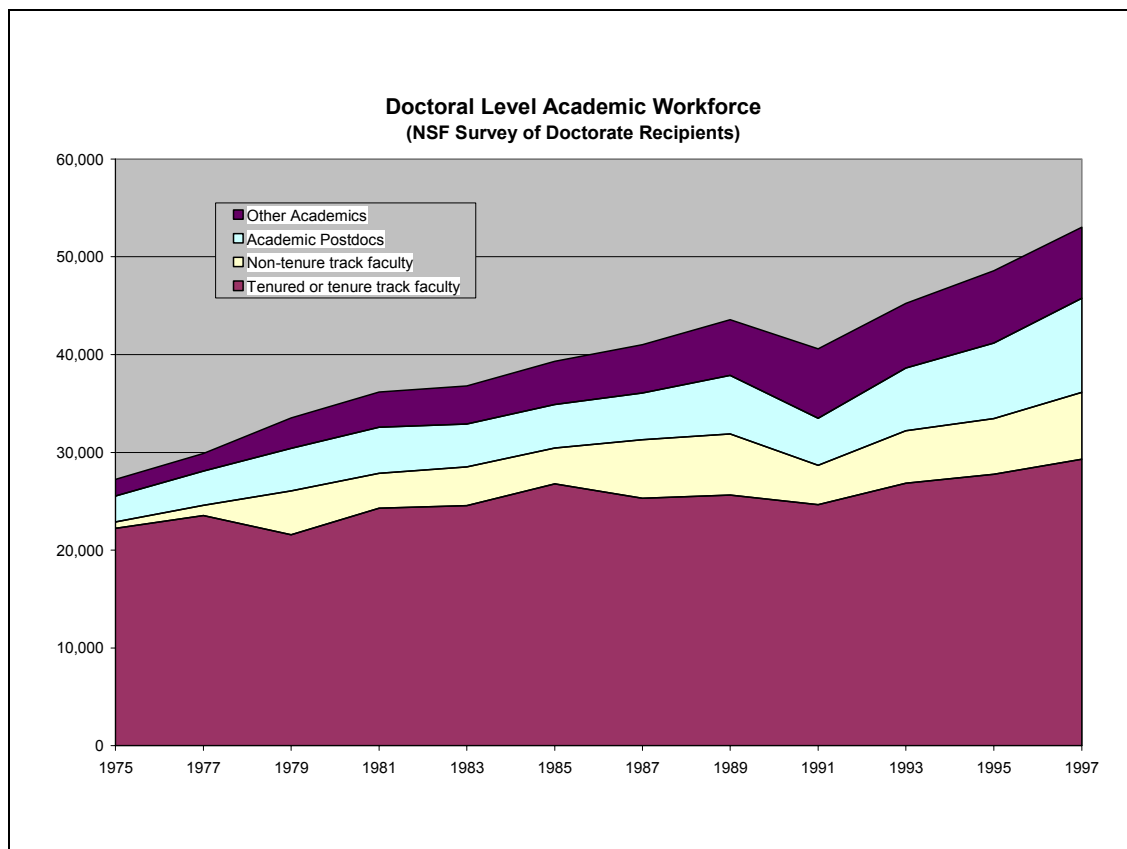
The available data on postdocs come from the Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS) which is done by NSF on an annual basis. Survey forms are sent to institutions and are filled out by department chairs. The survey gathers information about the number of postdocs in the department, how they are supported, etc. However, the survey is limited to individuals

who are in academic, degree-granting institutions. There are about 3,000 postdocs working at NIH who are not included in this particular survey.

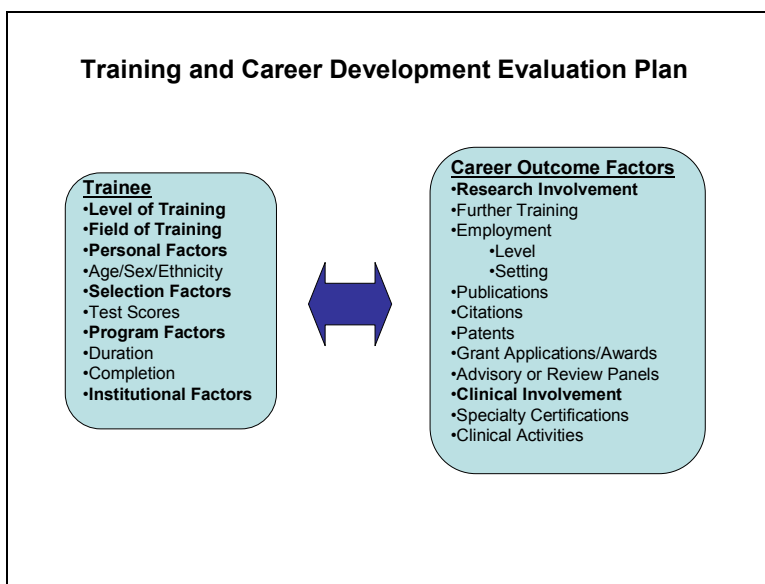


The situation for postdocs is quite different than it is for students. An increasing number of individuals have postdocs in the biomedical sciences. There are close to 30,000 postdocs in degree-granting institutions, and maybe another 10,000 or so in institutions that do not grant degrees.

Right now, 58% of those individuals at degree-granting institutions are here in the U.S. on temporary visas. That means domestic PhD production is not even coming close to the demand for individuals in postdoc positions. The information available on the doctoral level academic workforce is somewhat limited. It comes from another NSF survey called the Survey of Doctorate Recipients (SDR). This is a biennial survey that goes to a sample of individuals from the Survey of Earned Doctorates. If an individual received a degree in the United States, they may be in the SDR. If they did not get a doctoral degree in the United States, they are not included in the SDR.



Shown above are tenured faculty members in the academic workforce in the life sciences, non-tenured track faculty, academic postdoc (shown in light blue, second from the top, above), and other academics. Those who are classified as academic postdocs in biomedical sciences from the SDR only add up to about 10,000. However, the GSS count adds up to 30,000. There are some missing numbers in the SDR. There may be some classification issues between “other academics” and “academic postdocs,” but there is still a 20,000 gap. It should be noted that the foreign postdocs are not counted in the SDR because they did not get their degrees in the United States.



Another thing NIH does is training evaluation. NIH collects information on the type of training its trainees had and then looks at various types of career outcome factors as a means of evaluating the contribution of that training support to the ultimate career development of the trainees. This helps NIH shape the nature of those training programs to emphasize those factors that may be correlated with the types of career development in which NIH might be interested.

Evaluation of NIH Extramural Training and Career Development Programs

Central Data Available

- National Research Service Awards
 - ✓Trainees
 - ✓Fellows
- Individual Career Development Awards

No Central Data Available

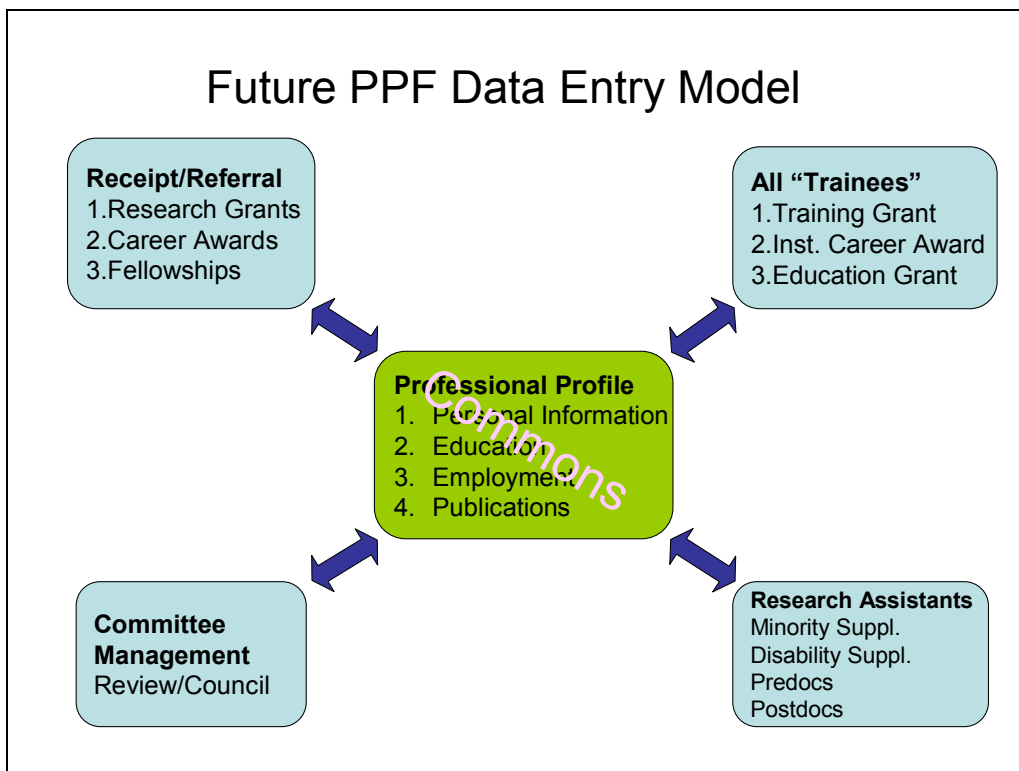
- Institutional Career Development Awards (K12)
- Education Grants (R25)
- Minority Supplements (SITS)
- Supplements for Individuals with Disabilities (SITS)
- Loan Repayment (LRP database)
- Research Assistants and Associates
 - ✓Graduate Students
 - ✓Postdoctorates

NIH does a good job collecting data for the National Research Service Awards and individual career development awards. Nearly 16,000 individuals are supported at any point in time under the National Research Service Awards. About 3,500 to 4,000 are under the individual career development awards. For many other training programs, there is no central data available, although efforts are underway to improve that.

Professional Profile (PPF)

- | | |
|--|--|
| 1. Personal Information | <ul style="list-style-type: none"> ▪ Institution ▪ Major ▪ Minor |
| <ul style="list-style-type: none"> ▪ Name ▪ SSN ▪ Sex ▪ Ethnicity ▪ Race ▪ Date of Birth ▪ Address ▪ Phone Number ▪ FAX Number ▪ E-Mail ▪ Citizenship ▪ Disability | 3. Employment |
| | <ul style="list-style-type: none"> ▪ Employer ▪ Address ▪ Work Phone ▪ Work FAX ▪ Work E-Mail ▪ Start Date ▪ End Date ▪ Rank ▪ Position |
| 2. Education | 4. Publications |
| <ul style="list-style-type: none"> ▪ Degree Awarded/Expected ▪ Year Awarded/Expected | <ul style="list-style-type: none"> ▪ NLM Accession Number ▪ Citation Text |

NIH is moving into a new data system, and in the future, applications will be submitted electronically, similar to Fast Lane at NSF. NIH will collect professional profiles on all individuals submitting grant applications. Right now, NIH collects this information, but it is in a paper bio sketch. That information has not been captured into a database, except for the principal investigator on research grants and for the individuals that are trained in formal training programs. In the future, this information will come in separately from the grant applications and will create a professional profile with identifying information, a list of their publications, and so forth.



In the future, individuals who have business with this system, whether they are trainees, committee members on review panels, councils, or research assistants on research grants, will create a professional profile. These individuals will be encouraged by the grant application process to keep this current. The principal investigator will want the reviewers to see the most up-to-date profiles for those particular individuals. That will give NIH a lot more information on the individuals it supports either as research assistants or as trainees, and it should allow NIH to evaluate its programs much more carefully than in the past.

Data Needs

- Census information on students and postdocs in non-academic settings
- Census information on all doctoral level researchers
- Identifying information on all students and postdoctorates supported by NIH
- Tracking information on students and postdoctorates who've had NIH support
- Identifying information on foreign research doctorates
- Longitudinal information on foreign research doctorates
- Identifying information on clinicians (physicians, dentists, nurses, etc) with research interests
- Longitudinal information on clinicians with research interests

So what are NIH's needs? NIH needs census information, not on students but on postdocs in non-academic settings, such as the 3,000 postdocs at NIH. No information exists on them. Also needed is census information on all doctoral-level researchers. Some of that comes from other sources such as decennial census information from the U.S. Census Bureau. Identifying information on all students and postdocs who are supported by the NIH is needed. This will allow NIH to match data with tracking information, so if somebody shows up as a principal investigator or as a staff member on a research grant in the future, NIH should know about it and be able to find that out.

NIH needs identifying information on foreign research doctorates, whether that can be done by matching the NSF information with the census or whether it might be possible in the future to get information from the Immigration and Naturalization Service or the State Department as part of the homeland security effort. This information would be very good to have that since foreign research doctorates are such a large portion of the biomedical workforce at this point.

Identifying information on clinicians is needed. The American Medical Association and the American Dental Association collect some of this information. NIH has worked with the Association of American Medical Colleges to look at some of these factors, but think there is a lot more exploring that could be done there.

Finally, NIH needs longitudinal information on clinicians, especially those with research interests.

Discussion:

During the question and answer period following the presentation, the following comments/questions were raised:

- What is the question which these data address? Is NIH trying to get a full picture of the labor market and NIH's place in it? Or is NIH trying to understand ways of improving careers to improve biomedical science? What are the issues NIH is going to use, because it is going to be a huge amount of data and it is going to be at a considerable cost to the PIs? Schaffer responded that it is not expected to cost PIs that much and that they could ask a student to complete that. Currently, when a program director on a training grant appoints a new trainee, they fill out not only

information about the appointment, such as when it is going to start and end, but they also fill out a lot of personal information about the trainee which they probably do not need to have access to, such as what their race is, when they were born, prior education, etc. In the future, the trainee will create the profile, and the program director, when they make the appointment, will just link to the profile that already exists. The appointment process for the PI actually becomes very simple.

- What can NIH do better with this complete data? Schaffer responded that NIH can do needs assessments much better if it has a more complete picture of what that labor market looks like. Secondly, NIH can begin to identify more carefully those characteristics of its training program that seem to be associated with future career success, however that is defined.
- Will the system collect information on salary and benefits? On what happens after the postdoc? If the individual publishes? Schaffer answered that it would be easy to monitor any transaction that individual might have in the future with NIH. Currently, program directors track their trainees for ten years. NIH could ask them to have the trainees update their profiles for ten years. NIH was not planning to collect salary information, but could certainly consider surveys from time to time to get some sense of what is going on. That will not be a permanent part of every profile.

WHAT WOULD WE LIKE TO KNOW ABOUT POSTDOCS?

Presenter – Carter Kimsey, National Science Foundation

NSF is all about three things: people, tools, and ideas. Very clearly for NSF, a postdoc has a human face. It is a person. It is a person with a lot of aspirations. It is a person that NSF has probably already invested a lot in. NSF has probably paid to have this person, as an undergraduate, work on somebody's research project in the summer. Maybe NSF has been involved in the curriculum development for their fourth grade science class. In lots and lots of places, NSF has already had an impact on that person and does not want to lose sight of the fact that a postdoc is, in fact, a person, and that our country needs that person to stay in science or engineering or mathematics and to continue to contribute to the vitality of the United States.

Sometimes when we talk about a "postdoc," we are talking about a kind of appointment. Sometimes, we are talking about a kind of experience. And usually, we are talking about the person. Perhaps we need a better vocabulary and better definitions. NSF's interagency committee on postdocs is looking at the definition of postdoc and what we mean by it. Is there a way to be clearer and also let people who are in this category know how much they are valued instead of just using this label that we stick on them? In other words, who are these folks?

Another question that NSF's postdoc committee is struggling with is where postdocs are and who knows they are there, because a lot of universities have no idea who on their campus is considered a postdoc. In some surveys and other cases, they are invisible.

Some postdoctoral scientists feel homeless, nameless, and unappreciated, that they are not really valued. Part of that has to do with the fact that nobody knows who they are, where they are, how many of them there are, how long they are planning to be there, and what anybody's obligation is to them.

We see postdoctorals as putting out lots of papers. We see them as pushing forward the frontier in most areas of science. They are the ones you go to. If you want to know the latest technique and if you want to be right on the cutting edge of how to do something, you are probably going to seek out the postdoctoral in that laboratory or in that research group. That is the person who is going to show you where the cutting edge is.

We really do need to know where these people are and what it is the institutions see as their responsibility as far as identifying these people and then mentoring them and doing the things that these individuals need. Likewise, we all know the contribution that they are making. They are the workforce of the future. They are going to be paying our pensions, so we have to care about them.

What does NSF's postdoc committee want to know about postdocs? It wants to know who they are, how many of them there are, and what their quality of life is in terms of benefits, health insurance, and retirement. Are they getting these things? If they are not getting these things, what are their needs for these? What stage in life are they? What salary requirements do they have? How much debt do they have coming out of college and graduate school? Is that keeping certain segments of our population from even entering this enterprise? In terms of diversity issues, is that falling harder on some groups than on others? These are the kinds of things that the committee wants to know about this group of people.

Postdoctorals should be learning something. Regardless of what they have been trained in as a graduate student, they will likely need to know more before they go out and teach courses, much less do research in any area. So they need training. Also, postdoctorals need to get and give mentoring. What is the role of postdoctorals in mentoring the next generation behind them?

Postdoctorals are obviously going to be doing some kind of research, but are they going to learn to collaborate? Are the collaborators going to be available to them? Is it going to be easy for them to

work with people in industry or is it going to be a barrier for them to work with people in industry? What about international issues?

Increasingly, if postdoctorals are going to move on into the academic world, some kind of teaching experience is needed. Just a few years ago, people were saying they might hire someone with a postdoc or not. Now, CVs need to show experience teaching. It is not enough to do research. You really have to be a super person to get a job in almost any sector, most particularly in academia, and we are certainly hearing more about teaching. How do we work that into this already very full plate that is in front of these folks?

These are some of the issues that NSF's postdoc committee is grappling with. There are variations from field to field and there seem to be some really high barriers in some fields for postdocs to do any teaching, despite what we have heard for mathematics and sociology.

One of the things that NSF cares a lot about is integrating research and education, so NSF is really trying to get activities going and keep activities going that do a good job of integrating research and education. But NSF also wants to do that at a personal level. NSF sees the postdoctoral period, however long or short it is, as an opportunity for the individual to integrate their research activities with their education activities.

NSF also sees it as a time for postdocs to establish some independence. NSF is looking at ways of changing the culture to create more independence on the part of the postdoctoral researchers so that they get credit for the work that they do. Intellectual property is certainly an area to be concerned about, and that is something that NSF is looking at, too.

We hear a lot about how unhappy people are with the postdoctoral enterprise. The postdocs themselves are not necessarily having good experiences and they themselves are doing a lot to change that situation. NSF is working with them to ensure that really effective change takes place for them.

NSF has a hard time figuring out in any given year how many postdoctoral people it is supporting, because all it gets are people's estimates of how they are going to spend the money. NSF does not get a line-by-line itemization of how the money was actually spent.

So the only data available is how many postdocs are listed on research grants, and in 2001, NSF thinks it supported about 4,400 people under this category. Three thousand of these were on research grants that were under \$500,000. That might be per year or it might be multi-year, but that is not clear from the data. In those cases, the institution is the grantee and so the institution sets the policy, the salary, and the fringe benefits for those individuals on those grants. Eleven-hundred-and-fifty are on grants bigger than \$500,000, which means they are on a combination of research grants and training activities.

There are about 250 postdoctoral fellows who are supported on individual awards. That is a grant to them directly. Those awards are really the only ones where NSF can control the stipend, the fringe benefits, and anything about the award, because those are grants NSF makes to a person. The stipend range right now for postdoctoral fellows is \$33,000 to \$45,000 and that is probably going to go up.

So, although the National Science Board has a policy on NSF postdoctoral fellows, that policy is only applying to 250 out of 4,400 people per year. However, it is still a pretty good policy. That means the different scientific disciplines at NSF can either have postdoctoral fellowship programs or not, as they perceive the need in their field. The idea, though, is if they are going to have a postdoctoral fellowship program, they must pay a competitive salary and must provide benefits for the individual.

Postdoctoral fellowships are done early in the career. Usually, that means within two or three years, sometimes four years, of receiving the doctoral degree. The postdoc is limited in time, normally two or three years. NSF wants to make postdoctoral fellowships available to more people than now. The idea is to maximize these independent postdoctoral fellowships enabling an individual to submit a proposal with a sponsoring scientist, apply for money, and have the grant awarded directly to the individual.

But there have been a lot of questions asked of NSF; primarily, why some people get treated the way the postdoctoral fellows get treated but the remainder of the 4,400 do not. Another question is if NSF should have a Foundation-wide policy on postdocs. This is what NSF is grappling with now.

There are pros and cons. One of the main drivers for this is the disincentive for undergraduate and graduate students who see postdocs treated so badly. Should there be some kind of policy that refers to everybody?

If NSF sets certain standards, other people in the federal government will probably follow them. If NSF decides that this is a group that really needs to be treated in a different way and if NSF starts doing that, there will be some benefit. Some people are saying not to do it or that NSF cannot afford it. They claim there will be postdocs at an institution who are being paid more than the starting faculty. NSF's philosophy on postdocs is that it is really an important career development activity and that is what NSF is interested in emphasizing.

The idea that there are 30,000 or so postdocs who are contributing to the U.S. economy and contributing to the knowledge generation is really important, but NSF is trying to focus on the career development aspects of postdocs and what it is that NSF needs to be doing to give these people the best career development activity as a continuum. There are a lot of K-12 programs, undergraduate research programs, and a lot of activities for graduates, but there is a big gap before the career awards, where people who have tenure are then coming in for grants. What can be done for the people that are in between?

A big issue for program officers is that if new programs are devised and goals are set, how then is progress measured on if those goals are met or not?

Kimsey went through the individual program announcements of NSF postdoctoral fellowship programs, to find out what people at NSF think they are doing when they create and run a postdoctoral fellowship program, and what would be the data that NSF would have to collect to determine whether or not they are getting the kinds of outcomes that they think they want to have. One is diversity, but in all the available data, the sample sizes are so small on underrepresented minorities that there is not a lot we can talk about. But it is important. Diversity is important and certainly a value that NSF holds very highly.

Interdisciplinary research was mentioned earlier. The postdoctoral period is a time to become really versed in more than just one field. From anecdotal evidence the postdoctoral period appears to be when people who do really significant interdisciplinary research got started doing it. Is there some way that by devising these programs NSF can encourage that to happen?

NSF just started a new program this year in interdisciplinary informatics with the math and physical sciences group to see what the perceived need is to get more people from math and physical sciences working in biology. Is the perceived need real? NSF is running a program and will be able to tell in a couple of months if that is real, because the proposals just came in.

Another important area that NSF is trying to address with postdoctoral fellowships is the idea that there are fields that we are losing in the U.S., where maybe we had leadership in the past but we just have so few people working in the area. Microbial biology is an example there.

New fields are also important, but what are they? A few years ago, everyone was talking about informatics, but what is the next new field? How do we decide what it is and how do we get there to get people trained so that the workforce will have the people that it needs?

Finally, the National Science Foundation is all about responding to new scientific opportunities. We do not ever want to forget that. NSF is trying to do something about the vitality in all areas of science, to be open to new scientific opportunities.

Discussion:

During the question and answer period following the presentation, the following questions/points were raised:

- This presentation discussed the partnership between the postdocs and academia and tying the research objectives to academia. Can you talk a little bit about tying the research objectives to anything NSF is doing with industry? Kimsey noted that the engineering group, particularly, has for a number of years had a program encouraging academic scientists to spend some time in industry, and it has worked somewhat. It has worked better at the graduate student level than the postdoc level. NSF also opens all of its postdoctoral fellowships to people who want to take a fellowship in industry.

Kimsey mentioned that there are a lot of people in academia advising students, who do not know anything about the industrial career track. They do not know anything about how to interview with industry. NSF is looking for ways to strengthen those collaborations, and is hoping to do that through training grants. NSF has a pretty good track record of having NSF engineering centers have industrial partners, and those are the places where industry collaborations have worked the best. In the biotech areas and in a lot of the social implications work that NSF sponsors, there is a serious interest on the part of industry, but NSF has not found the right model yet. Part of the effort is to come up with better models and maybe support a center or two where people can show NSF how to do this.

Kimsey also mentioned that international is another area. For example, NSF is encouraging research experience at undergraduate sites to be held in international organizations or foreign universities for the same reason. A few people know how to do it, but they need to teach others.

- Do the postdoc numbers presented include all the supplements NSF gives for international? Kimsey answered yes, that this is right out of budget line item data and does include international. She also noted that many people are not necessarily supported on a grant for the whole year, and may have been funded for only a month or two, so it is very complex.

WHAT WOULD WE LIKE TO KNOW ABOUT POSTDOCS?

Presenter – Debbie Stine, National Research Council

**What Would We Like to Know
About Postdocs?**

Deborah D. Stine
 Associate Director
 Committee on Science, Engineering,
 and Public Policy (COSEPUP)

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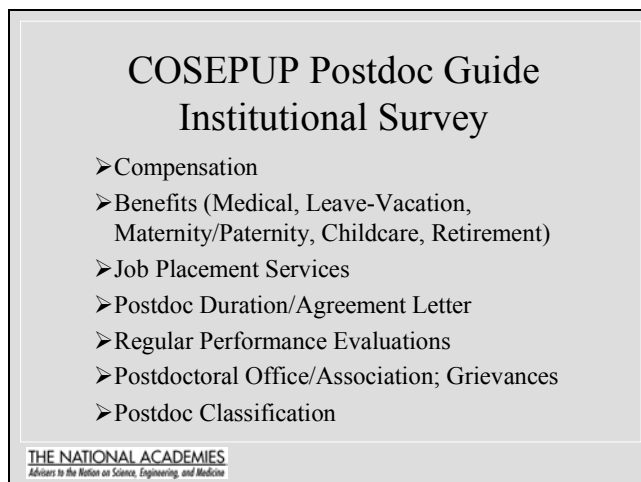
COSEPUP

- Joint committee of National Academy of Sciences, National Academy of Engineering, and Institute of Medicine
- Related Activities: Enhancing the Postdoctoral Experience of Scientists and Engineers; Reshaping the Graduate Education of Scientists and Engineers
- www.nationalacademies.org/cosepup

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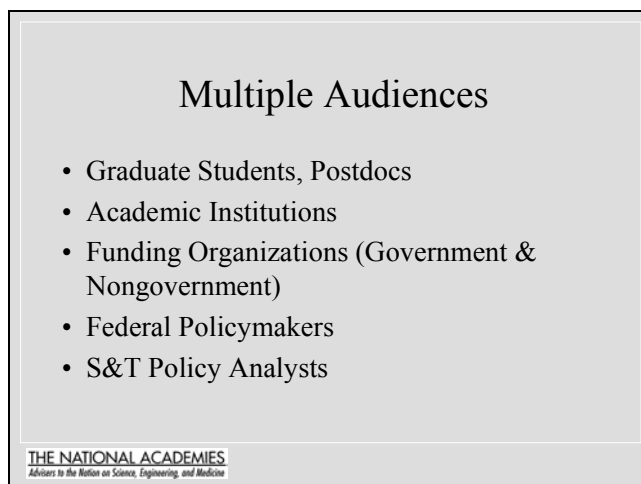
COSEPUP is the Committee on Science and Engineering Policy. It is a joint committee of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. It is actually not under the National Research Council, but under the three academies, and it includes only members of the academies. Its overall charge is the health and well-being of the scientific and technical community as a whole. COSEPUP looks at about 500 issues a year, and the well-being of the U.S.'s human capital has consistently been an issue throughout recent years.

COSEPUP has done several things to address this issue, two of which form the basis for this presentation. The first was a publication issued in 1995 called Reshaping the Graduate Education of Scientists and Engineers and second was a publication called Enhancing the Postdoctoral Experience of Scientists and Engineers. This second publication is a guide for postdoctoral scholars, advisors, institutions, funding organizations, and disciplinary societies.



As part of the postdoc guide, which was issued about two years ago, COSEPUP collected data, both qualitative and quantitative. COSEPUP did an institutional survey looking at a whole range of issues – compensation, benefits, medical leave, medical benefits, vacation, maternity/paternity leave, child care, retirement, job placement services, limits on the postdoctoral duration, formal agreement letter, regular performance evaluations, postdoctoral offices or associations, grievance policy, and how postdocs are classified.

In addition, COSEPUP conducted about 40 focus groups at institutions across the country, with all different types of postdocs in government, industry, and academia, in many different disciplines. That data, plus the whole collection of NSF data, is what led the committee to make its recommendation that the postdoctorate experience be enhanced.



There are multiple audiences to consider when addressing the question of what we want to know about postdocs. The first audience consists of graduate students and postdocs. They are, in general, the least considered when it comes to the generation of data. Data are generally not designed for their use, it does not answer the questions that they have, and it is not produced in a timely enough manner for them to make decisions. They are the most important audience of all these multiple audiences.

Then second audience is academic institutions. A lot of them are making major decisions right now about postdocs and they need to know a lot more about their own postdocs and what other institutions are doing. Funding organizations, both governmental and nongovernmental, are another

audience. This includes funding organizations such as HHMI and other foundations that support postdocs. Federal policy makers are also an audience. In addition to the agencies themselves, this includes the House Science Committee, the Office of Science & Technology Policy (OSTP), etc.

The final audience is S&T policy analysts. Sometimes data are generated more for these people, although the graduate students and postdocs are the most important. These individuals should be at the top because they have to make day-to-day decisions that affect their entire lives.

Graduate Student/Postdoc General Questions

- Will a postdoc enhance my career?
- Where do postdoc attain employment after the postdoc is over?
- How long does it take a postdoc to find a professional job?
- How long should I stay in a postdoc so that it benefits as opposes to harms my career?

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It would be good to have graduate student/postdoctorate focus groups to really enhance these questions. For example, will a postdoc enhance my career? Where do the postdocs obtain employment after the postdoc is over? Do most of them go to academic positions? Do they go to industrial positions? How long does it take a postdoc to find a job? How long should I stay in a postdoc so that it benefits as opposed to harms my career?

Graduate Student/Postdoc Institutional Questions

- Where are the best places to do a postdoc?
- What will I get paid if I'm a postdoc at a particular institution?
- Will I receive medical and other benefits?
- What if I have a problem? Is there someone to help me at that institution? Is there a postdoc office? Is there a ombudsperson?

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Then there are the institutional questions, and these are not only for graduate students, but also postdocs, because people are doing multiple postdocs. These are things a postdoc might want to know before going to an institution to know whether or not it was a good or bad place to do a postdoc. Where are the best places to do a postdoc? What will I get paid if I am a postdoc in a particular institution? Will I receive medical and other benefits? What if I have a problem? Is there somebody who is going to help me? Is there a postdoc office? Is there an ombudsperson?

Academic Institutions

- How does my institution compare to others in terms of
 - Number of postdocs
 - Postdoc working conditions
 - Postdoc title(s)
 - Funding sources
 - Institutional infrastructure?

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A lot of academic institutions have made significant progress over the past couple of years in making the initial steps to improve the quality of life for their postdocs. Other institutions are thinking they should perhaps do more, and might be wondering how their institution compares to other institutions. Academic institutions that want to get the best quality postdocs, might want to know how their institution compares to others in terms of the number of postdocs, the postdoc working conditions, the titles that are being used, the funding sources, and the institutional infrastructure. In other words, is there somebody who cares about postdocs on that campus? The same is true for federal laboratories and similar places. They do not necessarily have someone who cares about postdocs and brings them together.

Funding Organizations

- How does my federal/non-federal organization compare to others in terms of
 - Number of postdocs supported
 - Compensation and benefits (medical and other) provided to postdoc
 - Funding provisions (e.g., If we provide funding for a postdoc, we require the institution to provide medical benefits)

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Funding organizations might want to know how they compare to other organizations, and what compensation and benefits other organizations are giving. For example, if we provide funding for a postdoc, do we require an institution to provide medical benefits?

Federal Policymakers

- Are funding organizations/institutions treating postdocs appropriately in terms of their working conditions?
- What would be the costs and benefits of alternative models to the research assistantship such as traineeships and portable fellowships?
- Should OMB, IRS, and federal research organizations change their rules and policies regarding their treatment of postdocs?

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Federal policymakers might want to know if organizations are treating postdocs appropriately in terms of their working conditions, and what the costs and benefits might be for alternative models to research assistantships. At the last COSEPUP meeting, there was a lot of talk about this. Several times, COSEPUP has recommended traineeships and portable fellowships where there is more control. NSF is a good example of this. Out of the 4,400, they kept control over 200. If you switch everybody over to fellowships and you made them competitive, you have a lot more control over their salary, their benefits, and their working conditions, and researchers would compete to get those people who were on those fellowships. What would that involve? What would the impacts of that be?

A lot is heard about OMB, IRS, and Federal research organizations in terms of their rules and policies regarding their treatment of postdocs. For example, postdocs want teaching experience, but there are some rules on fellowships that forbid postdocs from gaining teaching experience. Some postdocs have gained teaching experience on the side at community colleges or other places just to make themselves more marketable for getting a job. There should be some sort of survey on what all of these different rules are.

S&T Policy Analysts

- What are the trends?
- Are postdoc working conditions the same, worse, or better than in the past?
- What actions are institutions taking to improve postdoc working conditions?
- Are postdoc working conditions discouraging Americans from entering science & engineering?


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For the analysts, what are the trends? Are people getting paid better than in the past? Are more people getting benefits? Are there more postdoc offices? Are things getting better? Are they getting worse? Are they the same? What's happening? And what actions are institutions taking to improve working conditions?

Are postdoc working conditions discouraging Americans from entering science and engineering? This is becoming a more and more critical issue, one we hear a lot about these days. The S&T enterprise is very much dependent on foreign students. Americans have many options to them. What if there was a 10%, 20% or 30% decline in the number of foreign students or foreign postdocs? What would happen? Would the S&T enterprise be able to function as it functions now?

Timeliness of Data Analysis

- NSF should work with disciplinary societies and other organizations to provide them with access to preliminary raw data
- As a service to their members, disciplinary societies could then analyze information such that it would be useful for graduate student/postdoc decisionmaking



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Another key factor is the timeliness of data analysis. COSEPUP has recommended numerous times that NSF provide more timely data, data that are not two years old, and COSEPUP realizes that this is hard. COSEPUP came up with a new plan in which NSF should work with disciplinary societies and other organizations to provide access to the preliminary raw data, and then as a service to their members, the disciplinary societies could analyze information so that the graduate student or postdoc could use it in their decision making. That is something that would hopefully be under consideration. People are making decisions every single day that affect the rest of their lives. It would be nice if they did it with better information. A lot of federal U.S. dollars are spent collecting this information. Let's make it so that people can really use it.

Discussion:

During the question and answer period following the presentation, the following questions/comments were raised:

- Postdocs and funders might want to know the number of tenure-track faculty positions open by discipline. Nobody really seems to know that information. There are estimates, but not very reliable ones. Stine responded that she did not get into job market questions because she was thinking of this as an examination of the postdoc situation. Obviously, we would like to know a lot more about what the job market is like for postdocs when they leave a postdoctoral position. Interestingly, less than 50% of S&E PhDs go into academic careers. What would that number be if you took that same analysis for postdocs, and again, by field?
- If a postdoc is really just an extension of the PhD training process and you do not want to produce more people than there are jobs, you would probably have about a third as many postdocs in the biological sciences as you have now. If you think the postdoc is something that provides training for a whole lot of things, then you would want to have more of them. And if you think it is a way of having a very large pool of people from which to select only the very best for permanent careers in biological science, then you have a different number altogether. And finally, if you were thinking about this as a way of being able to use research money well and minimize the cost of

inputs while maximizing research output, you would think this was a very nice pool of people to have to accomplish that. We have to think about the multiple ways this postdoc pool is used.

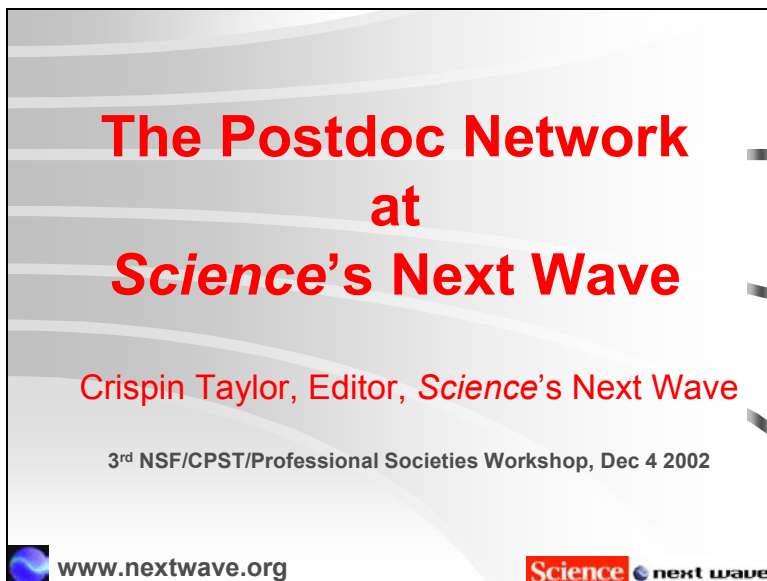
Stine responded: I have encountered faculty members who believe in the survival of the fittest atmosphere. They just want the best talent, whether or not those postdocs are American or foreign. But part of thinking about this is looking at the overall national policy in today's world and what it is that we want. It is the responsibility of the Federal Government and Congress to decide this should be the goal of our policy, and then the Federal agencies can follow that, whatever those goals are. Right now, there are mixed goals and some dominate more than others. That is why we need somebody to say, yes, the goal should be an educational experience and we should not necessarily be telling more people to enter into this area without providing a realistic estimation of their prospects.

- You need to collect data or phrase questions in a way that makes it clear how different the different postdoc experiences are. It should perhaps be what possible careers am I targeting and what type of postdoc experience related to that career is going to be the one that is going to be best for me? I think that different institutions will have different things to present that might work very well in a given field for one career outcome, but very different for a different career outcome. That is the kind of information that is absolutely essential. Stine responded: Should you do an industrial postdoc or not? You would think an industrial postdoc would enhance your ability to get an industrial career, particularly with that industry, but actually, we have been told that is not necessarily true. Industry is more likely to hire somebody who did an industry postdoc elsewhere. So it is career specific. That is why it is so important for graduate students, a year before they graduate from PhDs, to think about what their career goals are and develop a plan for doing that.
- The question of if a postdoctoral experience in industry helps you get a job in industry is going to be very specific by company. At Procter & Gamble, it is a big help. In other companies, it closes the employment door forever.
- For chemists, it is also different by discipline and outcome within the field.
- I am totally in sympathy with the fact that you worry about the quality of life for postdocs. Is it a good, positive experience? Is it not? Does it differ from discipline to discipline? But we have all talked about life science as sort of the exception. The length of time as a postdoc is getting longer. They are getting older. But the problem is the number of doctoral students we are producing every year. The number of PhDs coming out of this country on a yearly basis in life science is growing and growing. Chemistry is pretty flat, and in physics and math, not a whole lot is going on. These new PhDs in life science have no place to go, so the postdoc field becomes a holding pattern for them. That is a supply/demand issue that I would hope somebody could fix by slowing it down or tempering the growth curve. It is driven by funding. It is driven by the need for postdocs in academia to get work done, but when they have completed their two- or three-year stint, there is no place to go. How do you fix that?

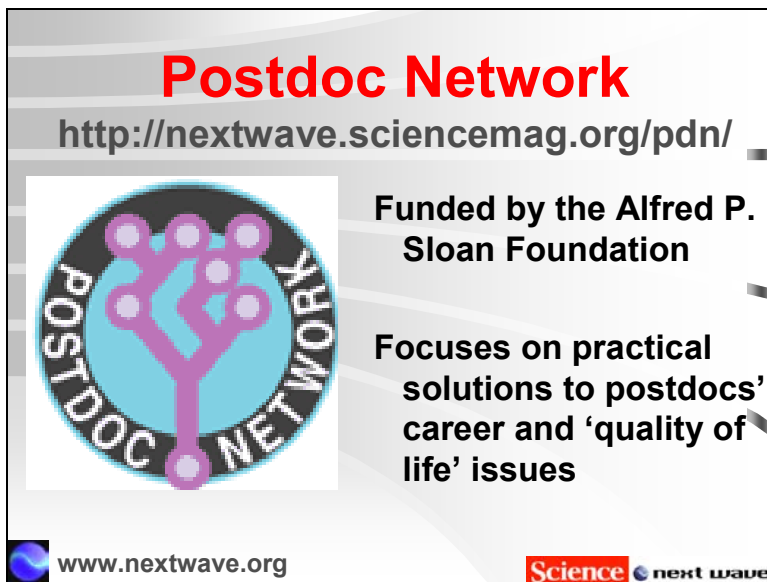
Stine responded: It is all your perspective of the world. The postdoc graduate student has one perspective in terms of promises made and promises not kept, but researchers need all those graduate students in postdocs to teach their classes and do their research. There are a range of views. Just like with industry, there are also a range of views among academics on these types of issues. That is why it is important to have some sort of national policy on it and have more control over what is happening.

CURRENT ISSUES UNDERWAY

Presenter – Crispin Taylor, Science’s NextWave



The Postdoc Network is a resource that has been available for two years now through *Science’s* NextWave. It speaks directly to some of the issues that have been addressed today in a practical, focused, and direct manner. It does not have a lot of information or data. It does not address those needs, although it distills some of the reports that are coming out. However, it does offer practical and immediate advice to postdocs and those that would mentor them.



The URL for the site, which is edited by Laurel Haak, is <http://nextwave.sciencemag.org/pdn/>. The site has been funded by the Sloan Foundation for two years. The site’s objective is to provide practical solutions to postdoc career advancement and quality of life issues. In that sense, it adopts a model that *Science’s* NextWave has used to great success for the last seven years, which is to let people tell their own stories about what they have been trying, what is working, what is not working, and also to

offer expert advice, as well. In this context, those people are society representatives, program offices, postdocs, or administrators at universities.

**The Postdoc Network
Launched in November 2000**

“to facilitate communication and interactions between postdoctoral researchers and their associations, societies, and offices across the country via a free on-line postdoc community.”

www.nextwave.org Science next wave

The mission of the Postdoc Network as elaborated to the Sloan Foundation is to facilitate communication and interactions between postdoctoral researchers and their associations, societies, and officers across the country via a free online postdoc community. The key points are that it is free, it is online, and it tries to speak to everybody involved in the conversation about postdocs and their career development.

The Postdoc Network

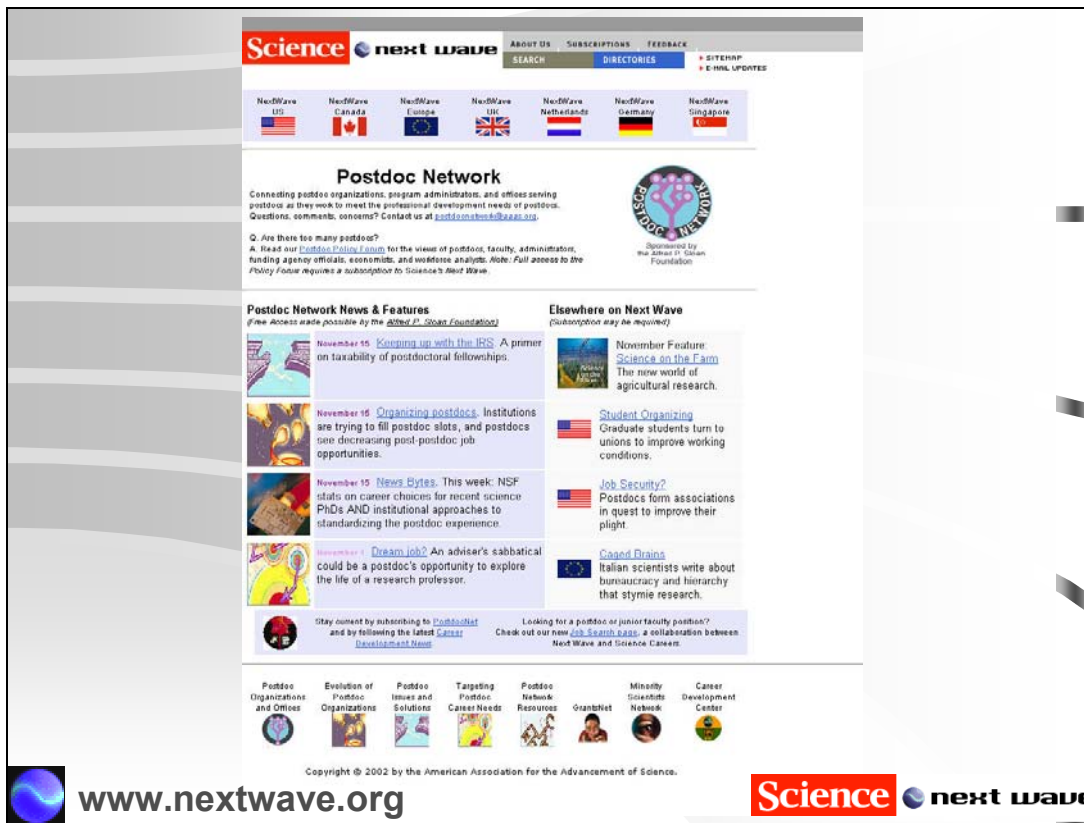
- The PDN has been the only national resource focusing full-time on postdoctoral matters, without regard to departmental or institutional affiliation
- We are working with several movements that appear to have the potential to sustain the national interest in enhancing the postdoctoral experience

www.nextwave.org Science next wave

Up until very recently, the Postdoc Network was just about the only national resource that focused full-time on postdoctoral matters without regard to discipline or department or institutional affiliation.

In addition to publishing the site and creating articles on a twice-a-month basis with this kind of information in it, the Postdoc Network has been working with several other groups and individuals to help improve the quality of information it can offer and also to keep the debate on postdocs moving in this

country. For example, Laurel Haak recently put together some of the disparate data that people have collected on postdocs to do an “uber survey in the raw,” which will be posted on the website.




The homepage for the Postdoc Network is refreshed twice a month. There are a couple of important things to point out about the homepage. First, at the top, there are a series of flags. The NextWave site, which is a career development and career mentoring site, began in the U.S. seven years ago and has since expanded in North America to Canada, across Europe, and throughout the world. On the European portal, access to the site is now provided to 27 countries in Europe.


On the homepage, the articles listed on the left side are Postdoc Network articles that are freely available. Laurel Haak also highlights a number of other articles from NextWave that are controlled by subscription, and individuals have access to those either through their institution, or in many cases, through their disciplinary society. A number of the disciplinary societies have purchased access to the site for their members and they come in through private member-only portions of the disciplinary society websites.

At the bottom left, there is a link for postdoc organizations and officers. That is a link to a variety of institutional policies and procedures.


Postdoc Network



Issues and Solutions
Practical solutions for quality of life issues – status, salary, benefits, childcare, and more. *(42 articles)*



Targeting Postdoc Career Needs
Tools to help your organization meet postdocs' professional development needs. *(37 articles)*



www.nextwave.org



In terms of the content, the Postdoc Network focuses on three particular areas, and then provides a general resource pool in addition to that. Links to those four areas of the site are also included on the bottom of the main page. Each link provides an index of all the articles in each of these content areas.

The first area is issues and solutions. This includes quality of life issues, postdoc status in the institution, whether they are employees or students from the institution's perspective, salary, benefits, child care, and more. There are currently 42 articles in this section of the site.

The second focus area is targeting postdoc career needs. This includes tools designed to help organizations meet their postdocs' professional needs. There are 37 articles in that section.

Postdoc Network



Evolution of Postdoc Organizations
Advice on how to create and maintain a postdoc association, office, or program. *(31 articles)*



Resources
Links to policy documents, salary/benefits information, surveys, resources for women and international scholars, professional development programs, and...



www.nextwave.org



There are a 31 articles in the section about the evolution of postdoc organizations, both from the institutional perspective and also from the postdoc perspective.

The resources section contains information gathered from elsewhere on the web. There are links to policy documents, salary and benefits information, a variety of different surveys at the institutional level or otherwise, resources for women and international scholars, professional development programs, and the Postdoc Network database.

Postdoc Network Database
 To help you keep abreast of postdoc offices, programs, and associations and to direct you to important contact information, we have created a one-of-a-kind database. In addition to links to the postdoc organizations themselves, you'll also find links to contacts, policies, programs, and related PDN and Next Wave articles. Keep in mind, that some policies, guidelines, and handbooks will contain title, status, salary, and benefit information.

Want to tell us about your new association or office? Or add your organization to the database? Then email us at postdocnetwork@aaas.org.

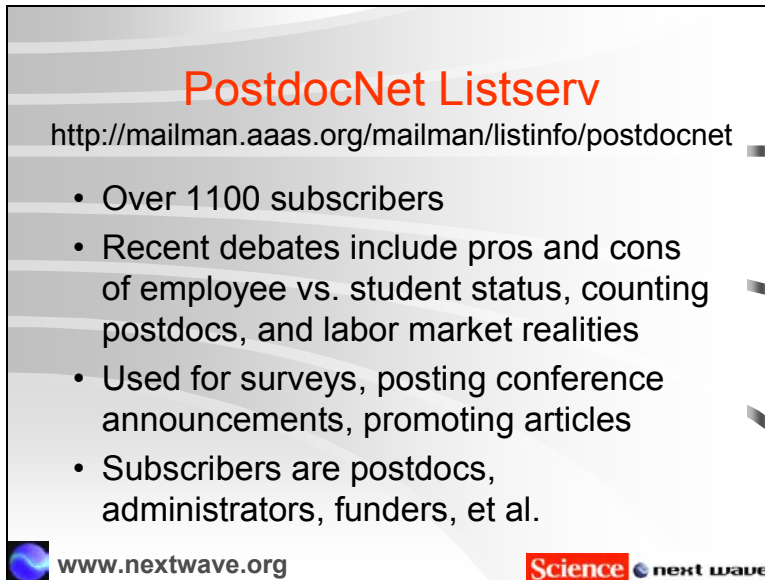
Institution	Program/Policies	Postdoctoral Association
Adelaide University, Australia	No Postdoc Office ▶ Policies ▶ Programs Human resources	Research Staff Association Working Party Contact
Alabama, University of -Birmingham	Office of Postdoctoral Education ▶ Contact: Sharon Johnston ▶ Programs International scholars Child care ▶ Policies Handbook ▶ Articles Postdoctoral enhancement awards Grievances Formation of the office Postdoc roundtable Recruitment and retention	No Association
Albert Einstein College of Medicine Belfer Institute for Advanced Biomedical Studies	Program Office ▶ Contact: Mary Anne Clifford ▶ Programs International scholars Housing ▶ Policies Benefits Accommodations Stipends Leave	Einstein Postdoctoral Association (EPA) ▶ Contact ▶ Programs Postdoc Survival Guide
American Chemical Society	Career Services ▶ Contact: Jean Parr ▶ Policy	

82 listings (12/2002)
10 International
48 Universities
5 Societies
11 Institutes
8 Government

Of the domestic institutions:
18 only have an office
20 only have a PDA
28 have both

This top page of the Postdoc Network database shown above illustrates the range of different resources and types of information collected in this database. This is not a database in the sense that it can be searched across all of these pages, but a series of links to information. The first column lists institutions. The second column lists programs and policies at the institutional level, and the third column lists postdoctoral associations. As seen above, Adelaide University has both institutional policies and programs in the human resources department for postdocs and a postdoc association. UAB has a variety of institutional level support for postdocs but as yet, no association.


There are currently 82 listings, ten of which are international, 48 are universities, five societies, 11 institutes, and eight government agencies or labs. Of the U.S.-based institutions, 18 have only a postdoc office, 20 have only a postdoc association, and 28 have both. Currently, there are about 50 institutions with postdoc offices and 50 with postdoc associations, not the same set.



PostdocNet Listserv

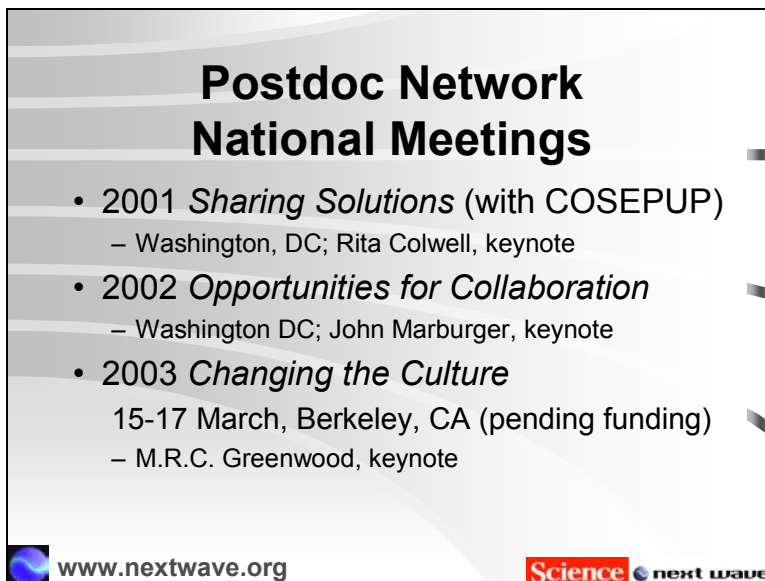
<http://mailman.aaas.org/mailman/listinfo/postdocnet>

- Over 1100 subscribers
- Recent debates include pros and cons of employee vs. student status, counting postdocs, and labor market realities
- Used for surveys, posting conference announcements, promoting articles
- Subscribers are postdocs, administrators, funders, et al.

www.nextwave.org 


The Postdoc Network also provides a listserv as an opt-in function. Visitors can sign up to join the list. They can opt to receive an e-mail whenever there is a new posting to the list or they can choose to receive a weekly digest. At this point, there are over 1,100 subscribers to the listserv, including postdocs, administrators, funders, etc.

This is a moderated listserv, but the debates are very high level. They are legitimate conversations including the pros and cons of employee versus student status, how to get around counting postdocs, and the realities of the labor market. The listserv is also used to promote the content on the site, to remind subscribers to come to the Postdoc Network and see the latest articles, and to notify people of surveys, be they the Postdoc Network's or others the Postdoc Network is promoting.



**Postdoc Network
National Meetings**

- 2001 *Sharing Solutions* (with COSEPUP)
 - Washington, DC; Rita Colwell, keynote
- 2002 *Opportunities for Collaboration*
 - Washington DC; John Marburger, keynote
- 2003 *Changing the Culture*
 - 15-17 March, Berkeley, CA (pending funding)
 - M.R.C. Greenwood, keynote

www.nextwave.org 

Another important function of the Postdoc Network, as originally conceived by the Sloan Foundation, was to hold national meetings of all groups involved in the postdoc issues on an annual basis. This has been done twice, and the Postdoc Network is looking for funding for the third meeting, which is to be held in March of 2003 in Berkeley.

The first meeting, in March of 2001, was held back to back with the COSEPUP convention. Dr. Rita Colwell from the NSF gave the keynote address. Last year, the meeting was held at the AAAS building and the newly minted Science Adviser, John Marburger, gave the keynote speech. The Postdoc Network hopes to hold a meeting March 15-17, 2003 in Berkeley, and M.R.C. Greenwood will give the keynote address, should it come to pass.

The Postdoc Network has tried, and has succeeded, in bringing people together. Out of those activities, a number of other things have arisen, including the National Postdoc Association idea and to some extent, the survey project.

How to contact us:

- Crispin Taylor, Editor, *Science's* Next Wave
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- Laure Haak, Editor, Postdoc Network
lhaak@aaas.org
- Postdoc Network homepage
nextwave.sciencemag.org/pdn
- PostdocNet Listserv
mailman.aaas.org/mailman/listinfo/postdocnet


www.nextwave.org



To contact the Postdoc Network, e-mail Crispin Taylor at ctaylor@aaas.org. Laurel Haak's e-mail address is lhaak@aaas.org.

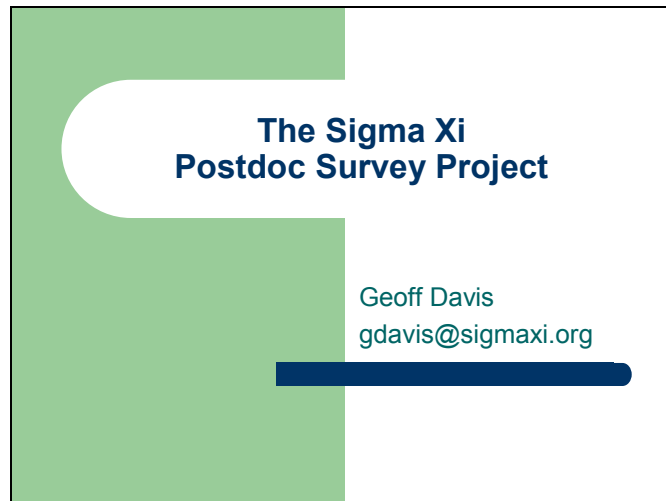
Discussion:

During the question and answer period following the presentation, the following points were made:

- Is there any industrial voice in the Postdoc Network, or is right now only academic, or maybe governmental, as well? Taylor responded: The objective, initially, was to put together the people who were trying to organize postdoc offices. Insofar as there are postdoc offices or associations in industry, then we would like to include that information. But the vast majority of the information in the Postdoc Network is academic. NextWave, which looks at career development from a much larger perspective, has a good deal of information about industry and industry careers and how to go about pursuing them.
- Are you trying to connect industrial postdocs with their peers to share perspectives and experiences? Taylor: I think that would be a great idea. We do that to some extent elsewhere on the NextWave site, in a forum platform, which is a more loosely constructed listserv, and that does happen to some extent. Part of the issue is getting the word out about the Postdoc Network's existence to those postdocs in industry. We have a pretty good connection and set of contacts with academic institutions. It has been harder to develop that in industry.

CURRENT ISSUES UNDERWAY

Presenter – Geoff Davis, Sigma Xi, Postdoc Survey Project



The Sigma Xi Postdoc Survey Project has the potential to answer a lot of the questions that people have raised today, although not all of them. It is listed as “proposed” on the agenda, but was funded by the Sloan Foundation on December 3, 2002. The project will be underway starting in January.



The project is the collected work of a number of organizations. Sigma Xi is the main home for the project, but the project is also receiving assistance from Crispin Taylor and Laurel Haak at *Science's* NextWave; from the National Postdoc Association; from Richard Freeman's group at the National Bureau of Economic Research, also funded by Sloan; and from the Research Triangle Institute's Department of Survey Research.

National vs. Local

- Previous talks: national-level information
- Deans, postdoc offices, PDAs need *local* info
 - What are the needs of the postdocs at our institution / school / department?
 - How does our institution / school / department compare to its peers?
 - Info on specific local topics

The project's goal is to provide for some of the needs that deans, postdoc offices, and postdoc associations have in trying to implement a lot of the recommended best practices for postdoctoral training and education. For example, an office might want to know, "What are the needs of the postdocs at our particular institution?" This is going to vary widely from institution to institution. For example, Stanford recently had to dramatically increase the salaries of their postdocs because a lot of them were not being paid enough to pay their rent in Silicon Valley. But this is not going to be an issue, say, at Urbana.

"How does our institution compare to its peers?" A lot of this information is being provided at the national level, but issues are going to be very different depending on the particular institution and given that these institutions compete amongst each other for resources, be that funding or hiring of the best people. Institutions want to know what kind of competitive position they are in relative to their peers.

A lot of institutions also have local issues that they alone may be interested in. Interestingly enough, there is a fair amount of information out there about local conditions for postdocs, but most of that information has come from postdoc associations and offices.

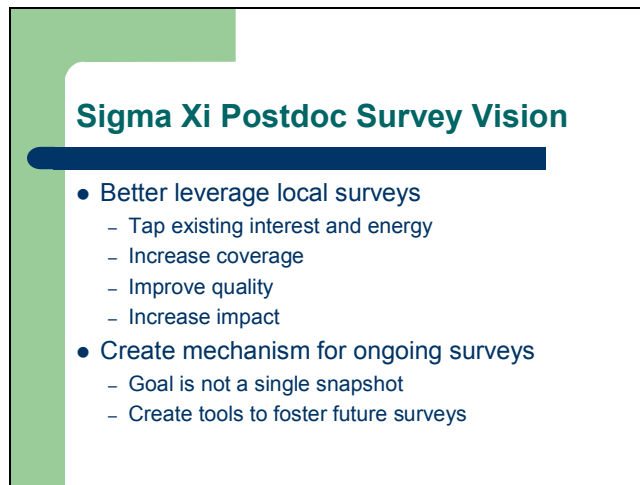
Local Information

- Dozens of existing local postdoc surveys
 - See <http://www.phds.org/?section=164>
- Most conducted by postdoc associations
- Considerable interest in the end-product
 - Associations have particularly strong motivation because they have a direct stake in the outcome
- Quality, methods all over the map
- Local surveys are *too* local – not useful for comparisons

There are a lot of postdoc surveys, most of them conducted by postdoc associations trying to get a sense of what their local peer community is experiencing. As such, they have a lot of interest in the end product. There are a lot of very enthusiastic people who want to know these things because they are the direct beneficiaries of better information about what is going on at their own institution.

The difficulty about this is that because most of these surveys have been done by individuals in their spare time on a volunteer basis, the quality and the methods are all over the map. The individuals conducting these surveys are not doing this as their day job and the time commitment that they have to their own research usually outweighs what they need to do to get these surveys up to scratch.

In a lot of cases, the local surveys are too local in that because they are focused on such institution-specific issues. It is very difficult to aggregate this data across multiple institutions to get a sense of what the context is for the issues that local organizations are facing. Because these surveys all have different needs, it is difficult to pool their efforts.



Sigma Xi Postdoc Survey Vision

- Better leverage local surveys
 - Tap existing interest and energy
 - Increase coverage
 - Improve quality
 - Increase impact
- Create mechanism for ongoing surveys
 - Goal is not a single snapshot
 - Create tools to foster future surveys

The vision of this project is to make better use of these local surveys; to use this energy, enthusiasm, and real interest to provide resources that will improve the end product; and to maximize the benefit for the effort that people on the ground are already putting in. The project will provide tools that will increase the coverage of these surveys, meaning expand these kinds of local surveys to a larger number of institutions; to improve the methodological and analytical quality of these surveys; and to increase the impact of these surveys, to make sure that the work that these postdocs and postdoc offices are putting in has the maximum benefit.

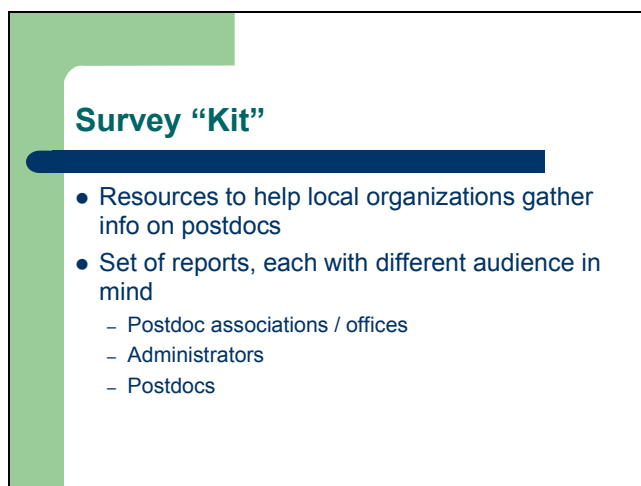
The vision is not just to create a single snapshot of what is going on, but to try to put in place some infrastructure that will allow these kinds of surveys to be done in an ongoing fashion, to make sure that there are resources out there for ongoing assessments of quality control for postdoctoral programs.



Support Improvements

- Help existing organizations benchmark postdoc experience
- Help get new postdoc associations / offices off the ground

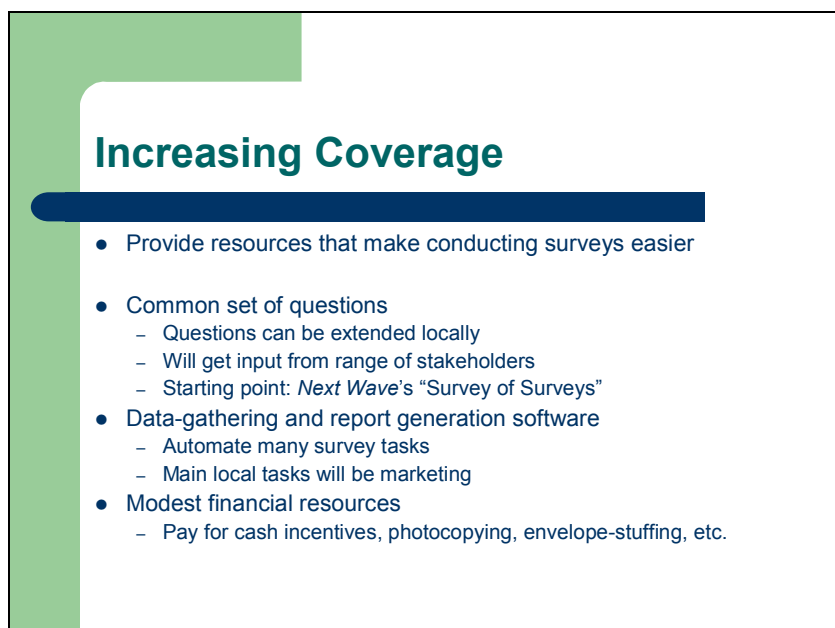
In particular, the project will support improvements in the postdoctoral experience by helping existing organizations benchmark the postdoc experience at their institution and by providing tools and resources to help postdoc associations and offices get off the ground. Local assessments are an essential step in getting a local association off the ground because it enables them to find out the real needs of their constituency, and it helps them assess the direction in which they need to go to best help the postdocs at their institution.



Survey “Kit”

- Resources to help local organizations gather info on postdocs
- Set of reports, each with different audience in mind
 - Postdoc associations / offices
 - Administrators
 - Postdocs

The project will develop a survey “kit.” It will include resources to help local organizations – be they postdoc associations, postdoc offices, or dean’s offices – gather information on their postdocs. The data will be analyzed and put together a set of reports with a number of different audiences in mind, including postdoc associations/offices, administrators, the postdocs themselves, and prospective postdocs.



Increasing Coverage

- Provide resources that make conducting surveys easier
- Common set of questions
 - Questions can be extended locally
 - Will get input from range of stakeholders
 - Starting point: *Next Wave's* “Survey of Surveys”
- Data-gathering and report generation software
 - Automate many survey tasks
 - Main local tasks will be marketing
- Modest financial resources
 - Pay for cash incentives, photocopying, envelope-stuffing, etc.

In terms of increasing coverage, the project will increase the number of local surveys that are being done, and provide resources to make this process easier. First, a common set of questions will be put together – questions that can be extended locally so that surveyors can add on specific questions that will only be asked of people at their institution.

To get these questions, input will be gathered from a range of stakeholders. Laurel Haak of *Science's* NextWave has put together a list of surveys that associations have conducted, and she has had a reporter distill these down into the best questions from this set of surveys. This encompasses a lot of what postdocs are asking of themselves. Debbie Stine had some great questions in the National Academy report that were asked of institutions. A range of questions will be gathered to make sure that a broad set of interests is covered. The additional reason for providing this common set of questions is to enable the comparison of apples to apples when cross-institutional comparisons and cross-departmental comparisons are conducted.

The second thing that the project is planning to provide is a set of data gathering and report generation web software that will be centrally administered, to enable an organization to direct its members to go to a particular website and fill out a survey. There will be software to enable the organization to control access to the survey. There will be measures in place to help the organization verify the identities of the people who are participating through some kind of selected follow-up after the fact.

The goal is to make the main task for the people on the ground conducting these surveys to be one of marketing, to reach out to postdocs at their institutions to get them to participate. Doing this at a national level is major task, because the postdocs are scattered over multiple places within an institution, and a lot of institutions do not know who their postdocs are. The organizations with the best resources on the ground are the postdoc associations and offices that have databases of postdocs.

The third thing the project wants to provide is modest financial resources, up to \$1,000 per participating organization, for cash incentives to participants, photocopying, stuffing envelopes, hiring a temp, etc.

Improving Quality

- Professional design (by RTI) of
 - Questions
 - Methodological procedures
 - Analysis procedures
- Set forth standards for participant data protections

In addition to increasing coverage, the project wants to increase the quality of these local surveys. As previously mentioned, the local surveys that have been done by associations are all over the map in quality – some are excellent and some are a little shaky. To that end, professionals will be brought in to help with the methodological procedures. After basic issues to be covered are formulated, the questions will be formally worded and tested by the Research Triangle Institute. RTI will define a set of methodological procedures for participating organizations to follow.

The methodological guidelines will not define just one option, because levels of resources differ at differing institutions. There will be a gold standard, where if an organization has a complete list of postdocs at their institution, they will follow one procedure. If an organization has a partial listing, they will

follow another procedure. If the organization has nothing, they will follow yet another procedure. This range of methodologies of varying levels will accommodate organizations with different abilities.

RTI will also put together common analytical procedures. Standards for protecting participant data will be carefully defined, to make sure that people are confident that they can provide candid feedback without fear of any kind of reprisal.

Improving Quality

- Non-response study
 - Look at demographics of non-respondents at selected institutions with good postdoc records (UNC)

A third thing that the project will do to improve quality is look at a non-response study. Even in the best case in local postdoc surveys, the response rates have not been very high. The best cases have only a 45 or 50 percent response rate. That raises the question of what kind of selection bias there might be. RTI will work with a couple of institutions with very good postdoc records to put together a non-response study to compare the demographics of the people who respond to the demographics of what is in the database to get a sense of who is not responding and what potential biases may be introduced via this process.

Increasing Impact

- Provide administrators / postdoc associations / postdocs with detailed reports
 - (Content appropriate to audience)
- Comparative data
 - Within institutions
 - Compare data across schools / departments
 - Between institutions
 - Compare selected data across peer institutions
 - Benchmark against peers

The final thing the project will do is increase the impact of these survey results. To do that, a set of professionally developed results reports targeted to different audiences will be prepared. For administrators and associations, detailed information will be provided about what is going on in the institution and how the institution compares to its competitors and peers. This is going to be not just across institutions, but also within institutions. For example, a department of molecular biology in a school of arts and sciences will be able to compare themselves to the department of physiology in the medical school. For postdocs themselves and prospective postdocs, a salary survey will be put together.

The survey project starts in January. Trials will be run in the fall of 2003 at a selected set of institutions to make sure that everything works, and then the survey will be opened up to a larger scale in cooperation with the National Postdoc Association and others in the spring of 2004.

More Information

- Very interested in what people want to know
- To provide input on questions or get more information, contact
 - Geoff Davis gdavis@sigmaxi.org
 - Pam Blondin pblondin@sigmaxi.org

If you have any input, please contact Geoff Davis at gdavis@sigmaxi.org.

Discussion:

During the question and answer period following the presentation, the following points were made:

- We talked earlier about getting disciplinary societies involved in generating information about their postdocs. This approach is scalable and potentially in parallel to the work at the level of the institutions and the departments within those institutions. You could, perhaps, ask disciplinary societies to also collect data, providing two sets of data from different cohorts, or people defining themselves differently, to get a better analysis of the overall national picture. Davis: I think the potential problem is survey fatigue. If you have different people asking the same questions, response rates go down. It is possible to do this in a cooperative fashion where that kind of thing does not happen, and it would be interesting to figure out how to do that. Perhaps it might be done in alternate years. This project is not exclusively Sigma Xi. The list of partners was presented earlier. There are many other people who will be participating at some level as well. We want to get as many people on board as possible because this is the kind of thing that is going to be difficult to do with a small number of people.
- Using the resources of the members of Sigma Xi, could you go to the heads of the graduate schools to say that it is very important for the school to do the survey on its campus? Instead of people reaching out to you, you would be marketing it to them. Davis: We have budgeted some resources for Sigma Xi chapter activities, and there are 550 Sigma Xi chapters, so, yes, that is exactly the kind of thing that we are hoping to accomplish.

- Another question to ask is how many postdocs are married and how many have children. One institution that did ask those questions on its survey was Baylor College of Medicine, and the number of postdocs who were married or had children was amazingly high. That helps people know the postdoc population and think about them in a different sense. Davis: Maresi Nerad has expressed interest in having some family structure questions on the survey, so that is something that is going to be addressed. It also speaks to the need for certain types of leave policies, such as family leave policies, child care arrangements, etc.
- Campuses, administrators, and NSF often do not really know quite who postdocs are, that postdocs get called many things, and that there are a number of different types of control and people who pay postdocs and a number of loci that have control of postdocs. In light of that, to whom are these questionnaires going? Davis: The surveys have been successful primarily when they were initiated by postdoc associations on-site. We are going to rely on these local organizations to help determine local membership in the class of postdocs.

Many people have raised today that there is not a universally accepted definition for postdocs. There are many shades of gray involved. Does a clinical fellow count? Does a clinical fellow not count? Is a one-year teaching adjunct position a postdoc or not? The way to address that is to ask at some point on the survey a set of demographic questions about the respondent in which they would indicate the characteristics of their position, such as whether their position involves some kind of directed mentorship, if their position is temporary, if it involves some training component, if they are a clinical fellow, etc.

With those kinds of questions, you can get a fairly large number of people to participate, and then depending on what definition of postdoc you choose to use, you can slice the data after the fact. That lets you produce data sets that would involve a variety of different definitions, producing a slightly different data set as a result.

The infrastructures at institutions for tracking postdocs are evolving and they are getting better, but it is a slow process. We envision this survey as a process for which the first year is funded, but the tools that are going to be produced are not going to be things that are going to go away. The methodological documents, the questions, etc., could certainly be reused, and the vision is to create something that will make this fairly straightforward to undertake in five years' time when the infrastructure is perhaps better.

- Do you plan on including government and industrial postdocs? Davis: We have been talking to Wally Schaffer about doing this at NIH. As for industrial postdocs, the issue again is, is there a postdoc office? Is there a postdoc association? Is there somebody who is interested in this who would actually serve as the local point of contact and who would do the legwork? If there is somebody who wants to do it, that is great. If not, we cannot impose it from the outside.


CURRENT ISSUES UNDERWAY

Presenter – Carol Manahan, National Postdoc Association

Creation of a National Postdoctoral Association

Steering Committee

Claudina Alemán
Orfeu M. Buxton
Raymond Clark
Karen Christopherson
Arti Patel
Carol Manahan
Avi Spier



www.nationalpostdoc.org

All of the steering committee members of the National Postdoctoral Association (NPA) are actually postdocs and volunteers. The NPA website, <http://www.nationalpostdoc.org>, provides a brief introduction to the association. The website will be expanded now that funding has been successfully obtained.

"Postdocs are central to this nation's global leadership in science and engineering. It is largely they who carry out the sometimes exhilarating, sometimes tedious day-to-day work of research. It is largely they who account for the extraordinary productivity of science and engineering research in the United States. Many among them will discover fundamental new Knowledge".

- Enhancing the Postdoctoral Experience for Scientists and Engineers: A Guide for Postdoctoral Scholars, Advisers, Institutions, Funding Organizations, and Disciplinary Societies. (2000)

Committee on Science, Engineering and Public Policy, National Academy of Sciences, National Academy of Engineering, Institute of Medicine, National Academy Press, Washington DC.
<http://books.nap.edu/catalog/9831.html>

Administrators and other individuals are sometimes not aware of postdocs, and need justification as to the purpose and the position of a postdoctoral association. This purpose shown above was obtained from the COSEPUP Guide, and provides a synopsis of the importance of postdocs.

“Fertilized” Grassroots Effort

Postdoc Network Meeting (*Science’s Next Wave*)

Clear needed national effort

- **Established PDAs**
- **Fledgling PDAs**
- **University Administrators**

Postdocs from various institutions banded together

Received planning funds

AAAS agreed to sponsor and assist NPA

Expanded committee and wrote 18-month proposal

The NPA is a fertilized grassroots effort, with effort not just from the postdocs, but from many individuals. It started out of the Postdoc Network meeting last year in Washington, DC, which was sponsored by *Science’s Next Wave*. It was clear at that meeting that a national effort was needed, that there were various individuals/organizations involved, and that their needs were not being met.

Among the individuals/organizations involved, first of all, were the established postdoc associations. There were also fledgling postdoc associations, or individual postdocs who were looking to start postdoc associations and were having a difficulty in starting a postdoc association at their institution. And finally, there were university administrators who were asking, “How can we have a postdoc association at our institution? We want to help postdocs. What can we do?” It was clear that there were a lot of unanswered questions at that time.

Since this initial national effort idea was discovered, the NPA realized that there are many more individuals and parties interested in postdocs who can participate in this national effort. For example, CPST is interested in what postdocs are doing, and all of the individuals at this workshop from postdoc associations, funding agencies, etc., are all interested in this topic.

So, postdocs from various institutions banded together and applied for and received planning funds from the Alfred P. Sloan Foundation. That funding was contingent upon finding a home for the grant, and graciously, AAAS, the American Association for the Advancement of Science, agreed to sponsor and assist the National Postdoc Association. The NPA has had a lot of assistance in not only managing this grant, but in creating the bigger planning grant, from Crispin Taylor and Laurel Haak of *Science’s Next Wave*; Shirley Malcolm, Head of AAAS’s Directorate for Education and Human Resources Programs; Eleanor Babco, Executive Director of CPST; members of AAU; etc.

The idea behind the effort to start the National Postdoc Association was that it be a collaborative effort. However, what distinguishes the NPA from other associations is that it speaks and represents postdocs as a group. In other words, it does not represent chemists or physicists or mathematicians or sociologists. It represents postdocs. However, many organizations and individuals have a lot of information that could be very helpful, and the NPA hopes to work together in a collaborative effort to try to benefit postdocs.

The NPA wrote an eight-month proposal to the Alfred P. Sloan Foundation, which was successfully funded on December 3, 2002.

National Postdoctoral Association

Aims:

1. **Establish a self-sustaining organization (NPA), to provide a voice for postdoctoral scientists.**
2. **Build consensus regarding “best-practice” policies for postdocs, develop educational initiatives, and encourage their implementation**
3. **Collaborate with government bodies, funding agencies and professional organizations to advocate for improvements in postdoctoral policies.**

So what are the NPA's aims? The NPA would like to establish a self-sustaining organization. The NPA wants to provide a voice for postdoctoral scientists. There currently is no such organization that specifically focuses on the wishes and needs of postdocs.

The NPA would like to build consensus regarding best practice policies for postdocs, develop educational initiatives, and encourage their implementation at the local level. There have been many recommendations from COSEPUP, AAU, and many others, so the NPA would like to work with these agencies that have produced these reports and ask its membership, which will be postdocs, what they believe would be the best practices policies and where they would like to go with that.

Finally, again stressing the collaborative nature of the NPA, it would like to collaborate with government bodies, funding agencies, and professional organizations to advocate for the improvement of this class of scientists, postdocs.

National Postdoctoral Association

1. **Establish a self-sustaining organization/voice for postdocs**
 - **Membership: individual postdocs, PDAs, institutions, professional societies and others interested in postdoc issues.**
 - **Plan: sustainability of finances, membership and leadership**
 - **Operational framework: *Democratically* adopt by-laws and a constitution**
 - **Host annual NPA meetings in conjunction with partner organizations**
 - **Work closely with partners (institutional and organizational), such as the AAAS, CPST and professional societies.**

So what does the NPA aim to do under each of these aims? To establish a self-sustaining organization, first of all, you have to have membership. Membership will be comprised of individual postdocs and individual postdoctoral associations at the various institutions. Institutions themselves can be members of the NPA, as well as professional societies and others interested in postdoc issues.

The NPA has outlined a plan for sustainability of finances, membership recruitment, and leadership. The sustainability of leadership of postdocs is also an issue because sometimes you only

have two years where you are a postdoc and then you move on to something else. So the NPA has built that into its plan, as well, to try to encourage that sustainability of leadership.

For our operational framework, the NPA has proposed to democratically adopt bylaws and a constitution. This will occur at a national meeting a year from this March. Annual NPA meetings will be hosted in conjunction with partner organizations. The 2003 meeting will be in March in Berkeley, California, assuming that funding goes well. All are welcome to attend.

National Postdoctoral Association

2. Build consensus regarding “best-practice” policies for postdocs, develop educational initiatives, and encourage their implementation.

- Liaison for existing institutional postdoc offices
- National survey of postdoctoral scholars in collaboration with Sigma Xi, The Scientific Research Society
- Census of institutional policies concerning postdoctoral scholars
- Institutional site visit teams for educational outreach and to assist in new PDA formation
- Distribute information and resources (Website, database)

Under building consensus, the NPA would like to provide a liaison for existing institutional postdoc offices to act as a central location. It is working with the Geoff Davis of the Sigma Xi Postdoctoral Survey Project, and this will be critical. The NPA realized when it wanted to start the organization, that data are key. At the local level, administrators sometimes ask why they should fund this or that for the postdocs, and if you have data that provide a concrete number, you can use that to encourage change.

The NPA would like to build consensus among its membership of institutional policies concerning postdoctoral scholars. Importantly, and something that is slightly different from other organizations, the NPA will perform institutional site visits, to encourage the formation of new postdoctoral formations and work on educational outreach to postdoc associations that need help for sustainability, etc.

And finally, the NPA would like to distribute the information and resources it collects via a website, database, etc.

National Postdoctoral Association

3. Collaborate with other groups to advocate for improvements in postdoctoral policies and track progress.

- Participate at meetings (regional and national) concerning postdoctoral policy
- Enter into productive collaborations with professional and educational organizations
- Present formal recommendations for changes in postdoc policy to the appropriate organizations
- Advocate for improvements in postdoc policy in collaboration with other organizations
- Survey will be repeated to evaluate efficacy

The NPA will collaborate with other groups to advocate for improvements in postdoctoral policies, and determine if progress is being made. The Sigma Xi survey is critical to tracking this progress. The NPA plans to participate in meetings concerning postdoctoral policy, both regional and national, and enter into productive collaborations with professional and educational organizations. It plans to present formal recommendations to its membership for changes in postdoctoral policy, and then once consensus is built, present these formal recommendations to appropriate organizations, whether they are funding agencies or individual institutions, etc. And the NPA would like to advocate for improvements in postdoctoral policy in collaboration with other organizations.

The survey will be repeated to evaluate this efficacy. For example, the NPA might perform a survey at an institution that does not have a postdoctoral association. The NPA then encourages the formation of a postdoctoral association. The survey could be repeated a few years after that formation to see if there was any actual improvement in the conditions of postdoctoral fellows at that institution. That is one example.

Key Components of NPA Business Plan	
Support	AAAS (E.H.R. Directorate) Initial Funding
Governance Structure	Democratic Executive Director Executive Board Advisory Board
Financial Sustainability	Memberships Cross-marketing Sponsors

Key components of the NPA's business plan are support from AAAS under the Directorate for Education and Human Resources Programs, and initial funding. The NPA needed to have an initial cash pool in order to hire an Executive Director, etc. The first 18 months of NPA's existence has been funded.

The governance structure will be democratic, coming from the members, which are primarily postdoctoral fellows. The NPA will be hiring an Executive Director, who will be the contact person and provide some sustainability of information. The Executive Board will mostly be faculty. The advisory board will primarily be composed of postdoctoral fellows. They will be involved in governance, as well.

In working towards financial sustainability, the NPA will have a membership component and a cross-marketing component. It hopes to work with various organizations and their memberships to target postdocs. It is hoping to find a way to target corporate sponsorship as well.

NPA- progress to date

- **Advisory Board with broad representation**
- **Collaborations:**
 - **Postdoc Network / AAAS for administration, education**
 - **Sigma Xi Postdoctoral Survey Project (in review)**
 - **‘best practices’, e.g., FASEB Individual Development Plan**
 - **GREAT group (site visit teams, policy reviews)**
 - **Postdoc Network (2003), FASEB (2004) and AAAS (2005) annual meetings**
- **Created business plan, submitted to a funding agency for consideration**

What progress has been made to date? The NPA has established an advisory board with broad representation from many institutions. The advisory board members are mostly faculty members who have shown a long-term interest in postdoctoral issues.

The NPA has collaborated with the Postdoc Network, the Sigma Xi postdoctoral survey project, and FASEB. The GREAT Group has agreed to work with the NPA on site visit teams and policy reviews, and the NPA has teamed up with other organizations in order to have meetings in conjunction with larger meetings in order to try to attract a broader audience. This year, the NPA's meeting will be with the Postdoc Network. Next year, it is planning to host a meeting in conjunction with FASEB, and the year following with AAAS, to try to reach out to many different postdoctoral populations.

NPA future plans

- **Recruit and Hire an Executive Director**
- **Inaugural meeting March 2003**
- **Forge additional partnerships with organizations**
- **Garnering “founding PDA” member pledges**
- **2nd meeting with FASEB in 2004**

What are the NPA's future plans? In the near future, it needs to recruit and hire an Executive Director. This position will be absolutely critical for the ability to successfully host the NPA's inaugural meeting in March 2003. The NPA will continue to talk to individuals and organizations to forge partnerships to participate in this collaborative effort. It is also garnering founding postdoctoral association membership pledges.

Successful advocacy will be determined by:

- Recognition of the essential role of postdoctoral scientists in the scientific enterprise
- Recognition of the NPA as a legitimate and valued policy and best-practices clearinghouse
- Energized local postdoctoral advocacy efforts
- Institutional action on postdoctoral policy initiatives, including a comprehensive review of current postdoctoral policies and implementation of workforce and professional development standards
- Efforts to create and standardize federal postdoctoral policies

How will the NPA determine if a postdoc's lot is improving? First of all, by the recognition of the essential role of postdoctoral scientists in the scientific enterprise. Many faculty do not know what postdocs provide. It is important that postdocs are recognized as valuable members of this process.

As an organization, the NPA would like to be recognized as a legitimate and valued policy and best practices clearinghouse. It would like to energize local postdoctoral advocacy efforts. In the last couple of years, a lot of postdoc associations have been started. However, in that same period, others have fallen off. The idea is to act as a way to encourage the formation and maintenance of postdoctoral associations and give these organizations tools in order to continue their efforts successfully.

Institutional action on postdoctoral policy initiatives, including a comprehensive review of postdoctoral policies and the implementation of these policies, would be a big boon and would show the NPA's efforts, although that may take a few years to occur.


And finally, efforts to create and standardize Federal postdoctoral policies would demonstrate that the NPA was successful, because as was mentioned earlier, postdocs are treated quite differently depending on their funding source.

National Postdoctoral Association

Steering Committee

Claudina Alemán
Orfeu M. Buxton
Raymond Clark
Karen Christopherson
Arti Patel
Carol Manahan
Avi Spier

www.nationalpostdoc.org



Send suggestions/ideas to: feedback@nationalpostdoc.org

The members of the National Postdoc Association Steering Committee are Claudina Alemán and Arti Patel from the National Cancer Institute, Orfeu Buxton from the University of Chicago, Raymond Clark

from the University of California-San Diego, Karen Christopherson from Stanford University, Avi Spier from the University of California-San Diego, and Carol Manahan from Johns Hopkins University. The NPA would welcome and specific suggestions or comments. The NPA website is <http://www.nationalpostdoc.org>, and the e-mail address is feedback@nationalpostdoc.org.

Discussion:

During the question and answer period following the presentation, the following points were made:

- COSEPUP recommended in their guide that there be postdoc representation on the advisory committees at NSF and NIH, giving them a voice in the policies of those institutions. And the next big issue coming up is going to be the Federal budget when that is submitted in January. Is it part of NPA's plan to get some sort of advisory committee on postdocs established at both NSF and NIH so there is a central office to deal with postdoc issues? Manahan: We have talked about specifics such as that. We know that at the local level, it is critical to be a voting member of key policy groups and we plan to investigate those ideas and options. We are pursuing ways to work with NIH and NSF and we have approached those groups to meet and talk about training. We will have to pursue those relationships with more vigor now that we have funding.
- Along the same lines, it would be an excellent thing for the various disciplinary societies to put postdocs on at least a few of the governance committees that help to run those organizations. Manahan: Some of the major problems with that have been sustainability, getting people to serve for a period of time, and recruiting new people. With a national focus, we would be able to commit individuals to those positions.

In addition, at the GREAT Group meeting last year, a professional development group that is part of the Association of American Medical Colleges, they were talking about training issues, but there were only two trainees at that meeting, and they were both from Johns Hopkins. In response to that, the GREAT Group has put together a postdoc committee comprised of four faculty GREAT Group members and four postdoctorates.

- It is hard to find industrial postdocs because there is no central organization. You might want to consider using the Fortune 500 list, throwing out companies that do not have obvious R&D components, and sending the remainder a single letter to the head of HR or recruiting to invite them to participate in the NPA, the Postdoc survey, and the Postdoc Network. Bringing in a postdoc is no different than hiring a full-time employee. They are an employee. They get all the benefits. They get a paycheck. So they have got to go into the HR system to be captured. If you simply send that letter into the system, somebody in HR will have access to the knowledge.
- What about fields outside of science? For example, the Spencer Foundation funds a number of postdoctoral fellows. Manahan: All of the individuals on NPA's steering committee happen to be from the biomedical sciences. But the NPA wants to have a national focus, and will include everyone in the sciences. The idea is to focus on where you have the largest numbers of people in postdoc positions. We are a national postdoc organization, not just a national science postdoc organization. We have a lot of room to grow out towards those other areas. Anyone who wants to become a member can become a member. The idea is we need to have an initial target audience to market to, and so we will start with that group and expand from there.

WHAT FURTHER INFORMATION IS NEEDED?

Moderator – Mary Golladay, National Science Foundation, Division of Science Resources Statistics

The task of this workshop was made far easier by the extremely high and thoughtful quality of both the presenters and the presentations, and also the response and the input from the group. During this workshop, a number of new things were turned up concerning postdoctorates:

- "Intellectual property" was raised. That is very important and has not really come up in recent postdoc meetings.
- In terms of institutional concerns, what is the role of the institution in providing the facilities for postdoctorate space?
- Unionization was mentioned, and associations.
- Timeliness was mentioned. NSF does have 2001 graduate student data from Survey of Earned Doctorates. NSF did not do national estimates of the S&E workforce for 2001, so it will not have that, but there are some data available about a year out from collection. When NSF released the national estimates for 1999, it got them out five months earlier than it ever had before in the decade. But timeliness in terms of issues; is it ever going to be timely? Eighteen months ago, the issues and what information needs were different than they are now. Information needs and concerns have changed in that length of time.
- A question was asked about how many faculty openings there are. That number would probably be different today than it was six months ago. As states in particular are putting together their budgets, how many states have had freezes? How many of those open positions perhaps early last spring are no longer even there? They might have vanished.
- There are going to be a lot of issues that come and go. With NSF's routine data collections, it is not going to be able to be the fast response mechanism that may be needed in a lot of areas, at least in terms of the kind of data collection discussed in the workshop and the time trends. The national postdoctoral survey might be a very important conduit and resource for that kind of activity to occur.
- A topic that has been discussed a little bit more, but again is very fruitful in terms of possibilities, has to do with the interdisciplinary or multidisciplinary movement and activity of postdoctorates. This has been discussed in terms of bringing together teams from different disciplines, but the examples even go beyond that to how to put a social scientist with a physical scientist, and how to look at possibilities.
- Carter Kimsey touched on the fact that NSF would like to think that it has touched a lot of people as they have gone through the educational system. NSF today has a somewhat different view of science and engineering, and no longer feels it is necessarily a loss if somebody who was a math major or a physics major ends up doing something else. Mathematicians and statisticians are needed in Congress, in associations, and in other governmental organizations. The general population needs to know math and science to survive in this context.
- Many programs think of a postdoc experience as one that expands, not just extends, the realm and the view of that person. There might be ways of thinking about postdocs that have not perhaps been pursued before.
- Charlotte Kuh may have provided the assignment for the workshop attendees when she said, "What's the question to which the data are the answer?"

- Carter Kimsey said that the postdoc experience must have and should have a human face. Postdocs are talking about people with careers. There is a national need and a national purpose. Individuals' goals need to somehow be merged with or be in sync with national goals and national priorities. Certainly, as a country, we do not want a workforce that is trained to do the wrong thing. It serves everyone to have a creative and a productive role in society.

So can all these various ideas be merged together? What is there that can be done? There is a responsibility to track the workforce, however you wish to define it. But the question is, for what purpose are we tracking these individuals? What is it we want to know about them? What do we ask them, assuming we can find them? And when do we ask it?

If you ask somebody right when they come out of a PhD, before they go into a postdoc, they might think one thing. You ask them while they are in the postdoc, they might think another. You ask them when they are launching or trying to launch, they might think another. And then you ask them five years out and you may get yet another one. Now, do we care about all those points? Do we care about some of them? When?

Are there any other questions to ponder, or other new concepts, new ideas, or words?

Discussion:

- Part of the problem in this whole debate is the fact that the pace of change in science, in society, and in the economy far exceeds that of the university's ability to respond in terms of changing educational programs. The key in training in the future needs to be flexibility. Undergraduate students, graduate students, and postdocs need to be given tools that do not narrowly define them to one particular niche, but tools that give them the facility to move around and to change and to develop. You talked about interdisciplinary, and this touches on that. To some extent it seems almost futile to have data that are a year or two old, and try to make predictions any number of years into the future that actually are on a time frame that people are thinking about with respect to their careers, simply because everything may change in 18 months.
- What students should know and perhaps what we should take more time thinking about with the data has to do with general trends. One year more or less of data should not make a difference in somebody's career plans. What is much more important to know for a graduate student who's thinking about doing a postdoc in the biosciences for example, is that it is a hugely competitive world out there.
- Regardless of the data or the collection and the age of the data, whatever might work now is not going to be working five years from now in terms of skills and training because the world will be a different place in five years. You need to try to develop mechanisms that make sure people who are going through the educational system as graduate students and postdocs have the facility to change and develop the skills that they need to use on a daily basis, whatever their career is, whether they are research faculty, whether they are in industry, or whether they are in publishing.
- Most of the questions today did not really deal with data in the narrow sense. They dealt with information. A lot of that information is qualitative. Some of it might be made quantitative, but there are a lot of very complex questions. All this discussion of skills and work environment is not easy to collect in numerical form, which makes surveys much more expensive, makes it much more difficult to gather information, and much more difficult to collate that information in a usable form.
- Suppose you find out that there was a big difference in the institutional origins of people who had ended up working outside of science. Does that tell you something good, that they were trained

to be flexible and that they are using that flexibility to find interesting and diverse careers, or does that data mean that they have failed because they could not find jobs in science? I think you raised the right question which has to do with information as opposed to data, because the informational content of the data really has to do with careful formulation of the questions to which you are going to apply the data.

- NSF is looking at what we are doing in training people that is leading to new opportunities in science and new economic opportunities for our country and whatever else follows on after that. That requires a different level of analysis, and that is why I am interested in “multidisciplinary,” because what new tools are we creating by encouraging people to think outside the norms? There has to be a data component to it, such as citations to published literature, but it is not a matrix anymore. It is in three or four dimensions, and that is what people in program offices, who are trying to create new programs ten to 15 years ahead, will be needing. What sorts of people will we need? What kind of research and training experiences should they have had to take this on? But data are still a big part of it. We should be collecting the kind of data that we are collecting.
- Golladay: Your comment brings up another thing that has been touched on, but not necessarily with respect to data, and that is globalization. There is a lot of across country flow. Certainly, there is communication. The whole intellectual property set of issues is tied up in that. How do we feel about communication cross-country, where a receiving country may treat that information differently than it might be regarded in the U.S.? There are a lot of things there that do have some data implications.
- For postdocs, what can they take out from that research group when they leave and need to be independent? That is not going to work if they cannot take the information out with them.
- We often try to figure out where new advances have happened and how we trace them back, and one of the primary examples of the value of basic research is if we had not been studying how to culture kidney cells, we would have never had a polio vaccine. There are about five or six of these classic stories that everybody has read. Everybody wants to know how we got where we are in science so we can nurture that process and that procedure, and people are a key part of that. But there are some other components besides the people that have to do with the scientific advances and how we put those data together with our people data, and get real information.
- I have broken it up into three things. First, long-term trends. The majority of PhDs do not go into academia. Second, is new information – marginal change. And third, we are talking about information as well as data – qualitative analysis and qualitative information. Nobody is better than NSF at collecting data. But the difficulty comes when NSF analyzes data that reaches certain conclusions. If there was some way to collect the information and then provide the opportunity for disciplinary societies or others to seek grants to analyze the data, maybe that would be a step to do a more adventuresome and useful analysis.
- Golladay: There are questions that are being asked that could be at least partially answered with data that are now there. NSF is trying to make that data accessible. We realize it is always a question of time and energy and technical expertise. We probably could push the information content further than we have.
- NSF has a grants program which is for the analysis of NSF data as well as the development of some indicators. NSF also has an American Statistical Association/NSF fellow, where you can come onsite and work with the data. We are trying very hard to get data out in other forms.

- Faculty have not been mentioned very much today. Faculty are well aware of the marketplace. They are very entrepreneurial and they know what the trends are and they are following up on that in their centers. We need to look at the data on faculty and the fact that tenure-track faculty are becoming extinct very rapidly, and that within the next decade, they will probably be in the minority on most campuses. The postdocs and the graduate assistants are doing a lot of the teaching. When you look at the data on faculty, you have to think in terms of what kind of a structure we have in our universities and where postdocs fit into this new professoriate.
- We saw this morning how the creation of the VIGRE program at NSF made a difference in what the mathematical sciences call postdocs. NSF may not think that it has a lot of power to affect what happens in terms of the training of young people, but NSF and NIH have most of the leverage in the Federal Government. It would be nice to have some models, not just data, that would allow you to think about possible futures and possible interventions. If you do not have a guess about what is going to happen in the future, then you are willing to let anything happen. It would be good to spend more time and resources to get some people to do some serious modeling that would help NSF and NIH think about policies toward graduate education and research that might have something to do with this increased non-permanence of the faculty. Unless you do some modeling about what the institutions are doing and how that affects the labor supply or your demand as an institution for what kind of labor, it is very difficult to figure that out.
- My understanding is that the NIH was exploring getting the Massey and Goldman model updated as one way of helping them evaluate possible funding strategies. I know Richard Freeman's group at NBER is interested in the dynamics of the whole labor force, although I do not know that they have actually committed to constructing detailed models.
- The role of NSF's Division of Science Resources Statistics is that of the data collection agency, but we do not collect data in a vacuum. We collect data to inform the policy debate. We are not the policy makers. Others work with us to tell us what questions they want to answer. We are not just going out to collect a bunch of data, but we have to collect data that is really relevant. This is the second or third in a series of interactions on postdocs. We have put in a request in the '04 budget submission to begin the development of a feasibility study to look at how we add an ongoing postdoc survey into the suite of surveys on the scientific and engineering workforce. How do we capture them? Do we add additions to the Survey of Doctoral Recipients? This is going to be a very difficult and long-term project and the more people we can interact with the better. You asked the question, "What's the relationship of the university and faculty?" My question is where is this in the whole continuum of education? There are so many people who have some graduate education and never complete it. How do we capture them as well? There are so many questions that this is a part of.
- Golladay: In talking about what further information is needed, some of the topics that have come up include institutional structure, institutional change, faculty questions, scientific discovery, what is really happening to knowledge, and world affairs. Those are in a different category from going to a postdoc, and different from my question about "when", which is narrow and focused on the person. There are a lot of contributing factors. How do we bring them together?

One other very important point was made that should not be lost. I really appreciated the various presentations after lunch about attempts to collect and then give back better, faster information to those serving in these positions. There are some nice initiatives which are very important in terms of getting graduate students to know what is out there, what is available, what the options are, and what can they expect.

- I have not heard much on diversity. I think that there is plenty of data on that and the under-representation of women and minorities.

- One other point has to do with foreign national representation at the doctoral/postdoctoral level. At the university-academic level, what is the strategy is to manage this over time. A lot of the data are backward-looking. I am trying to figure out where it is going, so I am looking for modeling and planned strategies. On the demand side, it is not an insignificant problem to hire a foreign national. A case has to be made with INS that this person is an outstanding researcher or it is in the nation's interest to keep them because their output is so great that the nation deserves to have them here. Or the Department of Labor needs to be convinced that qualified U.S. citizen or permanent resident can be found to do this work.

To find the foreign nationals we want to hire, we advertise; we recruit on campus. But the issue for us is that there is a growing population of students now at that level who are foreign-born, so the choices become limited. If I am limited to only hiring U.S. citizens and permanent residents, the number of people that I can consider for employment is shrinking relative to the total mass. You do find in some cases that a foreign national is the best candidate. The other outcome of this scenario is that some companies will use foreign students as a dispensable workforce, because you can get them a temporary work visa for six years, and after six years, if they do not have a green card, they have to go back home. They are just simply let go. I am trying to figure out over the long haul, are we in good shape or bad shape? Is the balance between foreign and non-foreign about right? Is it getting worse?

- Postdocs need to take a proactive approach to their careers, starting at the graduate level. Sometimes, people just do a graduate degree and then go on to a postdoc because it is just a natural, easy approach.

**APPENDIX A
LIST OF WORKSHOP ATTENDEES:**

Eleanor Babco, Commission on Professionals in Science and Technology
Michael Beals, Rutgers University
Nathan Bell, Commission on Professionals in Science and Technology
Jeffrey Brainard, Chronicle of Higher Education
Joan Burrelli, National Science Foundation
Lynda Carlson, National Science Foundation
Geoff Davis, Sigma Xi
Ronald Fecso, National Science Foundation
Mary Frase, National Science Foundation
Heather Garvey, American Society for Microbiology
Marta Gmurczyk, American Chemical Society
Carrie Golash, Federation of American Societies for Experimental Biology
Mary Golladay, National Science Foundation
Shannon Gordon, Consortium for Oceanographic Research & Education
Laurel Haak, American Association for the Advancement of Science
Susan Hill, National Science Foundation
Martin Ionescu-Pioggia, Burroughs Wellcome Fund
Jean Johnson, National Science Foundation
Saundra Johnson, National GEM Consortium
Mary Jordan, American Chemical Society
Kelly Kang, National Science Foundation
Nirmala Kannankutty, National Science Foundation
Carter Kimsey, National Science Foundation
Jessica Kohout, American Psychological Association
Charlotte Kuh, National Research Council
Evangeline Loh, Association of American Medical Colleges
Carol Manahan, Johns Hopkins University
Stacey Merola, American Sociological Association
Patrick Mulvey, American Institute of Physics
Judith Nyquist, National Research Council
Jean Parr, American Chemical Society
William Pate, American Psychological Association
Arti Patel, National Cancer Institute
Ann Progulske-Fox, University of Florida
Sam Rankin, American Mathematical Society
Alan Rapoport, National Science Foundation
Judith Glazer Raymo, Long Island University
Cleo Redline, National Science Foundation
Mark Regets, National Science Foundation

Heather Rieff, Federation of American Societies for Experimental Biology

Walter Schaffer, National Institutes of Health

Roberta Spalter-Roth, American Sociological Association

Deborah Stine, The National Academies

Nancy Sung, Burroughs Wellcome Fund

Crispin Taylor, American Association for the Advancement of Science

Jura Viesulas, American Chemical Society

Mary Ann Wangemann, EDS

Donnajeon Ward, Computing Research Association

Ron Webb, Procter & Gamble

**APPENDIX B
WORKSHOP AGENDA:**

**Postdocs:
What We Know and What We Would Like to Know**

**3rd NSF/CPST/Professional Societies Workshop
American Chemical Society
1155 – 16th St., NW, Washington, DC, Marvel Hall B-D**

Wednesday, December 4, 2002

- 8:30 AM Welcome**
- 8:45 AM I. What We Know About Postdocs**
Mark Regets – National Science Foundation
Maresi Nerad – University of Washington (Unable to attend, but her presentation will be available.)
- 9:45 AM Break**
- 10:00 AM Professional Societies:**
American Chemical Society – Jean Parr
American Institute of Physics – Patrick Mulvey
American Mathematical Society – Sam Rankin
FASEB – Heather Rieff
American Sociological Association – Roberta Spalter-Roth
- 11:30 AM II. What Would We Like to Know?**

NIH – Wally Schaffer – Report on Survey Plans on Postdocs
NSF – Interdirectorate Committee on Postdocs – Carter Kimsey
NRC – Debbie Stine
- 12:15 PM Lunch**
- 1:00 PM III. Current Initiatives Under Way**
Proposed Postdoc Survey – Geoff Davis
Postdoc Network – Crispin Taylor
Formation of a National Postdoctoral Association – Carol Manahan
- 2:15 PM Break**
- 2:30 PM IV. What Further Information is Needed – How Can we Obtain it? How Will We Use It?**
Roundtable Discussion – Mary Golladay

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2.	PDF	<p>NEW The Status of Native Americans in Science and Engineering - This report explores the tremendous growth of the Native American population in the 20th century, and looks at the progress this population has made in high school diploma and college attainment. Data are provided on high school mathematics and science course-taking, SAT scores, educational attainment, precollege education, and higher education. This 7 page report was prepared by Eleanor Babco, Executive Director of CPST.</p>
3.	PDF	<p>NEW The Best and Brightest for Science: Is There a Problem Here? - This 21 page publication, prepared by William Zumeta and Joyce S. Raveling of the University of Washington, examines whether outstanding students with science backgrounds graduating from U.S. colleges and universities today are deterred more than in the past from pursuing graduate studies in science and engineering. The report examines recent data, trends in quality, the educational and career path choices of top students, changes in post-graduation plans of science graduates, and policy implications.</p>
4.	PDF	<p>Under-Represented Minorities in Engineering - This 22 page report investigates the schism between minority students who make up more than a quarter of the American school-age population in the United States and the working population of U.S. engineers which is predominantly white non-Hispanic, with a fair representations of Asians, but only a sprinkling of African Americans, Hispanic and Native American participants.</p>
5.	PDF	<p>Changing Career Paths in Science and Engineering - This report details a CPST workshop held on May 9, 2001 which brought together distinguished representatives from business, industry, academia and government to discuss career paths of scientists and engineers in the context of changing hiring and retention policies of employers. The report consists of twelve papers presented under 5 workshop categories: 1. Data Overview, 2. Changes in Academia, 3. Changes in Business and Industry, 4. Opportunities in the Federal Government and 5. Options for Movement Among Sectors.</p>

Pub No.	View Publication	Publication Title/Description
6.	PDF Print Version Available	<p>Scientists & Engineers for the New Millennium - This publication is a collection of 11 reports broken into three categories; What We Know, What We Need To Know, and What Can We Do? This collection grows out of an all-day symposium which was held in February 2000 in Washington, DC. The origins of the publication, however, extend far deeper into a community, a literature, and our respective efforts as policy-conscious scholars to understand a problem for U.S. society that persists, nags, and frankly torments us - the determinants of who participates in science and technology.</p>
7.	PDF HTML	<p>Limited Progress: The Status of Hispanic Americans in Science and Engineering - This report explores the rapid growth of the Hispanic population, and particularly that from Mexico and Central America and comparable increases in educational attainment, particularly at the higher education levels. The report also focuses on how Hispanic influence is likely to profoundly change the predominantly English speaking culture of the United States. Spanish is already the second most widely spoken language in the United States, and Hispanic influences are increasingly noticeable.</p>
8.	PDF	<p>Trends In Graduate Enrollment By Department Quality and Citizenship 1993-1998 - This report explores the trends in graduate enrollment between 1993 and 1998 by department quality and citizenship. The purpose of the analysis was to determine, by discipline, if the broad decline in graduate enrollment in the natural sciences and engineering between 1993 and 1998 was evident across all departments regardless of quality rating of degree program. Of particular interest are the trends among U.S. citizens and permanent residents and these compare which trends for non-citizens (temporary residents).</p>
9.	HTML	<p>Up Hill Climb: The Status of African Americans in Science and Technology - The report focuses on the progress African Americans have made in increasing their participation in the science and engineering enterprise. For instance, test scores have risen; the number graduating from high school and entering college is increasing; the number receiving baccalaureates and going onto graduate school is increasing. But the proportions doing so are not large enough or climbing sufficiently to make much of a difference in the total makeup of the pool. This is occurring at a time when the traditional base of our science and engineering enterprise, white males, is decreasing.</p>
10.	HTML	<p>Emerging Fields in Science and Technology - This report presents the results of a workshop sponsored by the Sloan Foundation. The workshop focused on emerging new fields of science and technology and how these fields are identified and handled by the academic and corporate communities. One of the underlying themes of the workshop was adaptive change, the thoughtful response of science to the challenges of the future. Adaptive change is the agenda for those interested in the health of science and engineering fields. Key issues which are addressed in the workshop are: How Educational Institutions Deal with Growth in Science and Technology; How Emerging Fields are Defined; The Relationship between Industry and Academia in the Emergence of New Fields; Government's Role in New Science.</p>

Pub No.	View Publication	Publication Title/Description
11.	HTML	Best and Brightest - Part II: Are Science and Engineering Graduate Programs Still Attracting the Best Students - This report addresses evidence that U.S. graduate programs in the natural sciences and engineering may be attracting less than their historic numbers or shares of the highest ability students, particularly those of U.S. origin. Two important areas were addresses: 1.) what is known or could be learned about trends in the quality of students bound for S/E graduate programs from the existing literature or relatively accessible sources and 2.) identify additional data sources and analyses from them that could be usefully carried out over a longer time frame to add significantly to policy-relevant knowledge about this issue.
12.	PDF	Employment of Recent Doctoral Graduates in Science and Engineering - This report presents results of a survey sent to professional societies which queried recent doctoral graduates in science and engineering. Results of the survey include the following areas: Employment and Unemployment, Employment Characteristics, Salaries, Job Search Methods, Major Sectors of Employment, Primary Work Activity as well as Opinions and Methods.
13.	PDF Print Version Available	Employment Outcomes of Doctorates in Science and Engineering - The market for new Ph.D.s in science and engineering has undergone important structural changes over the last 20 years. This report concludes that increasing numbers of new Science and Engineering Ph.D.s are finding employment outside of the traditional academic sector, and the career paths of new doctorates working in academia are very different than those of their advisors.
14.	PDF HTML Print Version Available	Best and Brightest: Education and Career Paths of Top Science and Engineering Students - A study which examines what career fields promising students are choosing and why. The report focuses on whether science and engineering disciplines are attracting a larger or smaller share of these promising students than in the past. Data were analyzed all along the educational pipeline from the choices of high school graduates, through college and graduate/professional schools, and out into the labor force. 58 pages.