

On the Art of Procuring Reference Letters

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Careers in the Math Sciences

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Reference letters are among the most important documents shaping an individual researcher's career, and they are further distinguished by being largely inaccessible to the individual. There is an art to writing reference letters and an art to reading them. There is even an art to discussing and comparing them in admissions, fellowship, hiring, prize, and promotion committees. The subject of this column, however, is the art, in the face of their invisibility, of procuring effective letters for a portfolio: choosing their authors, chasing them in on schedule, and checking on their status. The target audience is junior applicants---from undergraduates seeking graduate fellowships to postdocs and graduate students seeking their first permanent positions---although many of the principles apply at all levels.

Selecting the Ideal Reference Set

When you are free to choose some or all of your references (the usual case for junior-level positions), the choice is one of the most important of your entire application campaign and should be exercised strategically. Junior candidates often instinctively reach for the easiest-to-approach letter writers, without considering the importance of the integrated picture of themselves that should emerge from a collection of perspectives. You should carefully consider whether your reference set effectively "spans the space" of criteria related to the application at hand.

The impact of a reference letter depends mainly on its content and the weight of the signatory, two factors that cannot be separated. Glowing letters from authors whose objectivity is compromised or whose judgment (for the immediate purpose) is not respected are not only worthless: They weaken your portfolio by creating the impression that you lack judgment. Similarly, letters signed by highly ranked people can be valueless or even harmful if they fail to convey enough knowledge of your qualifications or regard for your achievements and experience. The ideal author will know at least one important aspect of your achievements well, will in turn be well established to the likely readers of the reference letter, and will have strong respect for you; this author, with no conflict of interest, will be optimistic about your chances of success in the position sought.

An effective author does not need full-orbed knowledge but should have had substantial interaction with you, such as semester-length exposure in a course, independent study, or laboratory, or supervision of a significant professional activity. Reference forms usually ask authors to specify how long and in what context they have known the candidate, and this scoping of familiarity often makes up the first paragraph of a reference letter.

The number of references is usually specified, with fewer letters required for early-career and temporary positions, where less is at stake, and more for senior and permanent positions. Some universities require 25 or more letters of reference to hire a senior professor with tenure on entry, whereas a summer internship in a laboratory may

require only one or two letters. You should begin by envisioning an ideal set of letters, setting out in the voices of objective third parties aspects of your credentials and accomplishments that should make it into your portfolio, and then matching potential authors to those voices. No single writer is likely to comment authoritatively on your scientific, mathematical, computational, and laboratory abilities, creativity, productivity, dedication, ability to work independently, ability to work in teams, and expressiveness, but most of these qualities do need to be addressed within the set, depending on the application. You may also need to reserve one letter for an author who, because of special knowledge, can mitigate a negative element of your portfolio.

It is often wise to select authors from different disciplines and different institutions who can comment on your performance in different contexts (such as a core course, research, or teaching), depending on the aptitudes to be measured by the application. It is unwise to allocate a letter to an author---such as a sports coach, an orchestra conductor, a volunteer coordinator, or a former employer---who has known you mainly in a context unrelated to the application, although committees occasionally see such letters with junior candidates. Because sports, music, and other extracurricular activities are often strongly correlated with the discipline, passion, and endurance that drive research and academic success, however, an ideal reference will be able to comment in passing on your extracurricular strengths while concentrating on topics of professional impact. In fact, for a lively and enthusiastic final paragraph of a personalized reference letter, you should, if possible, prime authors with at least one anecdotal paragraph relating genuine interaction outside the workplace, classroom, or laboratory.

If allowed, you might want to provide one or two letters beyond the minimum required, more as a hedge against failure of some writers to deliver than as an attempt to overwhelm the system. Readers of portfolios generally do not appreciate excess material that slows their processing and does not add new information, but if redundancy is ever advantageous and interesting, it is in the reference deck.

Recruiting and Preparing the Writers

At this point, practicality intrudes. Beyond a potential author's "product" of familiarity with you times reader-recognition value, you need to consider the author's capacity to act in time.

Likely reference writers (for instance, well-known professors of core courses) are sought out by many well-qualified candidates. To ensure that such a writer is well primed to execute your reference efficiently, you should create a self-contained packet containing all the information the author will need to dispatch the reference in one sitting: (1) contact information for the recipient of the letter, (2) a description of the position and application closing date, (3) your own application essays and cover letter, (4) a resume, (5) relevant transcripts and scores, and (6) an explanation of the niche of the writer! It is very useful, as a reference writer, to receive a reminder along the following lines: "Professor Keyes, your letter will be the one that comments most authoritatively about my analytical ability, my promptness in completing projects, and my reasons for wanting to pursue X next fall. Remember that you gave me an A- in partial differential equations two years ago and it was your suggestion that led to my summer at Los Alamos with Y." You should provide this packet in both hard and soft copy. Writers of lots of references maintain files that may be hard or soft, or both, and you should make it easy for those writers to locate your files quickly for subsequent

updating and future requests.

Some faculty write many dozens of letters of reference during peak months, and they may even ask candidates for sample text to be incorporated into letters, to ensure that they capture their niches. You should not be flustered at such a request, and should not be modest in complying. You should be aware, though, that your words will not pass directly into the delivered product; they will be used simply to get the author's juices flowing following the formulaic paragraphs of the letter.

Scheduling the Campaign

Writing personalized impactful reference letters can be very time-consuming, so you should strategize about authors well in advance of deadlines, allowing yourself time to recover from declinations, absences, or unrequited e-mails. You should approach your references unassumingly, without urgency, whenever possible. (Of course, the time to write multiple letters exceeds the time to write a single one only slightly, provided that the purposes are similar; repeat requests can therefore be made with far less notice.) Careful advance planning of all the letters required for a given campaign, and an advance list of their targets and deadlines, not only increases the likelihood that they will be delivered, but can also remind authors of your organizational efficiency at just the moment that fingers are hitting the keyboard on your behalf.

To help maximize the time a writer has available for each candidate, you should complete the reference process as far as legally possible yourself. For hardcopy applications, this means printing out and filling in as many fields as possible, both about you and about the writer (title, affiliation, contact data). For reference letters collected online (the vast majority for positions filled by junior candidates), you can usually fill in each writer's basic contact information. Such streamlining is always appreciated and leads to fewer errors and faster completion.

Asking from a Position of Strength

You should try to evaluate the comfort that a prospective writer will bring to the task. A letter that cannot be strong is not only a waste of the writer's time---it would be a blow to your portfolio. It is never a good idea to attempt to secure, out of desperation or by deception, a letter for a position for which you are clearly not qualified. Everyone associated with the process will be uncomfortable, and in any case the system generally works to filter out unsuitable candidates. Unfortunately, given the vagaries of supply and demand, highly qualified candidates are sometimes filtered out as well---one reason for which no element of the portfolio, including letters, can be weak.

To discuss strategic or problematic aspects of an application, you might need to get on the appointment calendar of one of your recommenders. Results can include career counseling that saves you disappointment and opens up alternatives; you might also see marked improvement in your essays or resume. Prior to visiting a busy working scientist or educator, you should take advantage of institutional resources, such as career centers; you should also thoroughly discuss your plans with people who are not sufficiently objective about you to serve as references. This is the best way to take advantage of your peers and relatives: to help you bring the strongest, richest, and best converged presentation to the reference writer, who can then carry the baton for the final lap.

Checking Up

The inaccessibility of the vast majority of reference letters to candidates is beneficial to all involved. Open "To Whom it May Concern" letters carry almost no weight in review committees and usually represent a waste of time. Some writers are happy to share with candidates exactly what their letters have covered and relate their enthusiasm for the campaign. (In a similar spirit, some referees of scientific papers make their reviews known to a paper's authors.) Consumers of reference letters, however, almost always want their reports directly from the author, without candidate intervention. In view of this lack of control, candidates up against deadlines become nervous and often wonder whether, or how delicately, busy writers need to be reminded.

The advent of online applications has substantially reduced guesswork about the status of blind parts of the application and has provided a polite mediated reminder system. But if a firm deadline approaches and you learn of a missing letter---a critical letter that you have followed due process in securing and preparing---it is time to remind the author directly. For a cheerfully agreed upon letter with a well-prepared case, such reminders will almost always be cheerfully received and gratefully acknowledged by the author with a promise to complete. As a last resort, the author's administrative assistant may be a useful intermediary.

You should bear in mind that reference writers are usually also experienced reference readers. They know that stated deadlines are often matters of administrative convenience within institutions with bureaucratic latencies, and that late letters are usually accepted with full weight and will find their way into portfolios prior to committee review. If they are reassuring, you should be reassured.

Giving Back

Everyone in a position to write a career-changing letter of reference is there by the grace of earlier generations of mentors at school or work who poured their lives into today's writer and then wrote about the results in now dusty letters. The only gifts today's authors expect from today's candidates are those "in kind" or better to be delivered to tomorrow's candidates, in one-way cross-generational equity. Writers have their own rewards in the success of their protégés, and though they will moan to each other about the burden, they recognize that reference letters are key components of an imperfect system that nevertheless is on the whole effective in keeping their discipline healthy and growing.

Following Up

Downstream of the campaign for your degree program, job, or summer internship, you should follow up with your reference writers to document the outcome. Normally, this will entail a short e-mail or a quick office visit to say thanks and to receive heartfelt congratulations. If things haven't worked out, such an exchange might provide consolation and enhanced perspective, based on public or inside knowledge about the general success of candidates from the institution in some window of years. It might also lead to custom career advice and new directions. Reference writing, remember, is an art of its own and a natural outgrowth of the art of mentoring. Most artists like to know how their art is received.

As vice president of SIAM (2006–2009), David Keyes was the ex-officio chair of SIAM's Committee on Membership. He was invited by Susan Minkoff, the current chair, to be a

rotating columnist in the new SIAM Careers in the Math Sciences column. Keyes is the inaugural dean of the Division of Mathematical and Computer Sciences and Engineering at the King Abdullah University of Science and Technology and the Fu Foundation Professor of Applied Mathematics at Columbia University. He has written or read thousands of reference letters in his first 25 years in academia.