

General

Statistics and Ethics: Some Advice for Young Statisticians

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We write to young statisticians about the nature of statistics and their responsibilities as members of the statistical profession. We observe that the practice of the discipline is inherently moral and that this fact has serious implications for their work. In light of this, we offer some advice about how they should resolve to think and act.

KEY WORDS: Graduate study; Integrity; Principle; Professional practice; Research; Teaching.

Dear Gentle Reader:

So, you are embarking on a career in statistics. Good. It is a genuinely noble pursuit, though this may be hard to see as you wrestle with new-to-you technical issues varying from “How do I get this SAS job to run?” to “How do I show this thing is UMVU?” and on occasion find yourself wondering “What is the point of all this?”

This last question about purpose is actually a very important and quite serious one. It has implications that run far beyond your present pain (and joy) of “getting started.” How you answer it will affect not only you, but also the profession, and human society at large. We write to offer some advice and encouragement, and to say how we hope you frame your answer to this simultaneously practical and cosmic question.

What *are* this subject and this profession really all about? And why *are* you doing what you are doing? For sure, there are details to learn (and keep current on throughout a career). There is everything from the seemingly uncountable number of tricks of first year probability theory, to statistical computing, to nonlinear models. It initially looks like “soup to nuts.” You know that statistics is about collecting and handling data. That is true, but incomplete; there is much more than that at work here.

The vital point is that this discipline provides tools, patterns of thought, and habits of heart that will allow you to deal with data *with integrity*. At its core statistics is not about cleverness

and technique, but rather about *honesty*. Its real contribution to society is primarily *moral*, not technical. It is about doing *the right thing* when interpreting empirical information. Statisticians are *not* the world’s best computer scientists, mathematicians, or scientific subject matter specialists. *We are* (potentially, at least) the best at the *principled* collection, summarization, and analysis of data. Our subject provides a framework for dealing transparently and consistently with empirical information from *all* fields; means of seeing and portraying what is true; ways of avoiding being fooled by both the ill intent (or ignorance) of others and our own incorrect predispositions. The mix of theory and methods that you are discovering is the best available for achieving these noble ends. The more you practice with it, the sharper will become your (fundamentally moral) judgments about what is appropriate in handling empirical information.

Others from areas ranging from philosophy to physics might well object that we have claimed too much, wrapping statistics in a cloak of virtue to the apparent exclusion of other disciplines. After all, thoughtful scientists and humanists from a variety of fields are engaged in the pursuit of truth. And any serious education has moral dimensions. Our point, however, is that the particular role that the profession plays in science and society should not be viewed as amoral, and that this fact constrains how we all must think and act as its members.

That society expects our profession to play this kind of role can be seen in the place statistics has as arbiter of what is sufficient evidence of efficacy and safety to grant FDA approval of a drug, or enough evidence to support an advertiser’s claim for the effectiveness of a consumer product. And it can be seen in the fact that many disciplines have “statistical significance” requirements for results appearing in their journals.

Society also recognizes that when statistical arguments are abused, whether through malice or incompetence, genuine harm is done. How else could a book titled *How to Lie With Statistics* (Huff 1954) have ever been published and popular? The famous line (attributed by Mark Twain (1924) to Benjamin Disraeli) “There are three kinds of lies: lies, damned lies, and statistics” witnesses effectively to society’s distaste for obfuscation or outright dishonesty cloaked in the garb of statistical technology. Society disdains hypocrisy. It hates crooked lawyers, shady corporate executives, and corrupt accountants, and it has contempt for statisticians and statistical work that lack integrity. But young statisticians sometimes find themselves being “encouraged” to offer questionable interpretations of data. This pressure can come even from well-meaning individuals who believe that their only interest is in ensuring that their position is treated “fairly.” Maintaining an independent and principled point-of-

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view in such contexts is critical if a statistician hopes to avoid becoming a part of Disraeli's third "lie."

So, you are embarking upon a noble and serious business. We take as given that you have a basic moral sense and a strong desire to personally do good. We also take as self-evident that integrity is a pattern of life, not an incident. Principled people consistently do principled work, regardless of whether it serves their short-term personal interests. Integrity is not something that is turned on and off at one's convenience. It cannot be generally lacking and yet be counted on to appear in the nick of time when the greater good calls. This implies that what you choose to think and do now, early in your career, are very good predictors of what you will think and do throughout the whole of it. You are setting patterns that will endure over a professional lifetime and substantially influence the nature and value of what you can hope to accomplish.

A fair amount has been written about professional ethics in statistics and we do not propose to review it all or comment on every issue that has been raised. For example, Deming's (1986) article is fundamentally a discussion of ethics. Both the American Statistical Association (1999) and the International Statistical Institute (1985) have official statements on ethical guidelines for statisticians. And in a more general setting, the National Academy of Sciences (1995) has published a useful booklet that is primarily about ethics in science and has implications for statistical practice.

Our more specific goal here is to suggest some things that a high view of the discipline means for your present work and attitudes. Aiming to speak to both statistics graduate students and recent grads, we'll begin with some implications for life in graduate school, and then move on to implications for an early career in the discipline.

ADVICE FOR STATISTICS GRADUATE STUDENTS

"Graduate student ethics" (or for that matter "professional ethics") is really just "plain ethics" expressed in a graduate student (or professional) world. A discussion of it really boils down to consideration of circumstances and issues that arise in a particular graduate student (or professional) setting. So an obvious place to begin is with general student responsibilities. If you are still in graduate school, we urge you to be scrupulous about your conduct in the courses you take. Here are some specifics:

- Resolve to never accept credit for work that is not your own. It should make no difference to you whether an exam is proctored or unproctored. Whatever the homework policy of the course, make it your practice to clearly note on your papers places where you have gained from discussions with classmates or consulting old problem sets of others. It's simply right to give others credit where it is deserved and it's simply wrong to take credit where it is undeserved.

- If course policy is that everyone is "completely on their own," resolve in advance to politely refuse to discuss with peers topics that are off-limits, even if others violate the policy. It may seem a small thing at the time, but you are setting life trajectories that are bigger than the particular incidents.

- Determine to never take advantage of (or over) your peers. If you join a group study session, be ready to make your fair contribution, not just to benefit from the input of others. If you have legitimate access to old files or notes or textbooks that are helpful, let others know about them so that they can benefit as well.

What do these three points say? Simply that you should play by the rules set out and be clear and honest about all contributions made to the work you turn in. Why would anyone do otherwise? Honestly, only to gain an undeserved advantage in a course grade, or to avoid some effort. But a student willing to cut corners for an A or a free weekend will have serious difficulty not cutting corners in later professional responsibilities when the reward is a promotion or pay raise or a free weekend.

Some additional issues are related to the notion of "doing the hard thing." Everyone has things that come harder for them than others. It's human nature to want to avoid what is difficult and to even convince ourselves that really, the easy thing is what is important and the hard thing is worthless. But that is not only obviously silly, it has moral implications. Here is some advice for the student reader:

- Understand that acquiring an advanced education is a difficult enterprise, that there may be times when you *feel* like complaining about this, but that it doesn't really help to do so. Whining wastes energy and can poison the learning atmosphere for others. You are engaged in a noble, if difficult, pursuit. Give it your best shot without complaining. After all, most things worth doing *are* hard.

- Resolve to work on your weaknesses rather than excuse them. Doing good statistical work is important, and demands the best possible personal tool kit. The reasoning "I find methods (theory) easier than theory (methods), so I'll just do methods (theory)" implicitly and quite wrongly assumes that one can do good statistical work with half a tool kit.

- Decide not to denigrate the strengths of others. Give other people credit for what they can do that you cannot. Find your niche without minimizing the honest efforts and contributions of others.

- Determine to take the courses that will enable you to be the best-educated and most effective statistician you can be. These are often academically demanding, and may not form a particularly easy route to a high GPA. While difficulty, per se, is not necessarily a measure of how often you will find the material in a course useful, it *is* related to the mental discipline you will develop. If you choose a course that covers material you could easily pick up on your own or because it is taught by a professor who demands little in exchange for an A, you've cheated yourself. The choices you make about curriculum are moral choices, not just choices of convenience. You have a limited time in graduate school . . . use it wisely. How effective you will be as a professional depends on it. Besides, your choices say something nontrivial about the personal character that you are developing.

- Purpose to do what your thesis or dissertation advisor sets for you to do, as independently as you can. While it may seem that some assignments are arbitrary or unnecessary, remember

that you do not have your advisor's experience as a researcher *or* educator. This person knows what you know, what your abilities are, and the difficulty of your problem. He or she is trying to help you to develop as a responsible and independent member of the profession, one accustomed to consistently working up to your capabilities. Focusing your energy on the challenge of the problem and the opportunity it represents will take you much farther than wasting your energy in grumbling or in negotiating to be led through every detail of a solution.

It is worth adding a further note related to this last point. The advisor-advisee experience has the potential to be invigorating and rewarding (both professionally and personally) for both parties. Think of the efforts you put into it not only as a requirement for the degree, but as the beginning of what may be one of your most important and cherished long-term relationships. Find someone to work with who you like and respect, and put your energy into the enterprise.

Most statistics graduate students work as graduate assistants. Assistants should remember first that an assistantship is not a fellowship, but rather a job. And it is axiomatic that principled people return honest effort for their pay. If you are working on a faculty member's grant, that person must produce quality work in line with the interests of some outside entity. Do what you can to help him or her. If you are a teaching assistant, there are lectures to conscientiously prepare and deliver, papers to carefully grade, and students to help. If you are a consultant, people with real problems of data analysis will appear at your door seeking aid. They need your best effort and advice. Let us amplify a bit:

- If you are a research assistant it is understood that you have "your own" class work and thesis or dissertation to attend to. But some of your weekly hours are first committed to providing the help (programming, library work, report writing, etc.) your employer needs. There are important educational benefits that accrue as you practice at these duties. But the most fundamental reason to carry them out conscientiously and cheerfully is simply that it is the right thing to do. (And it is wrong to think that cutting corners now doesn't say anything about later behavior. Life will always be hectic and there is no reason to expect your work habits after finishing school to be better than the ones you are developing now.)

- If you are a teaching assistant, purpose to make the best of the fact that along with some conscientious, motivated, and pleasant students, you will deal with some unpleasant, intentionally ignorant, lazy, and dishonest students. It simply comes with the territory. For your part, make it a point to model integrity and purpose for all of them. Do your best to convey that what you are teaching them really does matter and how they do it matters as well. Resolve that whatever your "style"/personality (from animated to reserved) your body language will convey a genuine willingness to help. The job takes patience—plan on it. Resolve to treat all of your students well, whether or not their behavior in any sense merits that. And it should go without saying that although you want to be pleasant and approachable, propriety

and impartiality dictate that you are their instructor or TA, not their pal.

- If your assignment is to help with statistical consulting, you are already wrestling (at a "trainee" level) with some of the serious issues faced by one segment of our profession. Carefully consider and handle these now, as you begin to see how the "human element" of statistical consulting requires thoughtful and principled discipline. You're going to have to argue with yourself in conversations like:

- What looks to me like the thing that *should* be done would take two hours to explain and several more hours of my time to implement, while this client would be happy with something less appropriate that I could explain in five minutes . . .
- This client *really* wants "A" to be true, but these data look inconclusive . . .
- This looks pretty much OK except for that oddity over there that the client doesn't really want to discuss . . .

Graduate Student Reader, keep your eyes open during this graduate student experience. Watch your faculty and emulate the ones who take seriously what they do. There are some fine role models in our university statistics departments, excellent members of the profession. Find them, and learn as much as you can about what they think and how they practice statistics.

ADVICE FOR YOUNG PROFESSIONAL STATISTICIANS

Many of the themes we've introduced in the context of graduate study have their logical extensions to early professional life. But there are also other matters that we've not yet raised. We proceed to discuss some of the less obvious extrapolations and further ethical issues faced by young statisticians, organizing our advice around the topics of (1) research/publication, (2) teaching, and (3) professional practice.

If you have finished a Ph.D., you have been introduced to the craft of research in statistical theory or methods. You are in a position to help develop the profession's supporting body of knowledge and to contribute to our journals. It's important to consider the corresponding responsibilities. These are tied closely to a proper view of the purpose of publication in statistics. Published statistical research should provide reliable and substantial new theory or methodology that has genuine potential to ultimately help statisticians in the practice of the discipline. Statistical publication should not be treated as a game. It is, and should be treated as, a serious and moral business. Here are some points of advice issuing from this high view of what the research and publication activity is all about:

- Resolve that if you choose to submit work for publication, it will be complete and represent your best effort. Submitting papers of little intrinsic value, half-done work, or work sliced into small pieces sent to multiple venues is an abuse of an important communication system and is not honorable scholarship. It is not the job of editors or referees to proofread or complete your papers, or to insist that you follow up on important issues that you know exist. See the "Let's just send it off and let the reviewers

sort it out” impulse for what it is, a temptation to off-load your work to someone else. And the “I’ll just submit this half-done thing to an outlet that will print anything” strategy does nothing of real value for anyone. It wastes time and effort of those in the review system, and when “successful” it dilutes our literature. This makes important work harder to find, and in the end calls into question our very reason to exist as a profession.

- Purpose that when asked to do the job of a referee, you will do it thoroughly, impartially, and in as timely a manner as possible. There is no obvious short-term payoff to doing what is right here. But the integrity and currency of the scientific publication process depend on competent and principled referees taking the job seriously. Resolve never to do a shoddy/cursory review job, or worse yet to let calculations about personalities (and personal advantage) govern how you judge a piece of work. Even though many statistics journals use a “double-blind” system, the profession is small, and you will find it increasingly rare that you have no idea who authored a paper you receive for review. So remember that the *spirit* of the blind review policy is honorable, and that you have an obligation to conduct your review in this spirit even when you cannot be completely “blind.” And do what you can as an individual to help fix the widely recognized problem that the review process in statistics is presently much slower than in many other disciplines.

- Decide to routinely take the advice of editors and referees regarding papers that you submit for publication. Occasions are rare where editors or referees have it all wrong or purposely treat an author unfairly. Most often, the advice they offer is constructive and when followed substantially improves an article. Until an editor signals clearly that he or she has no further interest in a piece you have submitted, you should almost always make good faith efforts to revise your paper in accord with his or her advice. Serial journal-shopping for a venue that will publish a submission with essentially no revision may minimize the total effort an author expends on a paper, but the practice wastes the overall energy of the profession and has a negative effect on the overall quality of what is published.

- Determine to be scrupulous about giving credit where it is due. If another has contributed substantially to the content of a paper, co-authorship is typically appropriate and should be offered. (On the other hand, *never* list a colleague as co-author of a paper until you have that person’s explicit permission to do so.) And include acknowledgments of others deserving thanks for less extensive, but real, help with an article.

- Resolve to acknowledge priority and the derivative nature of your work with due humility. If after the fact of publication you find that some of your results can be found in earlier work, immediately send an acknowledgment to that effect to the journal where your paper appeared. In writing your papers in the first place, we encourage you to be forthright and helpful about what you know is already published on your subject, delineating carefully what others have already said and where your new contribution lies. (No one ever really “starts from scratch.” Don’t fall prey to the temptation to leave unsaid what you know is already known, thinking that to do so strengthens your own position.) And *never* borrow published/copyrighted words, even of your own authorship, without acknowledgment. To do so is pla-

giarism and is completely unacceptable. (This caution extends, by the way, to thesis and dissertation work, even if that work is never submitted to a journal for formal publication.)

A note related to this last point: Avoiding plagiarism places an extra burden on students whose writing skills are not strong, especially those struggling with English as a second language. But it is essential to find one’s own words and not simply copy or even paraphrase those of another (even for parts of a paper that are background and obviously don’t purport to provide new technical content). This is a very serious integrity issue.

Next, let’s consider issues relevant to teaching of statistics as a professional. There are reasons to do this whether or not you have plans for a career at a college or university. Teaching/training is increasingly done “in house” by corporations and consultants, and it could be argued that most professional presentations are essentially teaching efforts. The logical extension of the advice offered above to graduate teaching assistants is, of course, relevant here. But there is an important extra dimension to discuss, related to the freedom and responsibility that a professional has in answering the question “What will govern what and how I teach?” Will it be “What’s easy for me?” Or will it be “What will get the best short-term reaction from the students?” Or will it be “My best professional judgement as to what the students need for the long term and my best understanding of how to effectively convey that information?” This is a moral choice. Here is some amplification:

- Determine that you won’t fall into the trap of organizing all courses around your technical specialty. This is an issue of fundamental humility and recognition that none of us has put all that is needed into our personal little package (to say nothing about the matter of “truth in advertising!”). But we suspect that you know what we are talking about, having seen people turn every course they teach into a platform to show off their own work.

- Purpose not to be governed by what is easy to do. This is not an entirely separate issue from the previous one. But we are also thinking about cases where the case is not so blatant or not tied directly to one’s specialty. It’s a lot of work to learn new methods and software to include in a course, to freshen examples, to develop new laboratories and assignments for students, to replace outdated topics and means of presentation. And it’s sometimes possible to “get by” without investing that effort. But doing so is simply wrong. We urge you not to take that route.

- Resolve to do the best for your students, whether or not they appreciate your efforts in the short term. We live in a “consumer” society. There is huge pressure on teachers in all contexts to make students happy. But statistics is hard, and students DON’T know what they need. You will. We hope that you opt to do your best to provide that, not simply what will get the best crowd reaction. Lots of jokes, little in the way of course demands, and high grades can please many audiences. And leave students ignorant. Of course we should aim to be engaging in our presentation of our subject. But the point of teaching is to genuinely improve subject matter knowledge and the reasoning powers of students. It is not to produce feel-good experiences for them. (In this regard, we were recently dismayed to see an Iowa community college president quoted in the *Des Moines Register* (2001) as

proudly saying “We are really a service organization first and an educational institution second.” While that may in fact be true, it is a terrible commentary on the state of the institution.)

Those of you beginning academic careers will face enormous demands for early success. Most universities require substantial accomplishments in both research and teaching during the first six years of employment, and some place the bar so high that seemingly superhuman effort is required. If numbers of refereed publications and instructor evaluations are the “keys to success,” can you afford to have *real quality* as your primary goal? Is there enough time in six short years to accomplish all that is required if you take our advice seriously? These are real and hard questions. How you use your assistant professorship is critical to your long-term professional success, and it is obvious that you must take your institution’s expectations into account. But, we urge you as you face these issues to remember that one who spends an assistant professorship cutting corners is at best prepared to be an associate professor who knows how to cut corners . . . not one who has learned how to make a difference.

Turning finally to the area of professional practice, we note that most of what has been written about ethical guidelines for statisticians concerns what is appropriate in public practice, in lending aid to others in the impartial and efficient collection and analysis of their data. This is understandable, as (1) the discipline’s whole reason to exist is ultimately to provide such aid and (2) this activity is both subtle and full of pitfalls. Both the ethical guidelines and public skepticism typified in the “lies” quote of Disraeli point to the fact that statistics can be used to form highly technical and even technically correct support for statements which are in fact not true. We might hope this could happen only when nonstatisticians practice statistics without proper technical understanding of the subject. But statistical lies are by definition immoral uses of statistical arguments, whether technically correct or not, and stem from societal pressures that affect statisticians and nonstatisticians alike. What then must you do in society to preserve the discipline’s (and your own) integrity?

First, recognize that *a professional statistician should never behave like a courtroom lawyer*. The practice of law is based on an adversarial model in which each lawyer represents an assigned point of view—that which will yield the most positive outcome for his or her client. While the use of lies and intentionally misleading statements is prohibited in legal proceedings, legal strategy certainly does involve the selective use of evidence so as to present the truth (or some part of it) in the light most favorable to a particular point of view. But a key aspect of this model of litigation is that decisions are made by an unbiased authority (a judge or jury) based not on the case presented by a single side, but only after arguments presented by all parties are heard.

Statisticians usually do not operate in such well-controlled adversarial systems. If you *do* work in this kind of arena you must keep absolutely clear the distinction between an objective analyst and an advocate, and never purport to be (or think yourself) the first when you are the second. If you are employed by an organization (whether on a permanent basis or as a consultant) you are by definition not disinterested in its well-being. And if you are working “pro bono” for a cause you support, you are not dis-

interested in furthering the cause. In either case, it is axiomatic that your professional judgment is potentially clouded by what you (quite naturally) want to be true. And you will be no fair judge of the extent to which this clouding has occurred. There is real danger here. There is little that is more damning to the discipline than for one of its professionals, implicitly claiming some degree of objectivity, to be publicly exposed as overstating a statistical case in favor of his or her employer or cause.

More commonly, statisticians function as consultants to those who must make decisions. We do this through careful and thoughtful design of data collection mechanisms and analysis of assembled data. But “careful and thoughtful” here are words that acknowledge a critical fact: *Statistical analysis of data can only be performed within the context of selected assumptions, models, and/or prior distributions*. A statistical analysis is actually the extraction of substantive information from data and assumptions. And herein lies the rub, understood well by Disraeli and others skeptical of our work: For given data, an analysis *can* usually be selected which will result in “information” more favorable to the owner of the analysis than is objectively warranted.

The only “cure” for this difficulty is statistical practice based on assumptions embodying an informed, balanced, and honest representation of what is known. “Known,” not “wished for,” “desired,” “convenient,” or even “other-than-worst-fears.” This has implications for how statisticians must be and act if they are to be both effective and ethical.

- *Statisticians must be knowledgeable about the system under study*. They should not present themselves as competent to analyze data from systems about which they have no substantive understanding. Real data are not “context-free.”

- *On the other hand, statisticians must recognize and acknowledge the limitations of their “subject matter” knowledge*. Data and variation are ubiquitous. Knowing how to handle them can give you important and even uncommon insights in a variety of contexts where you have limited subject matter credentials. But the fact that you can make contributions in league with experts in a variety of fields doesn’t substitute for credentials in those fields. The credibility of the statistical profession depends upon its members being scrupulous about what they know and what they don’t know. Never forget that you are not the context expert.

- *Statisticians must go out of their way to see that their analyses allow interpretations of the available data which are tenable but not popular in the statistician’s organization*. This does not mean “be a troublemaker,” but it does mean that you should carefully think through how available data would be interpreted by those with all possible rational points of view.

- *Statisticians must write complete reports stating the results of their entire informed thought processes—including what they know, what they have assumed, what they have decided cannot be assumed, and what conclusions tenable assumptions support*. Our reports should contain “complete and sufficient” analyses upon which any rational point of view can be argued. If you come to the conclusion that one of the spectrum of sensible interpretations is “best” in a particular application, make it your goal to be absolutely transparent about your reasoning. People

should be able to easily see your full set of model assumptions, understand what methodology you have used to make inferences in that model, and have access to diagnostic and robustness work you have done. (This advice is sound in general. But it is perhaps especially relevant to explicitly Bayesian analyses. A consumer of a posterior distribution has a moral right to know how strongly it depends upon the prior.) Honest statistical work has nothing to hide. It says what it says. It doesn't try to obscure points where alternative conclusions are possible if other assumptions are made or different analysis paths are followed, and admits where model fits are short of perfection or conclusions are highly model-dependent.

As a statistician, your allegiance must be to finding the conclusions which can be supported by data and careful assumptions. Does this make the business of assumption selection more difficult than it seemed in your statistics coursework? Does it seem as though you must take these issues more personally and seriously than our favorite semi-academic phrase "Let X_1, X_2, \dots, X_n be iid $F \dots$?" Does it sound like your formulation of these assumptions may have more to do with nonmathematical *values* than has been discussed in your textbooks? Yes, this and more is true. Ethical statistical practice requires that you *take responsibility* for acquiring substantive understanding, knowing all rational points of view, and making decisions well beyond those based entirely in data.

- You must examine yourself to see that you are not even subconsciously leaning toward analyses which you believe will "please the boss" or yourself, or simplify the problem unjustifiably. This means that you cannot afford to think of yourself as a data technician or a hired gun. You must be secure enough to simultaneously separate any prior vested interest (yours or others') in the outcome from your analysis, and meld together seamlessly everything you know about the subject matter of your investigation with the structure of your statistical work. *You cannot do this unless you have strength of character and integrity.*

- You must not stop with the obvious or even the most likely explanation of data, but find ways to examine them so that all rational viewpoints can be informed. This means that you will work harder and longer than anyone who reads your reports will ever know. You will not rest until you *know* you understand all the information contained in the data, where "information"

is defined by the context of your work across the spectrum of rational viewpoints. *You cannot do this unless you develop an ethic of self-reliance, thoroughness, and hard work.*

- You must understand fully what your assumptions say and what they imply. You must not claim that the "usual assumptions" are acceptable due to the robustness of your technique unless you really understand the implications and limits of this assertion in the context of your application. And you must absolutely never use any statistical method without realizing that you are implicitly making assumptions, and that the validity of your results can never be greater than that of the most questionable of these. *You cannot do this unless you remain dedicated to being the best technical statistician you can possibly be, understanding that this involves knowing and understanding the mathematical arguments as well as the computational techniques behind every tool you need.*

Well there it is, more than enough advice to keep a young statistician busy for a career. We hope we don't sound too much like myopic cranks, finding "serious ethical issues" to raise in even the most mundane contexts. Instead, we hope that we have argued effectively that ethical matters are central to our discipline and provided some insight into issues that this raises. We further hope that you determine to take the matter of principle most seriously.

Carry on, Gentle Reader.

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