Course Outline STA492H1
A Seminar in Statistical Science

from the private notebook
of
David Brenner

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contact info: **seminar:**

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the science of doing science

Broadly speaking, *statistics/statistical theory/statistical practice* (by what-ever name) is 'the science of doing science'. And so to convey that general meaning, we often simply refer to it in a compression of that very phrase as *statistical science*. And sometimes we even refer to it in the plural collective as *the statistical sciences* thereby to remind ourselves that there are indeed several and varied provinces in the wide and ever-expanding domain of the general subject. In any case, and, as such, *statistical science* is a bona fide field of study, a subject matter in its own right. And anyone engaged in that study — either as a novice, eager to learn and to comprehend that which has already been discovered, or already one of those pressing hard to embar-que on a voyage of exploration to the outer reaches, the frontier, in search of the new — it is important always to remember that all of these efforts, the learning, the searching and the researching, are entirely open-ended and forever.

But, if we are to take all of this literally (which is a bit pretentious) then in order to understand perfectly what exactly it is that may legitimately be referred to as *statistics*, it falls to us to explain what in the first place qualifies as being *science*. One could of course argue for many possibly different definitions, from many different points of view, and in many different ways, some emotional, some mathematical. But it is not the job of this course outline to do so. In fact, it will be one of the specific tasks of the seminar itself, of the participants in the course, to take it on, as a group — to settle on a single unifying definition of what exactly science actually is in such a way that one may properly comprehend, therefore and thereafter, what actually is the science of doing science.

calendar description

This course is intended for students completing the *statistical science: theory and methods specialist program*. Novel influential ideas and current research topics in statistics will be explored through readings and discussion. Content will generally vary from semester to semester. Student presentations and written reports will be required.

course objectives and structure

Even while understanding that we have all been students in the same university, in the same department, and in the same programme of study (for at least a couple of years) — and mostly taken the same or similar courses over time — it still must be granted that each of us in this seminar, in this particular year, comes, potentially, from a quite different background in life, has different career aspirations, hopes and dreams, and so on, and so on. So, while we are all interested in considering the research opportunities available to a career statistician (or we wouldn't be in this seminar), these are so manifold and varied that no individual human can truly hope at this point in history to become fully expert in more than a few closely related specialized areas of study.

Accordingly, our aims in the seminar will be essentially two-fold:

(1) As a group: collectively to delineate all the known provinces, regions and municipalities of statistical science — in other words all those areas of special interest. As a group to write a semi-rigorous descriptive essay, in sev-

eral sections and subsections, that would provide to the 'educated layman'[1] with an undergraduate degree in statistics (not necessarily a specialist degree) a sound understanding of exactly what it is that all the various sorts of professional statisticians actually do in each of the various highly specialized intellectual niches and interests in which they either choose to reside or find themselves. We do this as a group of course because, while it is plainly true that no individual can do all things, everyone should at least be well aware of what those different things are that others amongst them (colleagues) do within the grand framework in which they are a fellow traveller. Since all of us in the seminar will contribute to this project we will need to structure things to some extent. We will need researchers, secretaries, writers and editors. And we will obviously have to make decisions: *data science* vs *statistical science* vs *computational science* vs *applied probability*   synonyms ?? other ??

(2) Individually: This is far easier to describe. Each of you has the unbridled freedom to choose for yourself a topic in the literature at large. Your only responsibility will be to keep all of us (but me especially) in the loop. We need to share. That is the prime directive of any seminar. In that connection, you also need to stay organized. So it will also be part of your duties to maintain a weekly diary. " ... went to the robarts library, looked through the journal, *JASA*, 2005, ... interested in the article ... and other work by the same author(s) ... " You are not required to become an expert yourself. Your job is simply to engage the literature in some coherent way that identifies a specific topic in a specific area of the statistical literature and present it to the rest of us in, say, a couple of 40 minute sessions — anything from time series to machine learning to statistical genetics to spatial data to ... well, you get the idea. This will usually involve a search through the literature under the auspices of the university library.

grading (G) **:**

It is in the very nature of a seminar, that all grades will be ongoing, and, of necessity, also participatory:

group participation (P_1) $=$ 40   – no fixed date
individual participation (P_2) $=$ 60   – no fixed date
final grade $G = P_1 + P_2$

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[1]Martin Gardner, *Scientific American*, 1968