PROBABILITY AND THE LAW

MARCELLO DI BELLO – STANFORD UNIVERSITY

READING GUIDE – WEEK #3

Devlin.   This is the main reading for this week. The article describes:
  (1) DNA evidence and how it's used in criminal trials (pp.1–9);
  (2) a controversy about the significance of DNA matches in cold hit cases (pp. 10–23);
  (3) Devlin's explanation of the controversy (pp. 23 onwards).
I do not expect you to read the entire article, but at least, read up to page 23. Below is a "map" of the article:

> (pp. 1–4) Summary of the Jenkins case; no need to understand the details, but make sure you understand how DNA evidence was used in the case.

> (pp. 4–9) Description of DNA profiling; read it carefully (especially pp. 4–6). What is the Random Match Probability?

> (pp. 10–12) This part introduces "cold hit" cases, those in which the defendant is identified through a database search. Make sure you understand the lottery analogy on page 10. How does a cold hit case differ from a traditional one?

> (pp. 12–16) Summary of the NRC position on the significance of a DNA match in cold hit cases (especially, read pp. 12–14). How does the Random Match Probability differ from the Database Match Probability?

> (pp. 16–20) Different options as to how DNA evidence can be presented.

> (pp. 21–23) Reconstruction of Donelley's position. In what way does he disagree with the NRC?

> *You can stop reading here if you're short of time.*

> (pp. 23–31) Excursus on different interpretations of probability (objective v. epistemic/subjective) and the Monty Hall problem.

> (pp. 33–41) Devlin's explanation of the NRC-Donnelly disagreement (based on a disagreement about the underlying interpretation of probability).

> (pp. 41 onwards) Remarks about trials proceedings and mathematics.

Wasserman.   This is not required reading. The article is an introduction to DNA evidence.

Response paper.   For the response paper, you have two options.

OPTION 1. You can explore whether the application of the product rule in DNA evidence cases is warranted. Devlin writes:

> Since it [=the Random Match Probability] is computed using the product rule for multiplying probabilities, it assumes that the patterns found in two distinct sites [=alleles] are independent. During the early days of DNA profiling, this was a matter of some considerable debate, but by and large that issue seems to have died away. (p. 6)

Briefly explain why (and how) the Random Match Probability relies on the independence assumption and the application of the product rule. Next, and more importantly, look for scientific literature supporting (or discrediting) the independence assumption. Use Google or go to the library. If you find relevant articles, one or two should suffice; briefly summarize what they are about (no need to read them all; just look at the abstract and skim them; write the bibliographic details in your response paper). If you do not find any relevant literature, that's fine. In that case, write up a few sentences about your literature search, what you tried to do, and how, in the end, it yielded no result.

OPTION 2. Alternatively, you can summarize the NRC-Donnelly debate about cold hit cases. In particular, explain why the NRC believes that a DNA match in a cold hit case is less probative than a match in a standard case, and also, explain why Donnelly disagrees with the NRC. Use the lottery analogy on page 10 if you think it helps, and feel free to take a stance.