

Then and Now: Women in Statistics

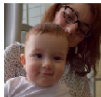
Karen Buro

Department of Mathematics and Statistics
MacEwan University

Putting Women into the Equation, BIRS, March 16 - 18, 2018



**Math & Stats
MacEwan University**



Two Statisticians



Florence Nightingale
(1820 - 1910)



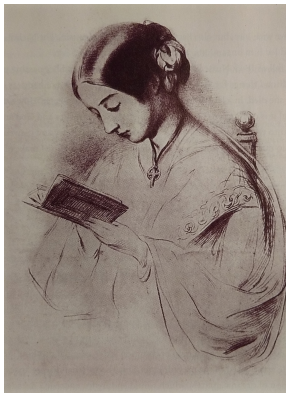
Nancy Reid
(1952 -)

Early Years



- *May 12, 1820 in Florence
- one sister, Parthenope
- upper ten thousand
- deeply religious
- instinct to nurture
- taught by her father in classics, mathematics, and languages

Struggle as a woman



- Victorian society:
a woman's place is in the home
women are too fragile for difficult
mental activity
girls are only fit to learn domestic
arts
- the family entertains many artists
and scientists
- Florence has many opportunities to
travel across Europe
- comfortable in a man's world
- secretly trains in nursing
- 1853: superintendent at institution
for sick gentlewomen (finally)

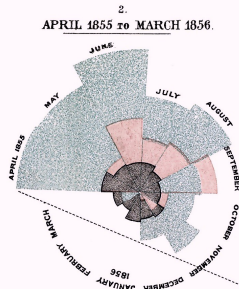
Crimean War (1854-1856)

- leads volunteer group to Scutari introducing women nurses to military hospitals
- appalling conditions leading to many avoidable death
- becomes nursing administrator and introduces changes to procedures, hygiene, setup
- The Lady With The Lamp

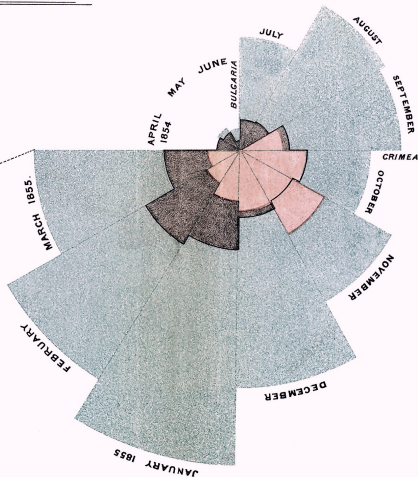


Nightingale the Applied Statistician

DIAGRAM OF THE CAUSES OF MORTALITY IN THE ARMY IN THE EAST.



1.
APRIL 1854 TO MARCH 1855.



The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex.

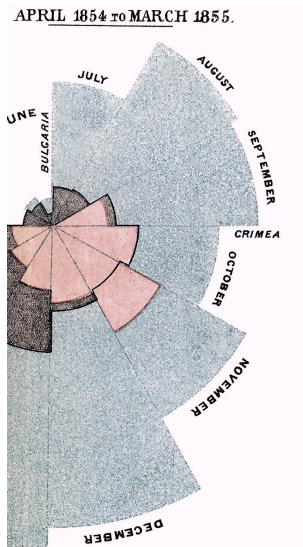
The blue wedges measured from the centre of the circle represent area for area the deaths from Preventable or Mitigable Zymotic diseases, the red wedges measured from the centre the deaths from wounds, & the black wedges measured from the centre the deaths from all other causes. The black line across the red triangle in Nov. 1854 marks the boundary of the deaths from all other causes during the month.

In October 1854, & April 1855, the black area coincides with the red, in January & February 1855, the blue coincides with the black.

The entire areas may be compared by following the blue, the red & the black lines enclosing them.

Nightingale the Applied Statistician

- devised new visual representation of data
- collected data as evidence
- based recommendations on statistics
- championed the scientific method in nursing
- offered endowment for a professorship for Applied Statistics at Oxford University



Nightingale today

- “What would Flo do?”
- hygienic standards (ventilation, water, light, cleanliness)
- administration
- use scientific method and empirical evidence to trigger change



Nancy Reid

Education

- *September 17, 1952 in Niagara Falls, ON
- oldest of four siblings
- High school in Niagara Falls, ON
- 1974 B.Math University of Waterloo
- 1976 M.Sc. (Applied Math) University of British Columbia
- 1979 Ph.D. (Statistics) Stanford University
 - “Influence functions for censored data”
 - Supervisor: R.G. Miller, Jr.



Why statistics?

"I stumbled into this by accident because everyone had to take a second year of Statistics course, and, of course, we found it hard and we didn't really understand it, but I got high marks. As a result, I thought that I should take a third year Statistics course and in the fall term, we were taught the Theory of Inference, which we also didn't understand, and everyone got quite low marks. However, the professor promised us that if we stayed for the second half, then he would use the marks from the second half, for both of the courses. The second half was Regression, and it was really fun, so after that, I was a bit hooked. " (NR, 2017)



Reid the Mathematical Statistician

- NSERC (NATO) postdoc at Imperial College, London
- 1980 UBC – Assistant Professor in Statistics
- 1986 University of Toronto – Associate Professor
- 1988 Promotion to Full Professor
- 1997 - 2002 Department Chair
- 2004 University Professor
- 2007 - Canada Research Chair
- 2015 D.Math. (Honoris Causa) University of Waterloo

Reid the Mathematical Statistician

- over 100 refereed publications
- 4 books
- over 80 invited lectures at meetings + conferences
- over 70 invited lectures at universities
- 23 graduate students + 9 post-docs



Parameter Orthogonality

- DR Cox, N Reid (1987) Parameter orthogonality and approximate conditional inference. *Journal of the Royal Statistical Society. Series B (Methodological)*, 49(1), 1-39. (over 1250 citations)
 - if parameters are orthogonal, then their maximum likelihood estimates are asymptotically independent, which simplifies the inference about parameters of interest in the presence of nuisance parameters.



Nancy Reid - Selected Honours

- 1992 Recipient of the President's Award of the Committee of Presidents of Statistical Societies
- 1995 Canadian Mathematical Society Krieger-Nelson Award
- 2000 Wald Lecturer, Institute of Mathematical Statistics
- 2001 Elected Fellow, Royal Society of Canada
- 2009 Gold Medal, Statistical Society of Canada
- 2009 **Florence Nightingale David** Award, Committee of Presidents of Statistical Societies
- 2014 Appointed Officer of the Order of Canada
- 2016 Guy Medal in Silver, Royal Statistical Society



Barbara Montgomery Dossey. *Florence Nightingale: Mystic, Visionary, Healer*. F.A. Davis Company, Philadelphia, 2010.



Colleen A. Hobbs. *Florence Nightingale*. Twayne Publishers, New York, 1997.



D. R. Cox and N. Reid. *Parameter Orthogonality and Approximate Conditional Inference*. *Journal of the Royal Statistical Society. Series B (Methodological)*, 49(1): 1-39, 1987.



Larry Riddle: Nancy Reid, *Biographies of Women Mathematicians*, Agnes Scott College.

<https://www.agnesscott.edu/lriddle/women/reid.htm>



Ana-Maria Staicu: Interview with Nancy Reid, Wiley Online Library.

<http://onlinelibrary.wiley.com/doi/10.1111/insr.12237/full>



Questions?

