

Problems and Challenges with Epidemiological Data

Multiple Testing

Science point of view

What is the meaning of life?

What is real?

→ What is reproducible?

Fooled by randomness?

16 May 2011

5

10-sided dice experiment

1. Pair up, one rolls, one records the p-value.
2. If you get 0-0-0, then roll again to get 0.000xxx
3. Circle all p-values <0.050 (049, 03x, 02x, 01x, 000)
4. Note any col or row with multiple significances.
5. Hold your sheet up when finished.

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6

Finger length and prostate cancer



"finger length" "prostate cancer" gets 52,600 Google hits.

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7

Covered by everybody Press release contained no warnings

reuters msnbc fox21online cbsnews wsj etc.

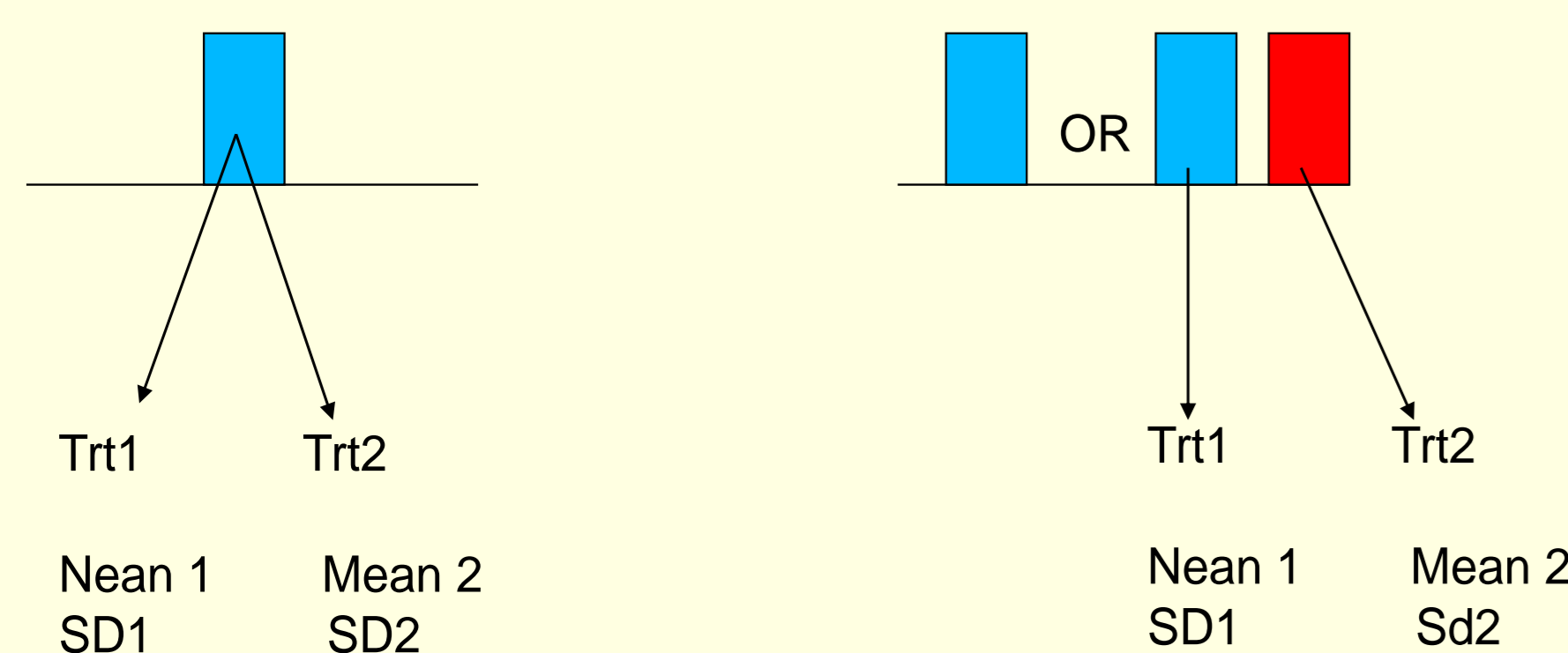
Professor Ken Muir, joint senior author at the University of Warwick, said: "Our study indicates it is the hormone levels that babies are exposed to in the womb that can have an effect, decades later. As our research continues, we will be able to look at a further range of factors that may be involved in the make-up of the disease."

Prostate Cancer Research Foundation
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8

Straw Man Real Condition?



$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{X_1 X_2} \cdot \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

P-value > 0.05 P-value < 0.05

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9

Questions: Obesity causes medical problems?

MedCondition	YoungFemale	YoungMale	OldFemale	OldMale
1. Angina				
2. Arthritis				
3. Asthma				
4. Cancer				
5. C. Bronchitis				
6. CHD				
7. Emphysema				
8. Heart Attack				
9. Liver Disease				
10. Stroke				
11. Thyroid D.				
12. Diabetes				
13. H. LDL				
14. L. HDL				
15. C React Protein				

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10

Paper and authors

Short Communication

Hand pattern indicates prostate cancer risk

AA Rahman¹, A Lophatananon², SS Brown², D Harris², J Anderson⁴, T Parker⁵, D Easton⁶, Z Kote-Jarai⁷, R Pocock⁸, D Dearnaley⁹, M Guy¹, L O'Brien¹, RA Wilkinson¹, AL Hall¹, E Sawyer², E Page², J-F Liu¹⁰, The UK Genetic Prostate Cancer Study Collaborators¹¹, British Association of Urological Surgeons' Section of Oncology¹¹, RA Eeles^{7,9,12} and K Muir^{9,12}

19 Authors and Two Associations.

British Journal of Cancer (2010), 1-3

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11

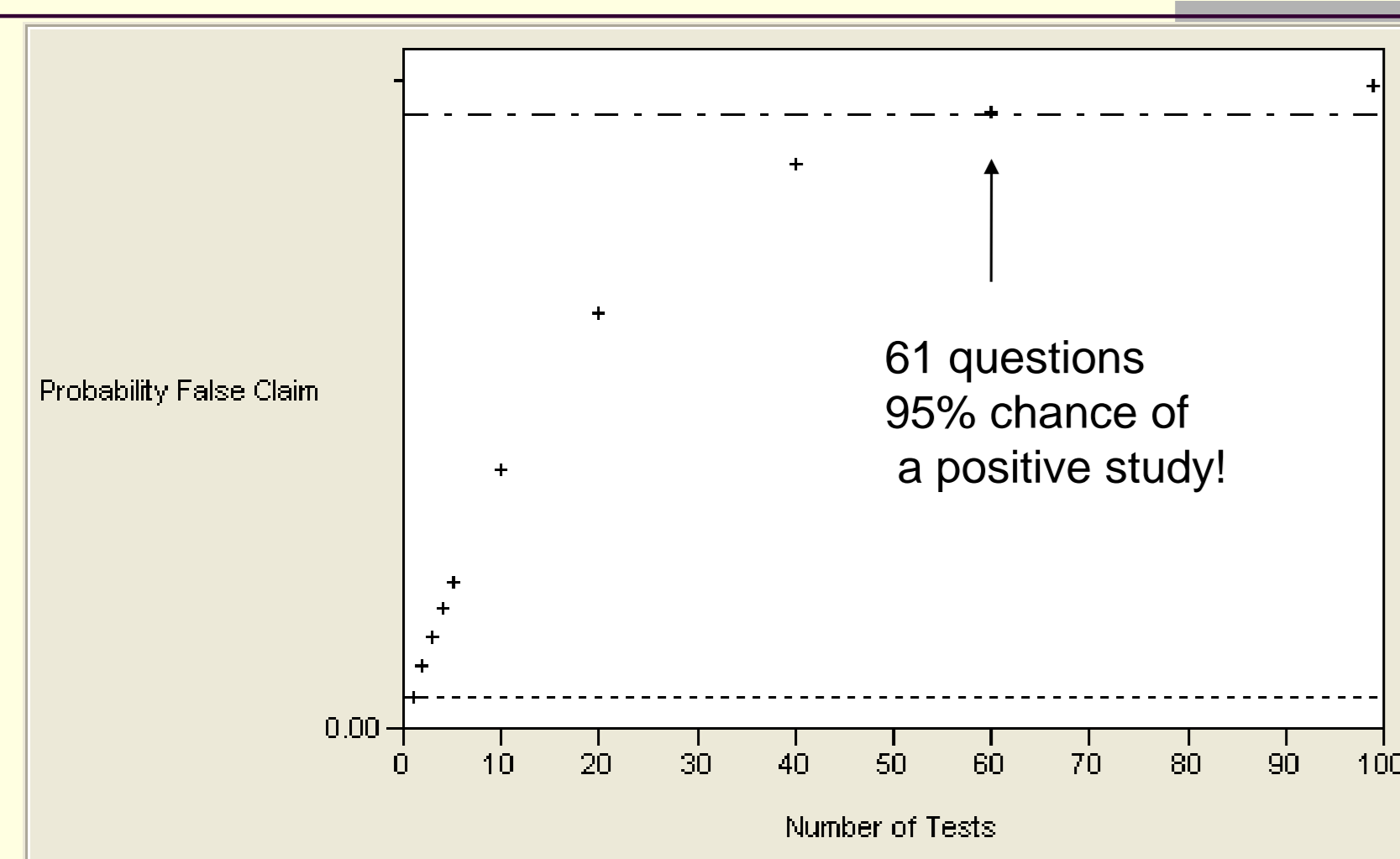
P-value < 0.05 !



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12

How do you get a "p < 0.05"?
Answer: Ask lots of questions.



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13



10-sided dice simulation

MedCondition	YoungFemale	YoungMale	OldFemale	OldMale
1. Angina	.584	.660	.936	.067
2. Arthritis	.190	.251	.099	.451
3. Asthma	.205	.920	.259	.086
4. Cancer	.443	.641	.903	.491
5. C. Bronchitis	.310	.768	.076	.782
6. CHD	.599	.884	.290	.149
7. Emphysema	.100	.821	.107	.999
8. Heart Attack	.747	.543	.622	.158
9. Liver Disease	.183	.394	.596	.466
10. Stroke	.479	.013	.004	.999
11. Thyroid D.	.851	.935	.415	.047
12. Diabetes	.554	.654	.354	.772
13. H. LDL	.537	.383	.475	.900
14. L. HDL	.189	.618	.967	.293
15. C React Protein	.943	.910	.251	.750

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14

Abstract (Crazy biology and statistics)

BACKGROUND: The ratio of digit lengths is fixed in utero, and may be a proxy indicator for prenatal testosterone levels.

METHODS: We analysed the right-hand pattern and prostate cancer risk in 1524 prostate cancer cases and 3044 population-based controls. (How many other variables)

RESULTS: Compared with index finger shorter than ring finger (low 2D : 4D), men with index finger longer than ring finger (high 2D : 4D) showed a negative association, suggesting a protective effect with a 33% risk reduction (odds ratio (OR) 0.67, 95% confidence interval (CI) 0.57-0.80). Risk reduction was even greater (87%) in age group o60 (OR 0.13, 95% CI 0.09-0.21).

CONCLUSION: Pattern of finger lengths may be a simple marker of prostate cancer risk, with length of 2D greater than 4D suggestive of lower risk.

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15

Contact information

Stan Young

young@niss.org

919 685 9328

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16