

Statistics as a Career

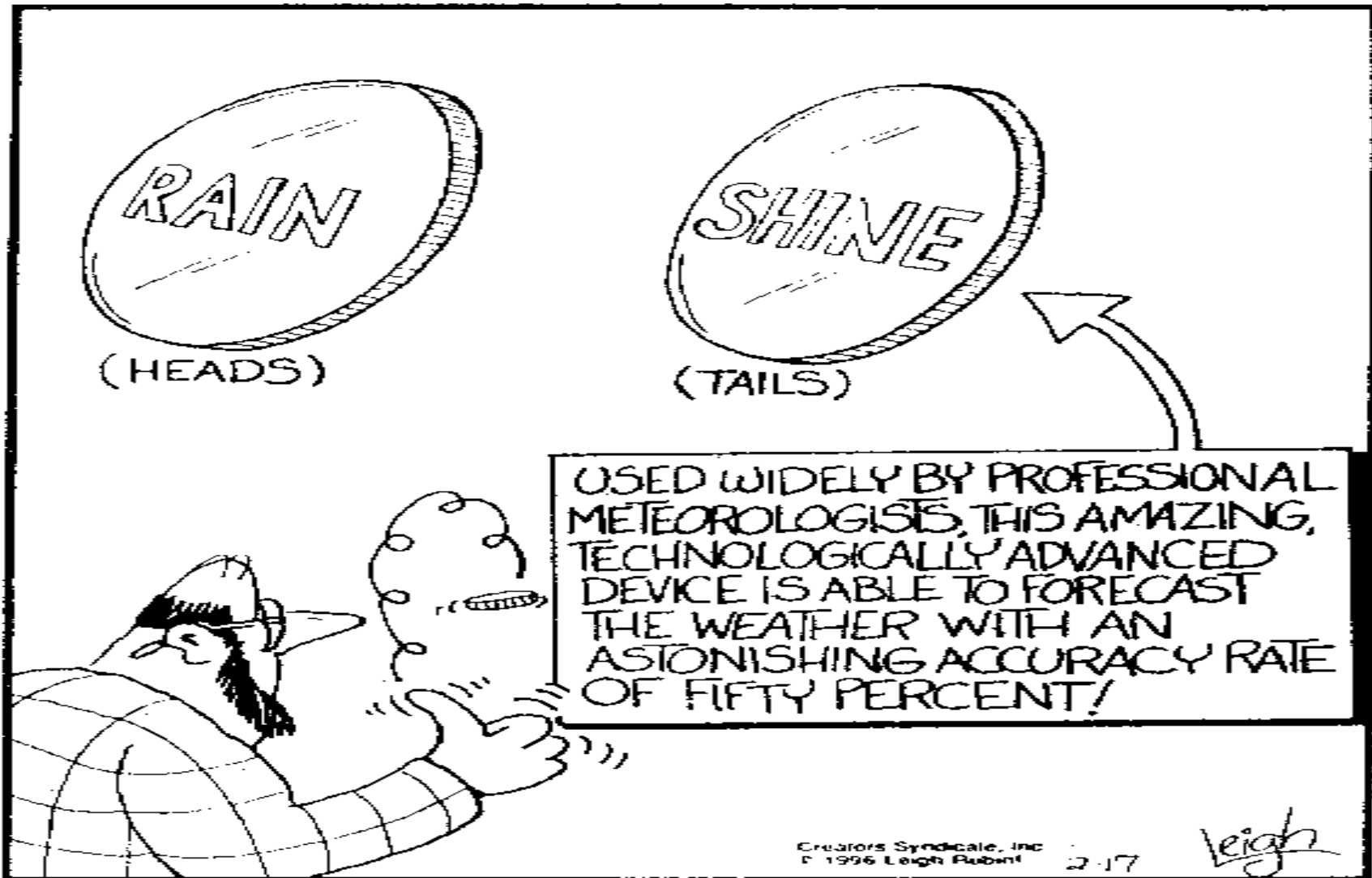
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NMMU

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Lets Be a Weatherman

RUBES by LEIGH RUBIN



Why do Statistics?

- "It is far better to foresee even without certainty than not to foresee at all. "
 - Henri Poincare
- "An economist is an expert who will know tomorrow why the things he predicted yesterday didn't happen today. "
 - Evan Esar
- Because you have to!

Who Uses Statistics?

- The easy answer – everyone
- School teachers
- Decision makers in business
- Decision makers in government
- Academics/researchers
- Journalists/reporters
- The loudmouth at the braai

The list is endless

Example: From School Maths to “Basic Statistics”

- Linear modelling

$$y = mx + c$$

$$y = \beta_0 + \beta_1 x + \varepsilon$$

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_p x_{pi} + \varepsilon_i$$

$$\mathbf{Y} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\varepsilon}$$

Example: From School Maths to “Basic Statistics”

- Linear Programming

- Minimise $Z = 2x_1 + x_2$
- s.t. $4x_1 + 3x_2 \geq 6$
- $x_1 + 2x_2 \geq 3$
- $x_1, x_2 \geq 0$

- Solutions

- Solve the model graphically
- Solve the model using the simplex algorithm
- Solve the model using Karmarkar’s interior point method.

Example: Step Up From School Maths

- MLE for Pareto Distribution
 - David Friskin, Dept of Statistics, NMMU

$$(i) \quad \frac{n}{\hat{\alpha}} + n \ln \hat{\lambda} - \sum \ln(\hat{\lambda} + X_i) = 0$$

$$(ii) \quad \frac{n\hat{\alpha}}{\hat{\lambda}} - (\hat{\alpha} + 1) \sum (\hat{\lambda} + X_i)^{-1} = 0$$

Example cont': Solver

- What?
 - Microsoft Excel add-in
 - Linear and nonlinear programming
- How?
 - GRG2 algorithm (nonlinear)
 - Simplex algorithm (linear)
 - B&B (integer)
- Why

Example: Metallurgy

- Statistical control for sampling of metallurgical material Hannah Gerber, MSc, UPE
 - Two-sample t - and f -tests
 - Distribution fitting
 - Nonlinear modelling

Example: Business Management

- An Exploratory Investigation into the Statistical Methods Used by Authors of Original Research in the South African Journal of Business Management
 - Gary D. Sharp: Department of Statistics
 - Catherine G. Logie: Centre for Extended Studies
 - Madéle Tait: Department of Business Management

Basic descriptive statistics	Publications which include basic descriptive stats	Publications which excluded basic descriptive stats
Percent of total 1984/85	27.2	28.0
Percent of total 2004/05	34.4	10.0

Example: Art

- Chris Jordan – **Running the Numbers**
An American Self-Portrait

website: <http://www.chrisjordan.com/>

- Each image portrays a specific quantity of something
- Statistics can feel abstract and anesthetizing
- Depicts 60,000 plastic bags, the number used in the US every five seconds

Example: Economics

- Growing demand for quantitatively (statistically) literate Economists
- Environmental economics project for WRC
 - Modelling the WTP for water to maintain environmental conditions
 - Descriptive statistics, linear models, censored models, non-linear models, survey design, sampling, resampling techniques, residual analysis

Examples: Recreation

- Gambling
 - Lotto
 - Horse racing
 - Casino
 - Sports betting
- Sport
 - Cricket
 - Rugby
 - Soccer
 - Dancing

Examples: Recreation

- Movies makers and/or script writers

What Skills Does a Statistician Need?

- Logic
 - [Critical thinking](#)
 - Mathematical training
 - Computer/programming skills
- Communication/Language
 - Report writing
 - Presentations
- Ability to work under pressure
 - Results needed asap

Who Employs Statisticians?

- Banks
- Insurance Companies
- Government Departments
- Manufacturing and Sales Departments
- Official statistics
- Universities & research companies
- Market Research Companies

First Steps to Becoming a Statistician

- First degree
 - BSc/BCom with Statistics, Economic Statistics, Mathematical Statistics, Biostatistics
- Honours – specialise
- Masters and PhD – research project

Useful “Other” Subjects for Statisticians

- Applied Mathematics
- Economics
- Computer Science
- Actuarial Statistics

Is There a Demand for Statistics Graduates?

- Obviously not in the same category as career focussed degrees such as engineering, accounting or medicine
- Tertiary institutions struggling to fill posts
- Most of the graduates from NMMU are employed soon after completing honours degree

Conclusion

- Statistics as a career can be
 - Challenging
 - Stimulating
 - Rewarding (financially and personally)
 - Fun

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