





Data analysis - numerical methods

• Estimation: what are the values of μ_X, μ_Y, σ^2 ?

• Hypothesis testing: $\mu_X = \mu_Y$? true or false? how confident?

 µ_X = 80.02, µ_Y = 79.98, σ²=0.0007178

 p-value<0.01, H₀: µ_X = µ_Y is rejected under significance

level 0.99.

• <u>Compare</u> the graphical and numerical methods

➤ graphical methods: <u>intuitive</u> perception, <u>vague</u> conclusion

> numerical methods: lack of intuition, accurate conclusion

Decision making

- There is a (statistically significant) difference between the means of the 2 methods: $\mu_X > \mu_Y$
- level of evidence?

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• Some other examples of statistical applications		
Election: survey on voting	\succ The signal and the noise	
\blacktriangleright Lung cancer \longleftrightarrow Smoking	(精準預測)	
➤ Moneyball (魔球)	➢ Big data	
▶ Thinking, fast and slow (快思慢想)	➢ Data-based AI	
• <u>Materials</u> to be <u>covered</u> in this course Probability A Paviaw: Chapters 1, 6		
Fibbability – A Review. Chapters 1~0		
Estimation: Chapter 8		
Hypothesis Testing: Chapter 9		
Decision Theory: Chapter 15 (Rice, 1995, 2 nd Edition)		
► <u>Applications</u> :		
 Survey Sampling: Chapter 7 	Website of my <u>mathematical</u> statistics course	
 Two-Sample Comparison: Chapter 	er 11 http://www.stat.nthu.edu.tw/~s	
 Analysis of Variance: Chapter 12 	ex.php	
 Some Graphical Methods from Chapter 10 		

✤ Further reading:	Introduction, p.1-9
→ Lewis (2004), Moneyball (中譯:魔球).	
➤ Kahneman (2011), Thinking, Fast and Slow (中譯:快思慢想)	
▶ Silver (2012). The Signal and the Noise (中譯:精進預測)	·
Stigler (2016). The Seven Pillars of Statistical Wisdom	
> Sugier (2010), The Seven Thiars of Statistical Wisdom.	
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made by S.-W. Cheng (NTHU, Taiwan)