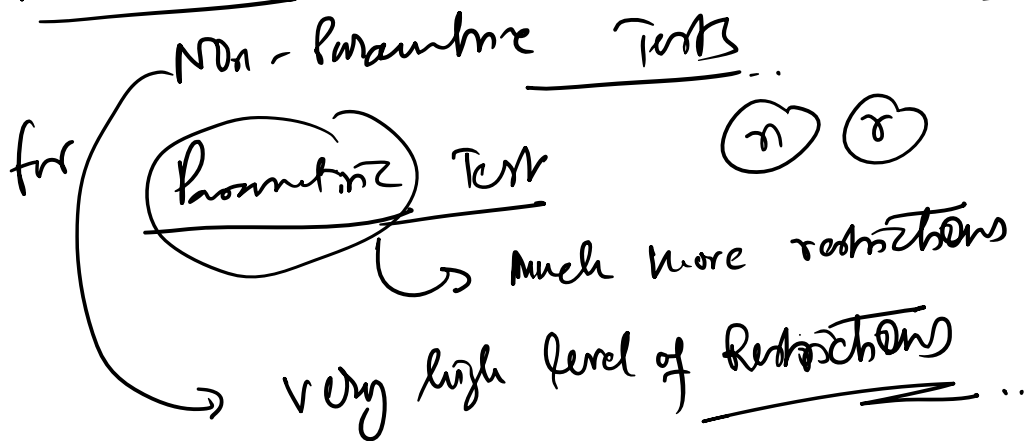


# STATISTICS

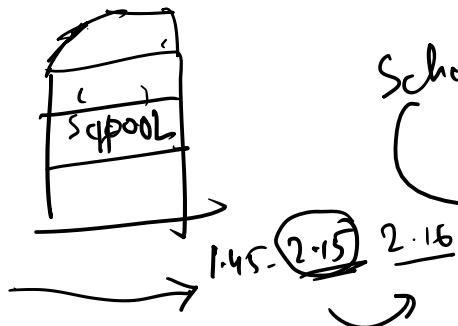
UT  
9 AM

9062395123

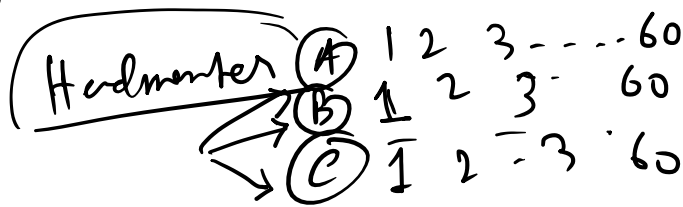
## RUN TEST



Realistic → Non-parametric  
More Accurate → Parametric ...



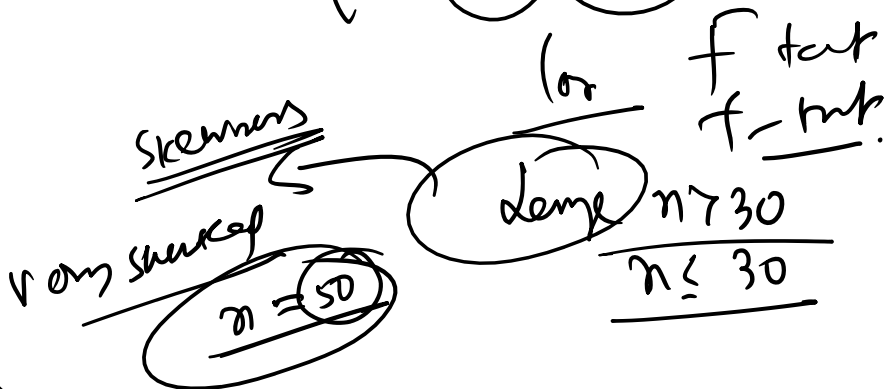
Schwerpunkte



VI (3rd)  
VII (10th)  
VIII (11th)

How to identify?

$n^2$   $(N)$   $(Z)$



Cygnus ...

Fonds

Killing you as one another

... long vs Time

# Trade Accuracy vs Sampling vs Time

Insight yet efficient

$\{ 1, 2, 4, 5, 6, 7, 10$   
 $\rightarrow 1, 100, 479, 671, \dots$   
 $-69, 148, 1994, -32, 11, \dots$   
 $2^{99}, 2^{8192} \dots$

① Binary data's Randomness → Ran Test

② Signature of data change → McNemar Test

③ One-Sample location Test  
 paired Sample → Sign Test  
 Wilcoxon Signed Rank Test

④ Are samples independent  $K=2$  → M-W Wilcoxon Test

⑤ ANOVA, Sample Rank → Kruskal Wallis Test  
 $K > 2$

Comparison with location Test → Accuracy  
75-90%

One-Sample location → t-test/2 test

Paired Sample →  $n$   
 Two sample location →  $n$

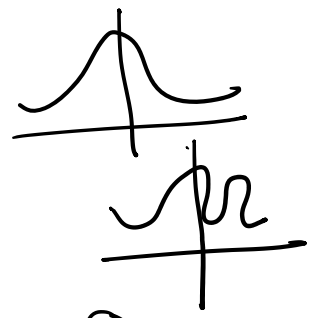
$K > 2$  → no test

$n_1, n_2$   
 $n_1, n_2, \dots, n_i$

# Asymptotic

Relative Efficiency

$n = 12$   
 $n = 10$



ALE

2000m

limiting value of RE when  $n \rightarrow \infty$

①  $12 \times 50 \Rightarrow \frac{600}{257}$

150 X 500

75000

final number

20% - 30%

70-80%

Somed by hand

run on face

Hards



Run



Same coming

W W W W W W L W L L W

2003/2007/2011/2015/2019/2023  
Ind Am Ind 2nd

Relm Sharma 750

WI  
VI  
Ind

① 1, 2, ... 3

WI

W W I A P S A A A I A (E) 1/1/1

A → S

n = 2

$H_0 \rightarrow$  Random  
 $H_1$ : Two many Runs non-random  
 $H_2$ : few Runs  
 $H_3$ : No Pattern / NOT Random

$(n_1)$   $(n_2)$   $\rightarrow$  Category wise.

Run Test

Team	M	W	L	NRR	Pts	Last 5
1 IND	3	3	0	+1.821	6	✓✓✓✓○
2 NZ	3	3	0	+1.604	6	✓✓✓✓○
3 SA	2	2	0	+2.360	4	✓✓○
4 PAK	3	2	1	-0.137	4	×✓✓○
5 ENG	3	1	2	-0.084	2	×✓×○
6 AFG	3	1	2	-0.652	2	×××○
7 BAN	3	1	2	-0.699	2	×××○
8 AUS	3	1	2	-0.734	2	×××○
9 SL	3	0	3	-1.532	0	×××○
10 NED	2	0	2	-1.800	0	××○

WWW  
WWW

LLW

2019

Team	M	W	L	NRR	Pts	Last 5
1 IND	9	7	1	+0.809	15	✓✓×✓✓
2 AUS	9	7	2	+0.868	14	×✓✓✓✓
3 ENG	9	6	3	+1.152	12	✓✓××✓
4 NZ	9	5	3	+0.175	11	×××✓✓
5 PAK	9	5	3	-0.430	11	✓✓✓✓×
6 SL	9	3	4	-0.919	8	××××

WW WW

WLWLW X

5	PAK	9	5	3	-0.430	11	✓✓✓✓✓	→
6	SL	9	3	4	-0.919	8	✗✓✓✓✓	✓ X
7	SA	9	3	5	-0.030	7	✓✓✓✗✓	✓
8	BAN	9	3	5	-0.410	7	✗✗✓✓✓	✓
9	WI	9	2	6	-0.225	5	✓✗✗✗✗	X
10	AFG	9	0	9	-1.322		✗✗✗✗✗	no random

W WW LL WWLLW

10-6-9

3, 2, 2, 2, 1

$\gamma_U$  → upper critical value  
 $\gamma_L$  → lower critical value

$R_{obs} < \gamma_{right}$

$H_1$  (Too many runs)

GGGB  
 → 1111  
 (55) (11)

variance  
 ↑  
 C.V. =  $\frac{SD}{\text{mean}}$

$R_{obs} > \gamma_U$   $H_1$

$R_{obs} > \gamma_L$   $H_2$

$R_{obs} < \gamma_L$  or  $R_{obs} > \gamma_U$   $H_3$

Large Sample Test

$$Z = \frac{(R \pm 0.5) - \mu_R}{\sigma_R}$$

$$\mu_R = \frac{2n_1n_2}{n} + 1$$

$$\sigma_R^2 = \frac{2n_1n_2(2n_1n_2 - n)}{n^2(n-1)}$$

$n = n_1 + n_2$

.....

19-23

Durga Puja ..