Big Data Fundamentals and Applications

Statistical Analysis (II)

Descriptive Statistics – Graph

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5. Area Plot
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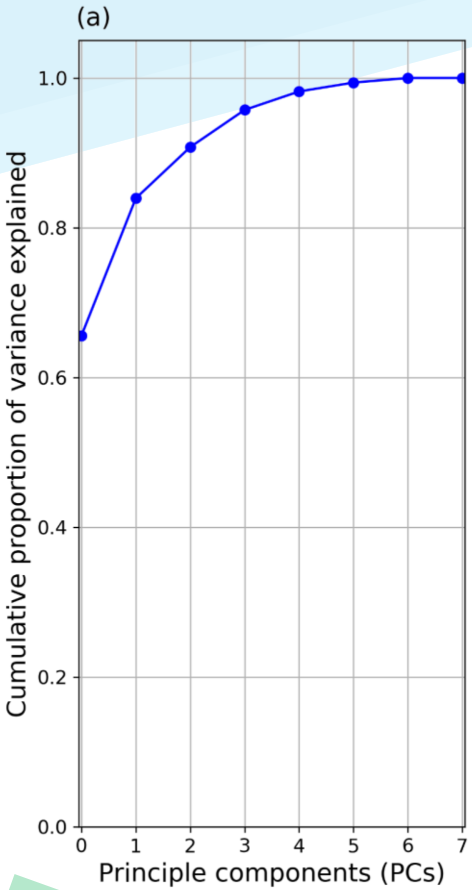
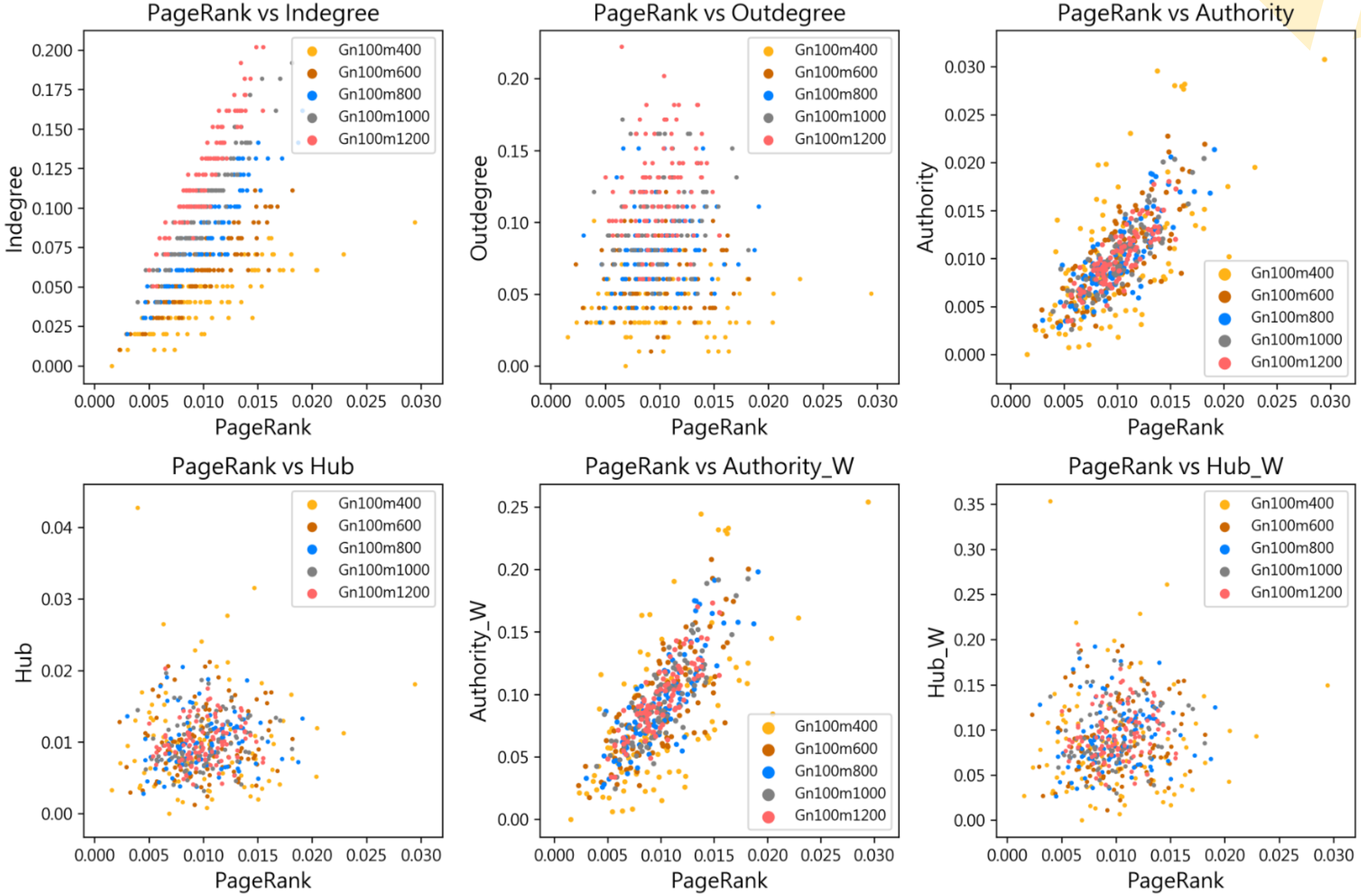
Visualization

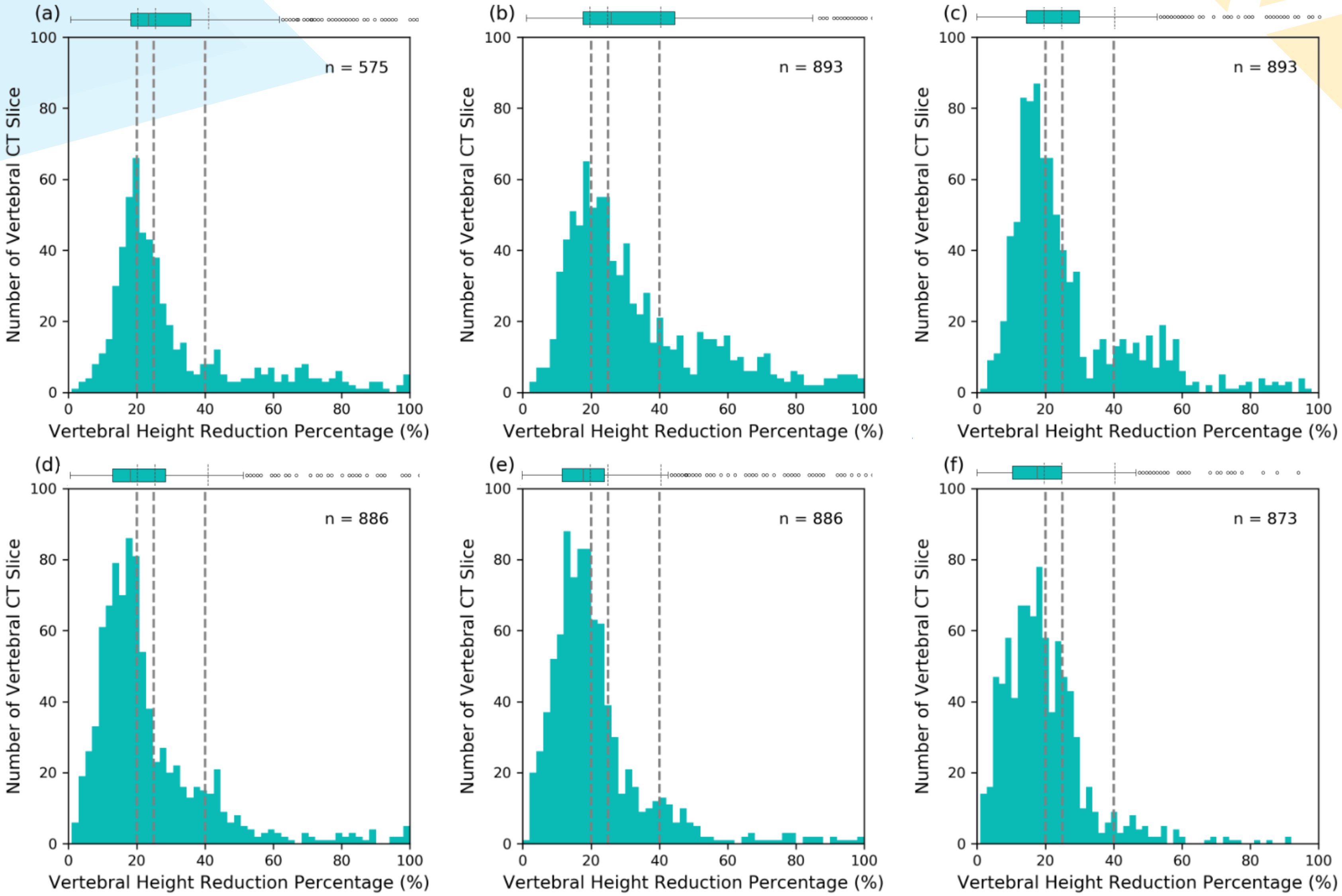
- As we mentioned before, data visualization is one of the most effective approach for data exploration to understand the characteristics of each feature or dataset.
- According to the attribute of data, we need to select the appropriate visualization methods for illustration.
- Here, we are going to introduce bar chart, biplot, box plot, control chart, forest plot, histogram, pie chart, Q-Q plot, scatter plot, stem plot, violin plot, radar plot, and line plot.

Line Plot & Scatter Plot

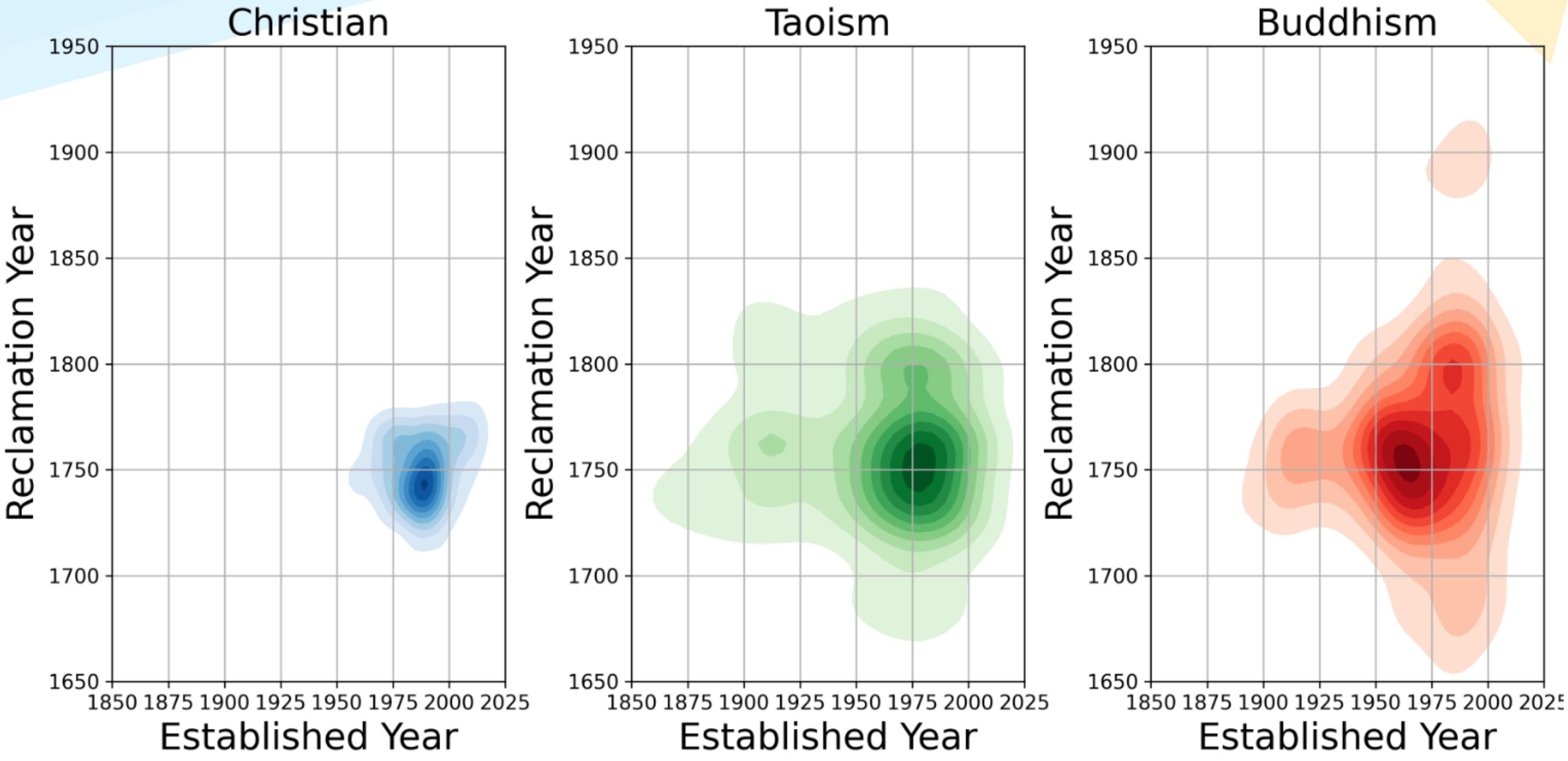




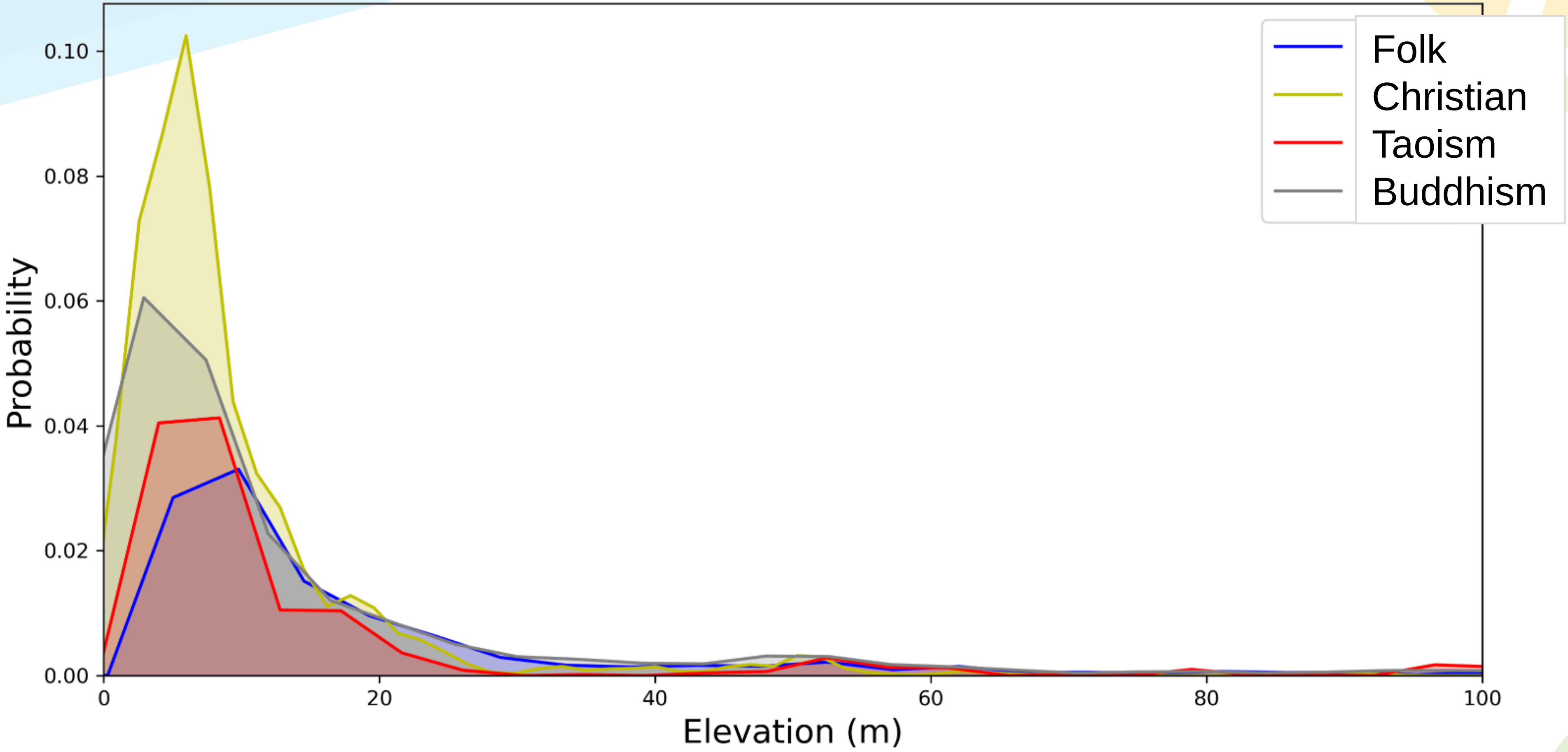
1D Histogram



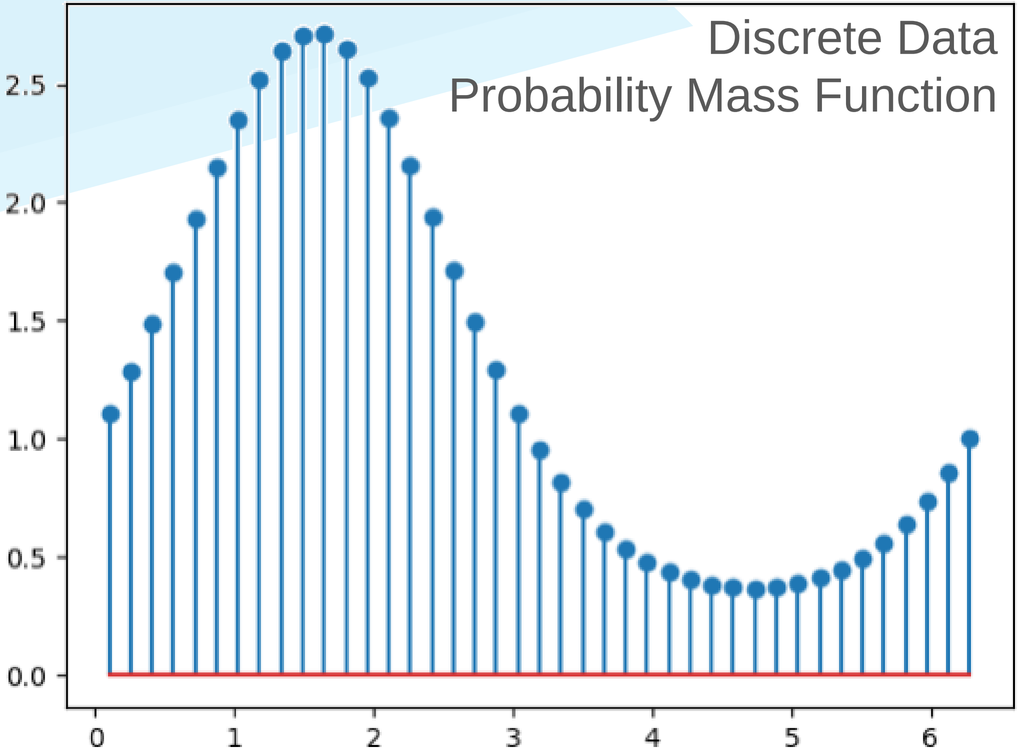
2D Histogram



Area Plot


Probability
0.00
0.02
0.04
0.06
0.08
0.10
0
20
40
60
80
100
Elevation (m)
Folk
Christian
Taoism
Buddhism

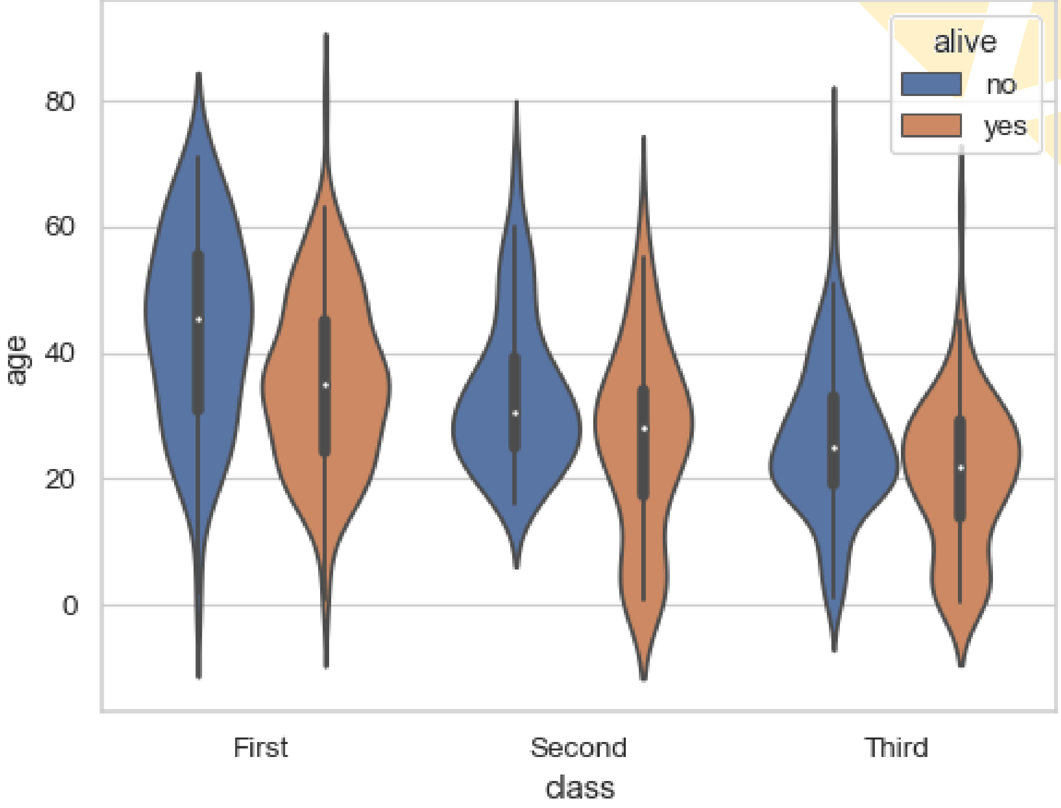
Stem Plot & Violin Plot



Discrete Data
Probability Mass Function

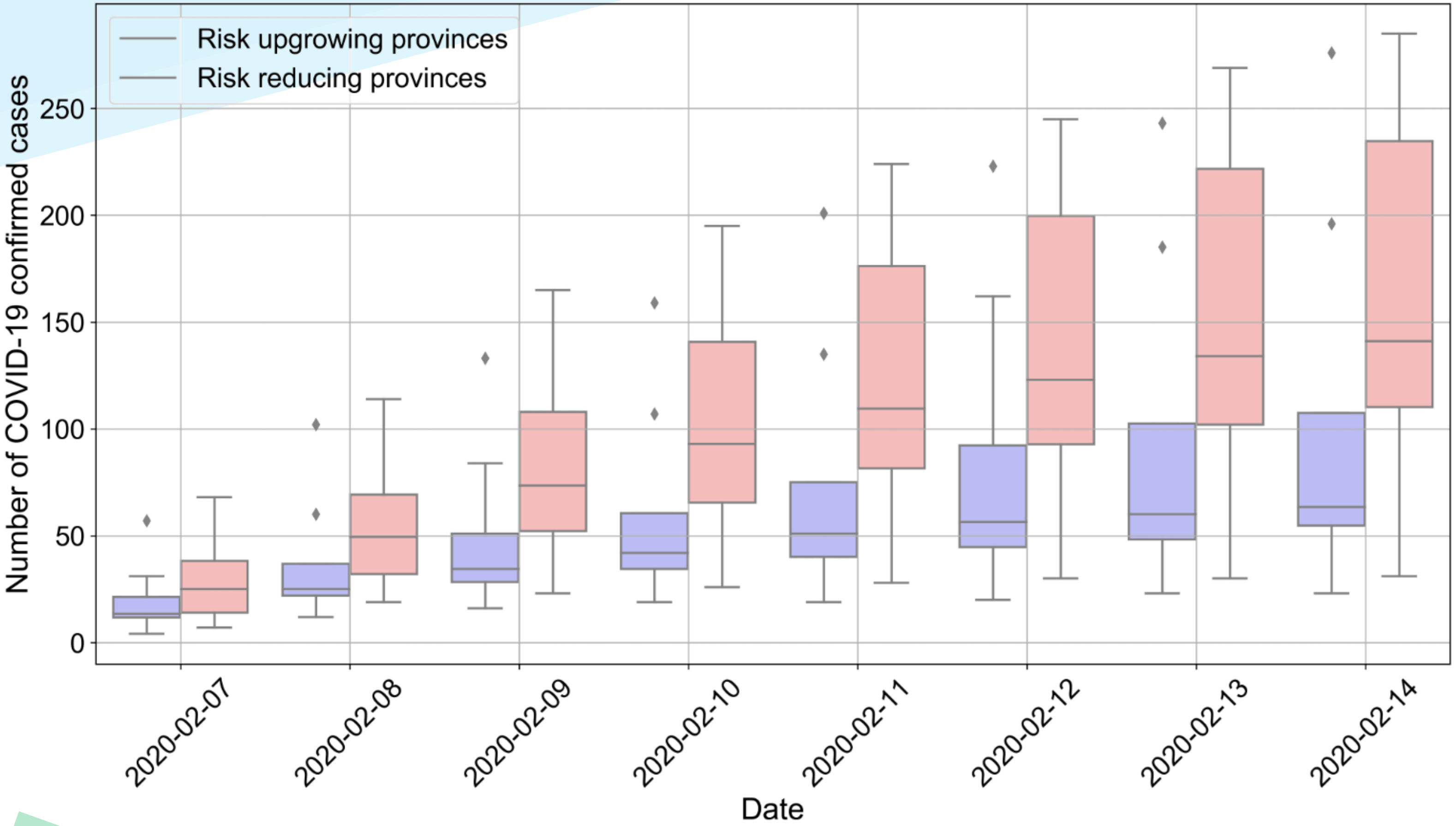
Source: https://matplotlib.org/stable/gallery/lines_bars_and_markers/stem_plot.html#sphx-glr-gallery-lines-bars-and-markers-stem-plot-py

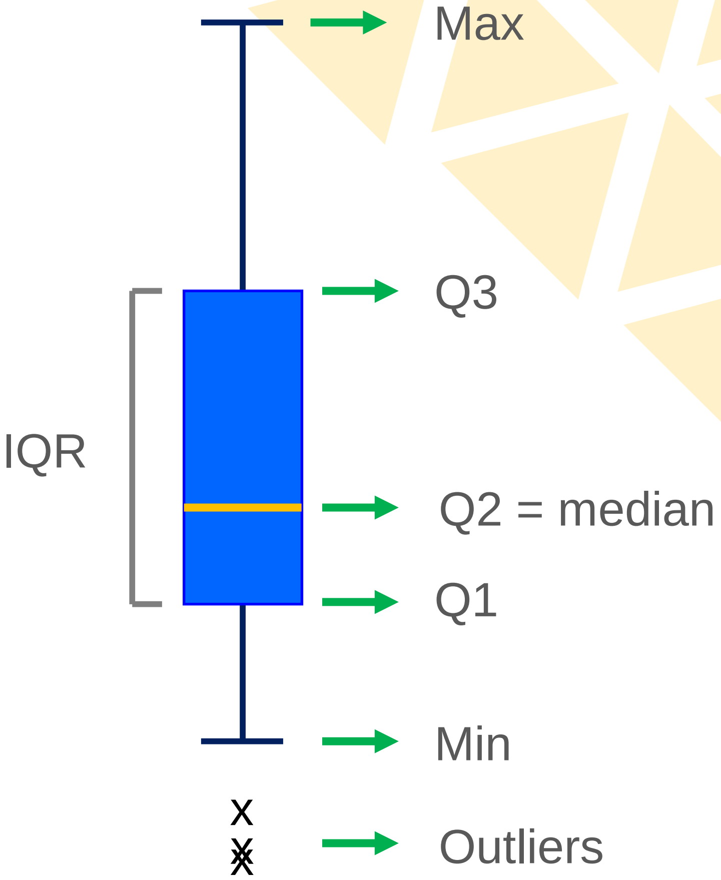
Continuous Data



Source: https://seaborn.pydata.org/generated/seaborn.violinplot.html

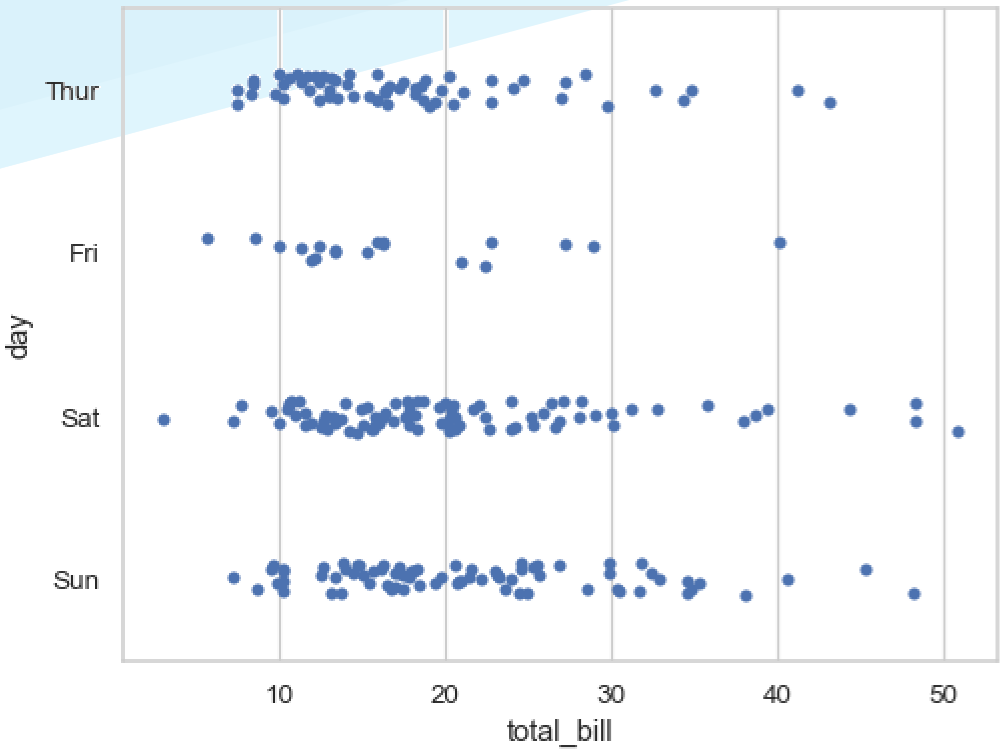
Box Plot


Risk upgrowing provinces
Risk reducing provinces
Number of COVID-19 confirmed cases
0
50
100
150
200
250
2020-02-07
2020-02-08
2020-02-09
2020-02-10
2020-02-11
2020-02-12
2020-02-13
2020-02-14
Date

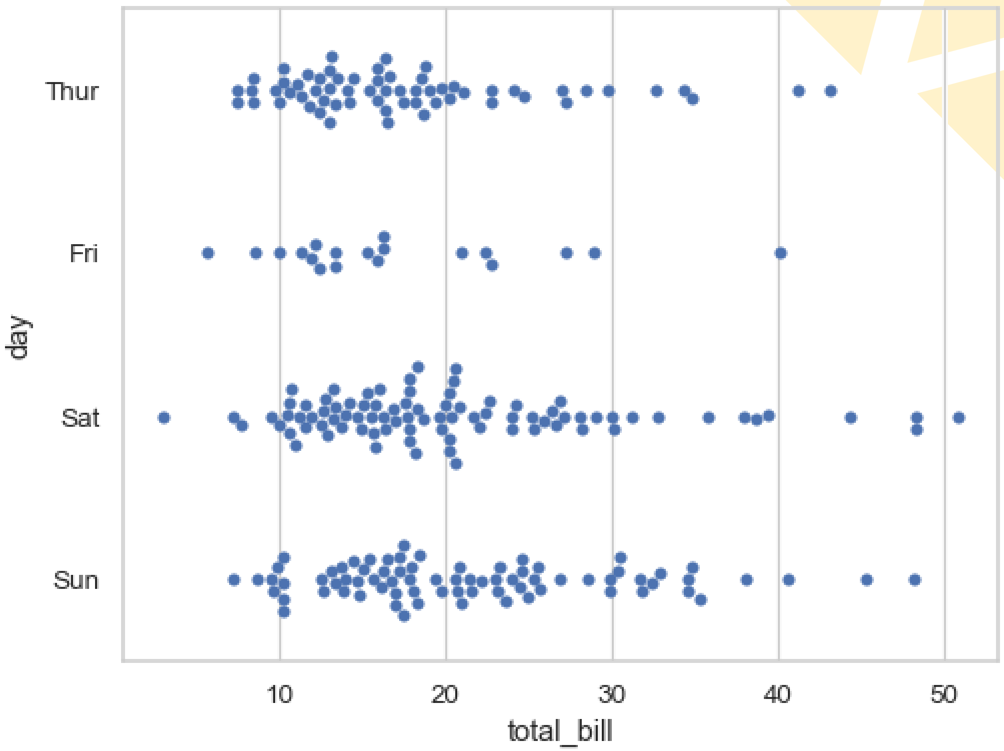

Max
Q3
IQR
Q2 = median
Q1
Min
X
X
Outliers

Strip Plot & Swarm Plot

Observe the d

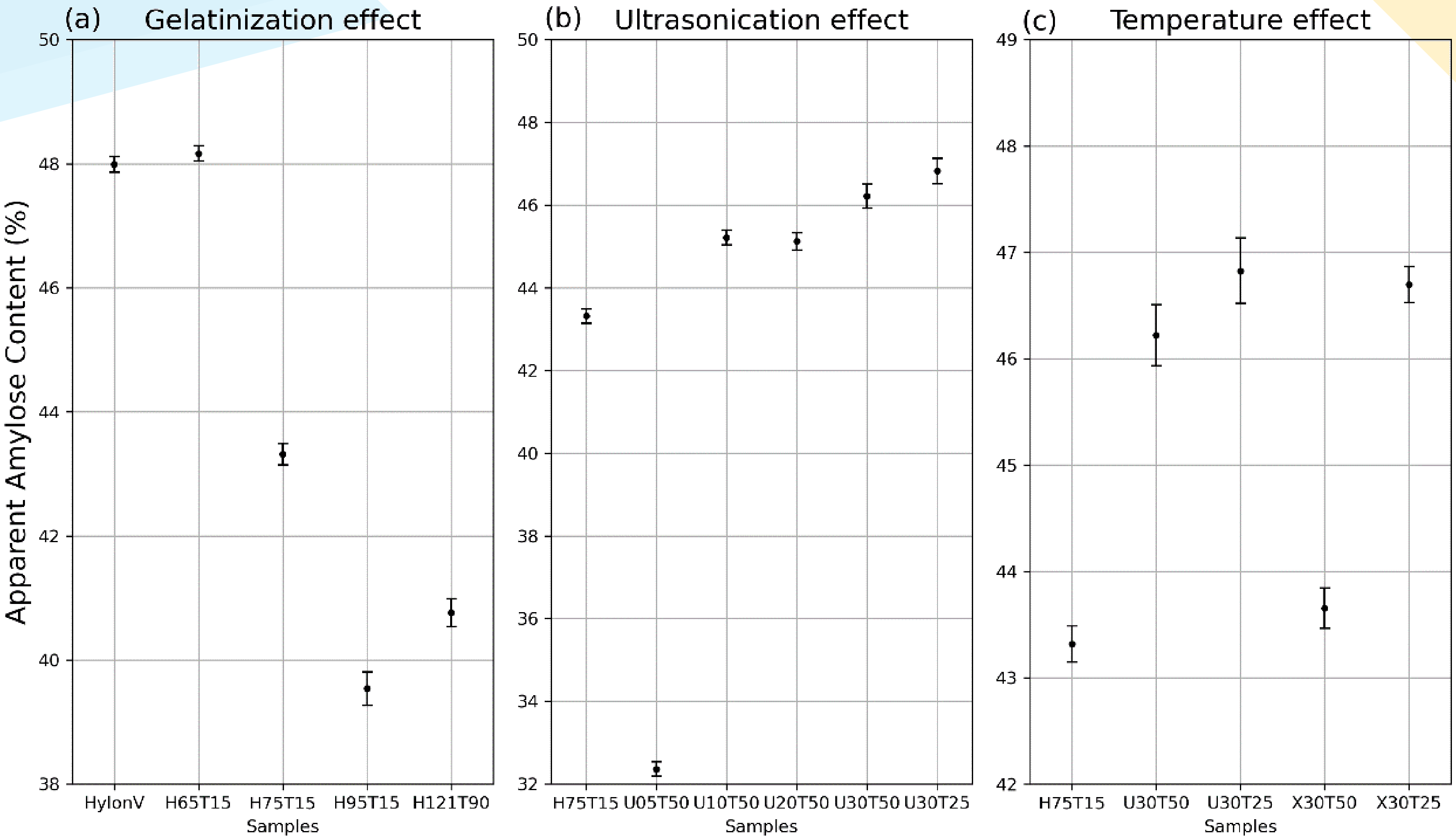


Source: https://seaborn.pydata.org/generated/seaborn.stripplot.html

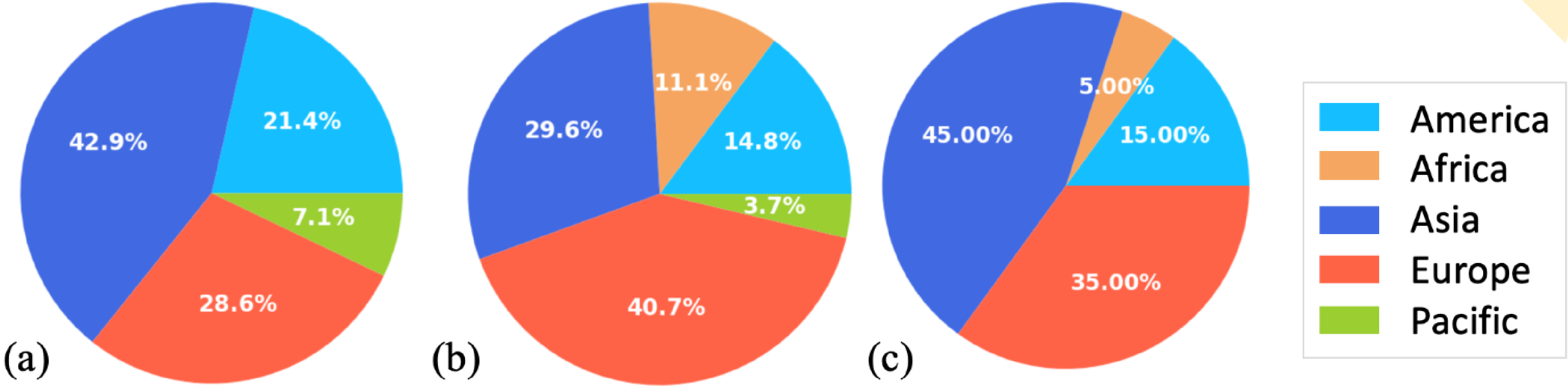


Source: https://seaborn.pydata.org/generated/seaborn.swarmplot.html

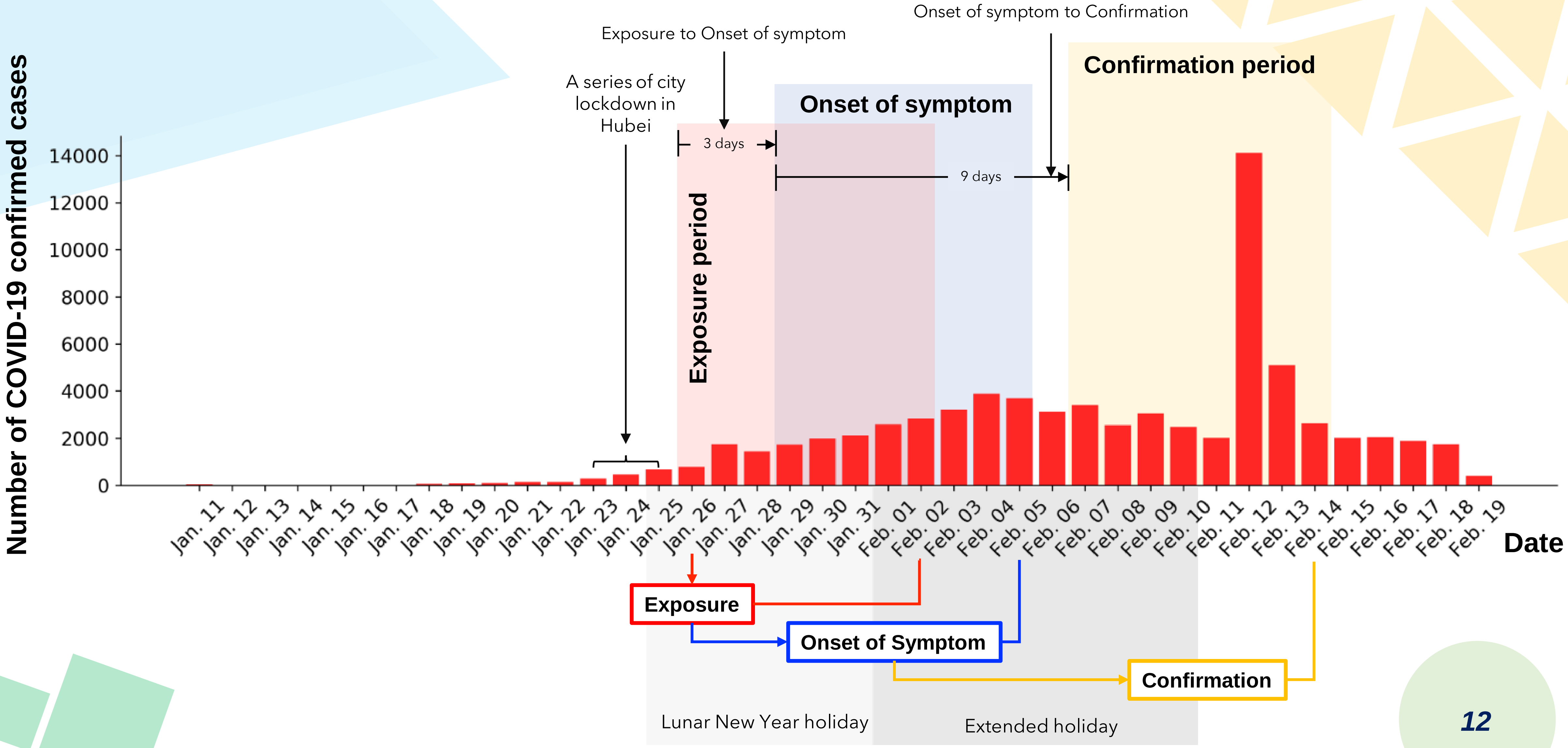
Error Bar Plot



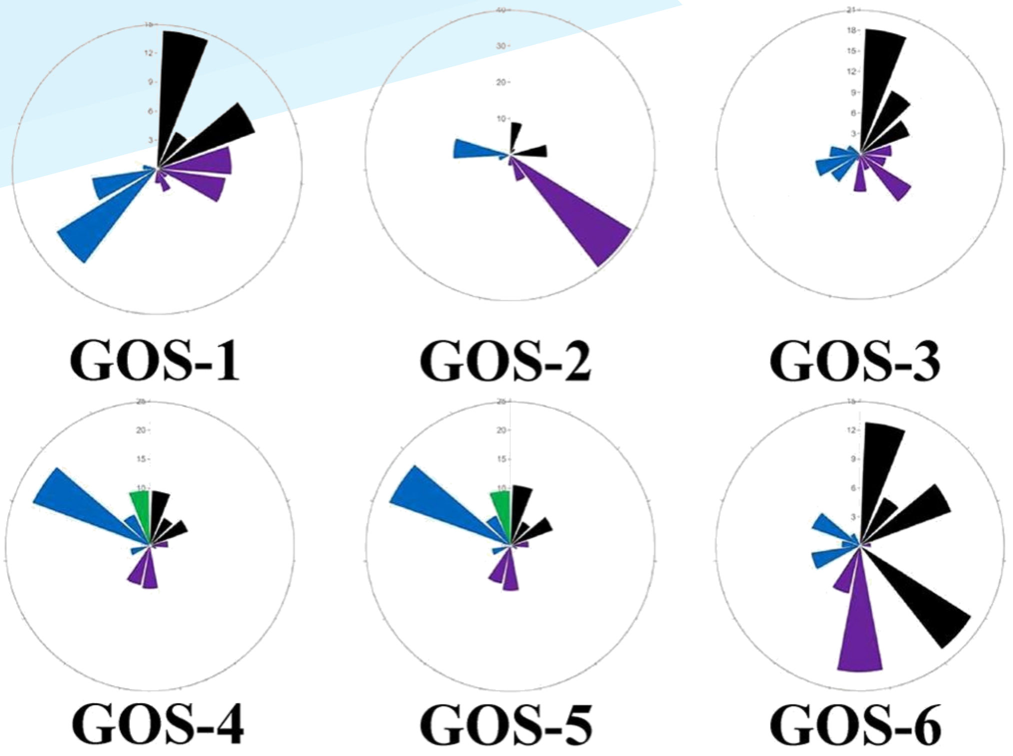
Pie Chart


42.9%
21.4%
7.1%
28.6%
(a)
29.6%
11.1%
14.8%
3.7%
40.7%
(b)
45.00%
5.00%
15.00%
35.00%
(c)
America
Africa
Asia
Europe
Pacific

Bar Chart

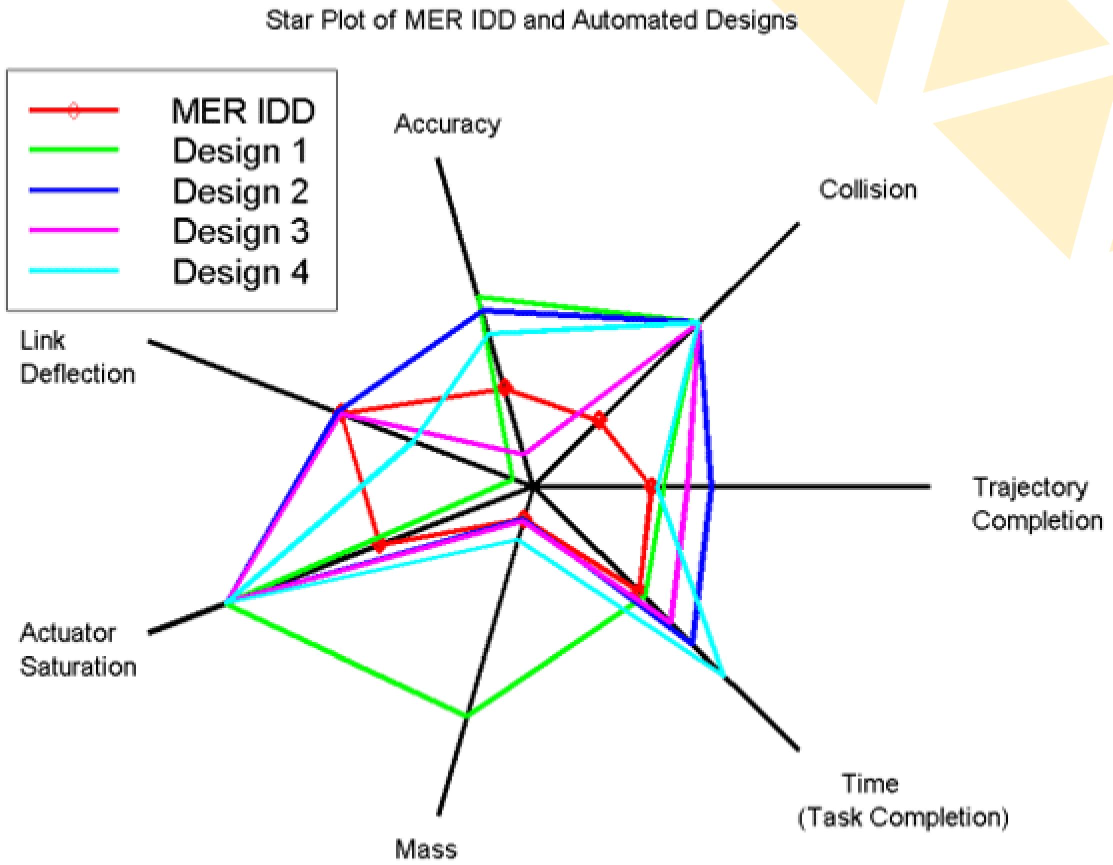

Onset of symptom to Confirmation
Exposure to Onset of symptom
Confirmation period
Onset of symptom
A series of city lockdown in Hubei
3 days
9 days
Exposure period
Number of COVID-19 confirmed cases
14000
12000
10000
8000
6000
4000
2000
0
Jan. 11
Jan. 12
Jan. 13
Jan. 14
Jan. 15
Jan. 16
Jan. 17
Jan. 18
Jan. 19
Jan. 20
Jan. 21
Jan. 22
Jan. 23
Jan. 24
Jan. 25
Jan. 26
Jan. 27
Jan. 28
Jan. 29
Jan. 30
Jan. 31
Feb. 01
Feb. 02
Feb. 03
Feb. 04
Feb. 05
Feb. 06
Feb. 07
Feb. 08
Feb. 09
Feb. 10
Feb. 11
Feb. 12
Feb. 13
Feb. 14
Feb. 15
Feb. 16
Feb. 17
Feb. 18
Feb. 19
Date
Exposure
Onset of Symptom
Confirmation
Lunar New Year holiday
Extended holiday

Rose Plot & Radar Plot



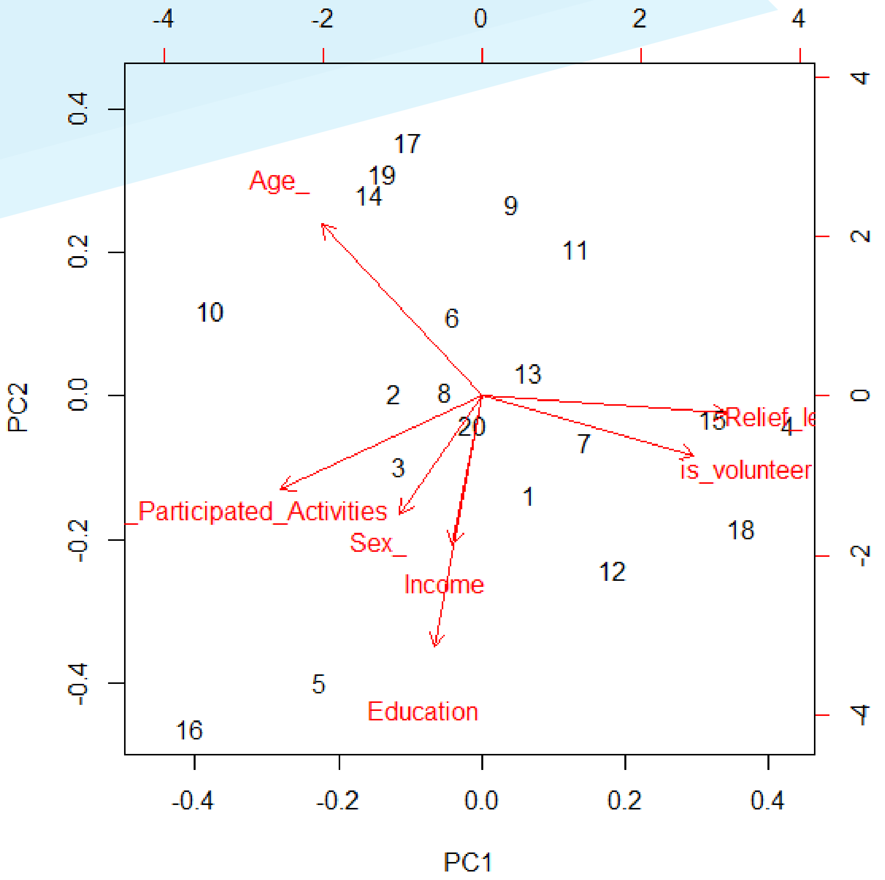
Profile diversity in various GOS samples

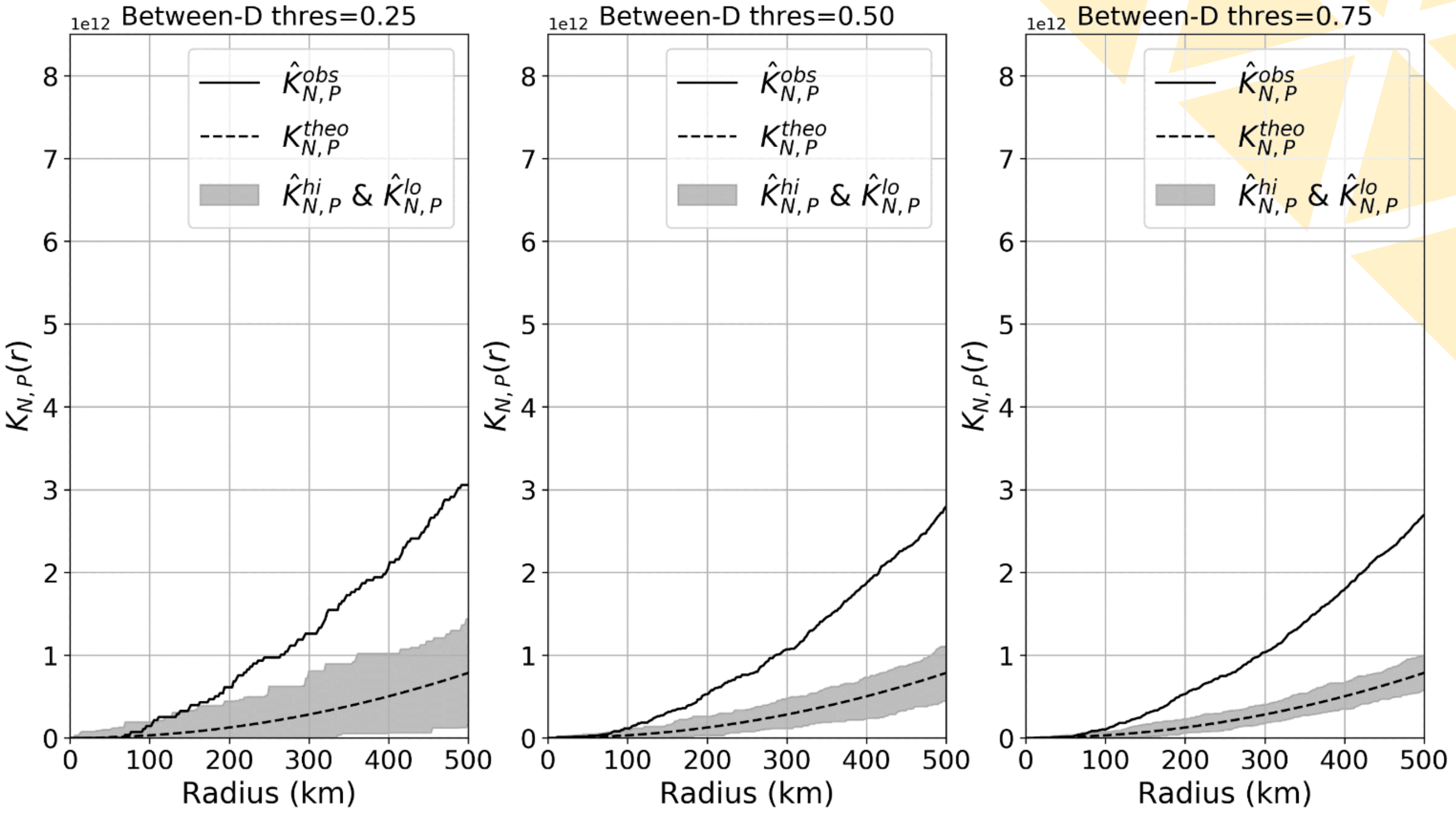
Lin et al. (2022) Profile diversity of galacto-oligosaccharides from disaccharides to hexasaccharides by porous graphitic carbon liquid chromatography-orbitrap tandem mass spectrometry. Food Chem. Vol. 390. 133151.



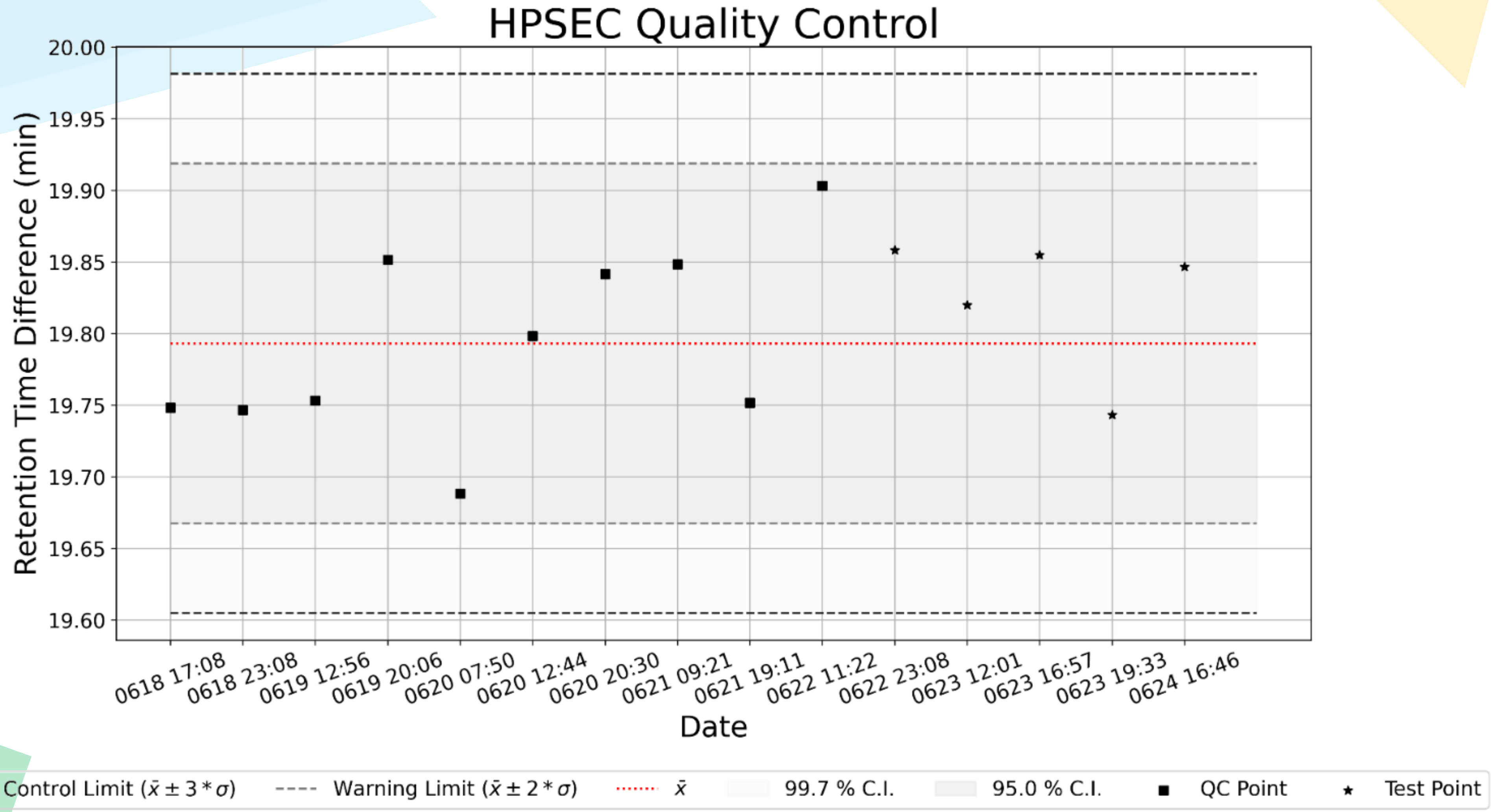
Source: https://en.wikipedia.org/wiki/Radar_chart#/media/File:MER_Star_Plot.gif

Biplot & Control Chart (I)

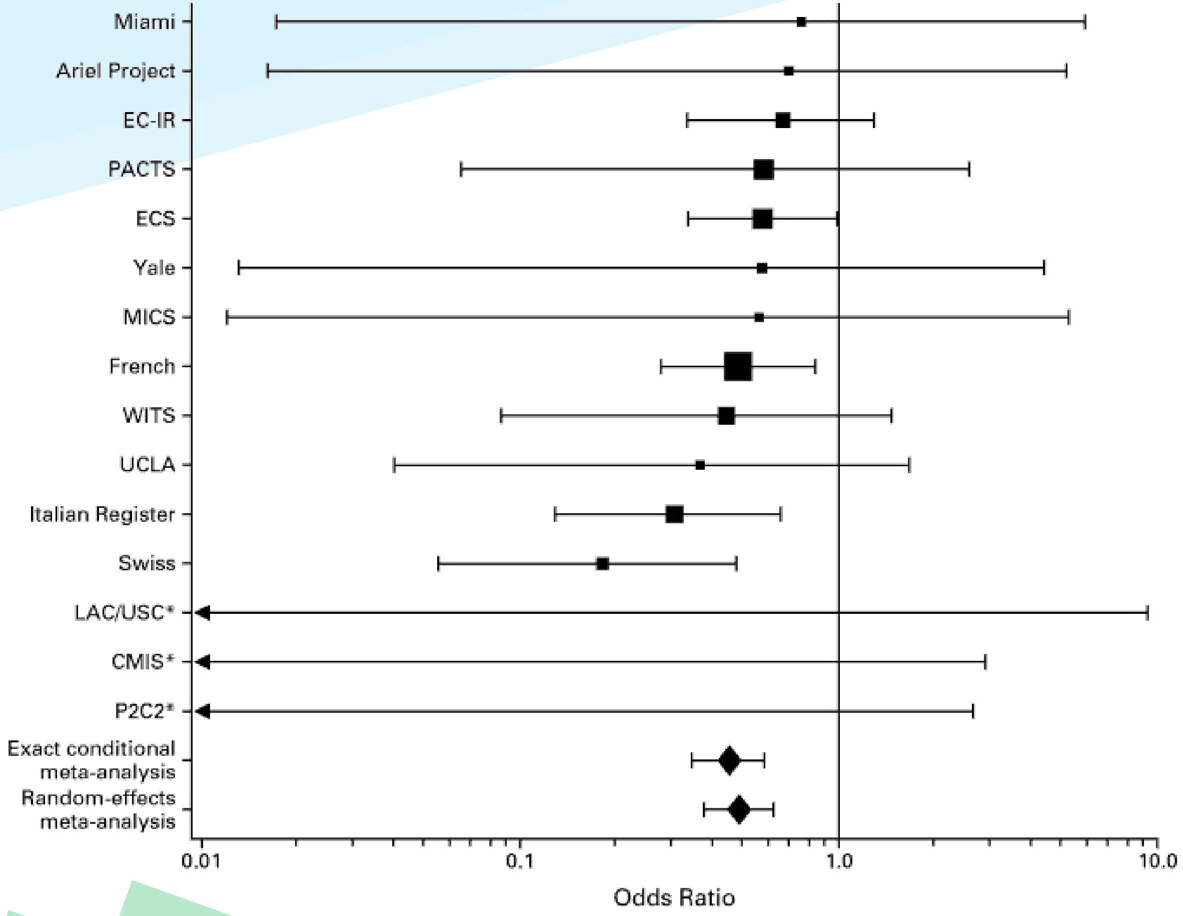




Control Chart (II)



Forest Plot



	Diseased	Healthy
Exposed	20	380
Not Exposed	10	490

$$risk\ of\ developing\ the\ disease\ given\ exposure = \frac{DE}{VE} = \frac{20}{400}$$

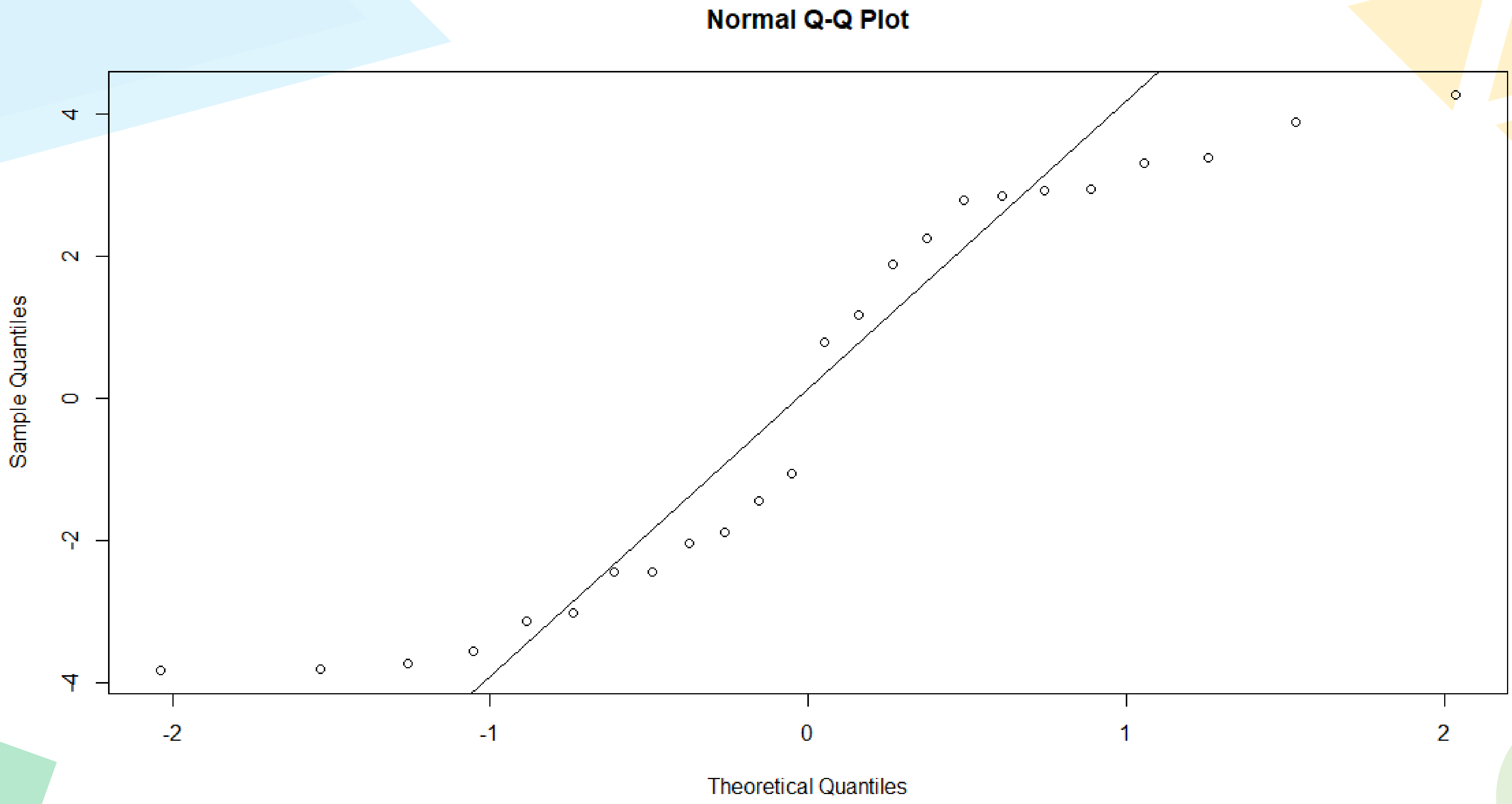
$$risk\ of\ developing\ the\ disease\ given\ non - exposure = \frac{DN}{VN} = \frac{10}{500}$$

$$relative\ risk = \frac{\frac{DE}{(DE+HE)}}{\frac{DN}{(DN+HN)}} = \frac{DE/VE}{DN/VN} = \frac{20/400}{10/500}$$

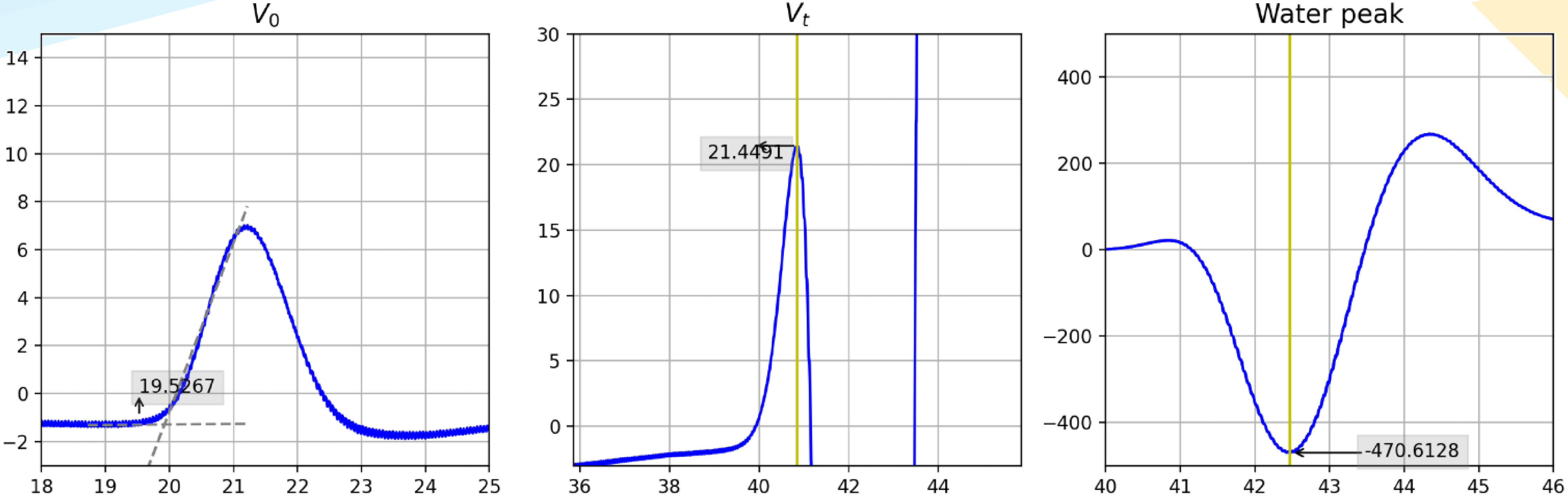
$$odds\ ratio = \frac{DE/HE}{DN/HN} = \frac{20/380}{10/500}$$

Source: https://www.nejm.org/doi/full/10.1056/NEJM199904013401301

Quantile-quantile Plot (Q-Q Plot)



Combination Chart



Question Time

If you have any questions, please do not hesitate to ask me.

The End

Thank you for your attention))