

視覺化的語言心法

資料、模型、與溝通

2018-03-31 LEOLUYI@III

<https://goo.gl/uLgwSe>

關於我

- › 呂奕 LEO LU
- › 台大工管
- › 目前於金融業服務
- › BUILD DATA PRODUCTS
 - › ETL
 - › MODELS
 - › TEXT MINING
 - › VIZ
- › ...



大部分人對視覺化的常見問題

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- › 想實做自己的視覺化流程，但不知道如何開展，老是做到一半放棄
- › 用 EXCEL 辛苦做出的圖表，卻無法在下次重複使用
- › 導入視覺化工具，卻變成「純試試」，一點都不實用，造成導入的軟體無法發揮其效用

目的決定手段的好壞

WHY DO WE CREATE DATA VIZ?

PURPOSES OF VIZ

- > COMMUNICATE
- > 報告給老闆、同事.....
- > 讓相關的人做決策
- > ...

WHAT I OFTEN DO: DATA ANALYSIS (EDA)

OUTLINES

- > THE LANGUAGE OF DATA VIZ (20 MIN)
- > VIZ THE MODEL BY EXAMPLE (20 MIN)
- > SUMMARY AND RECAP (5 MIN)

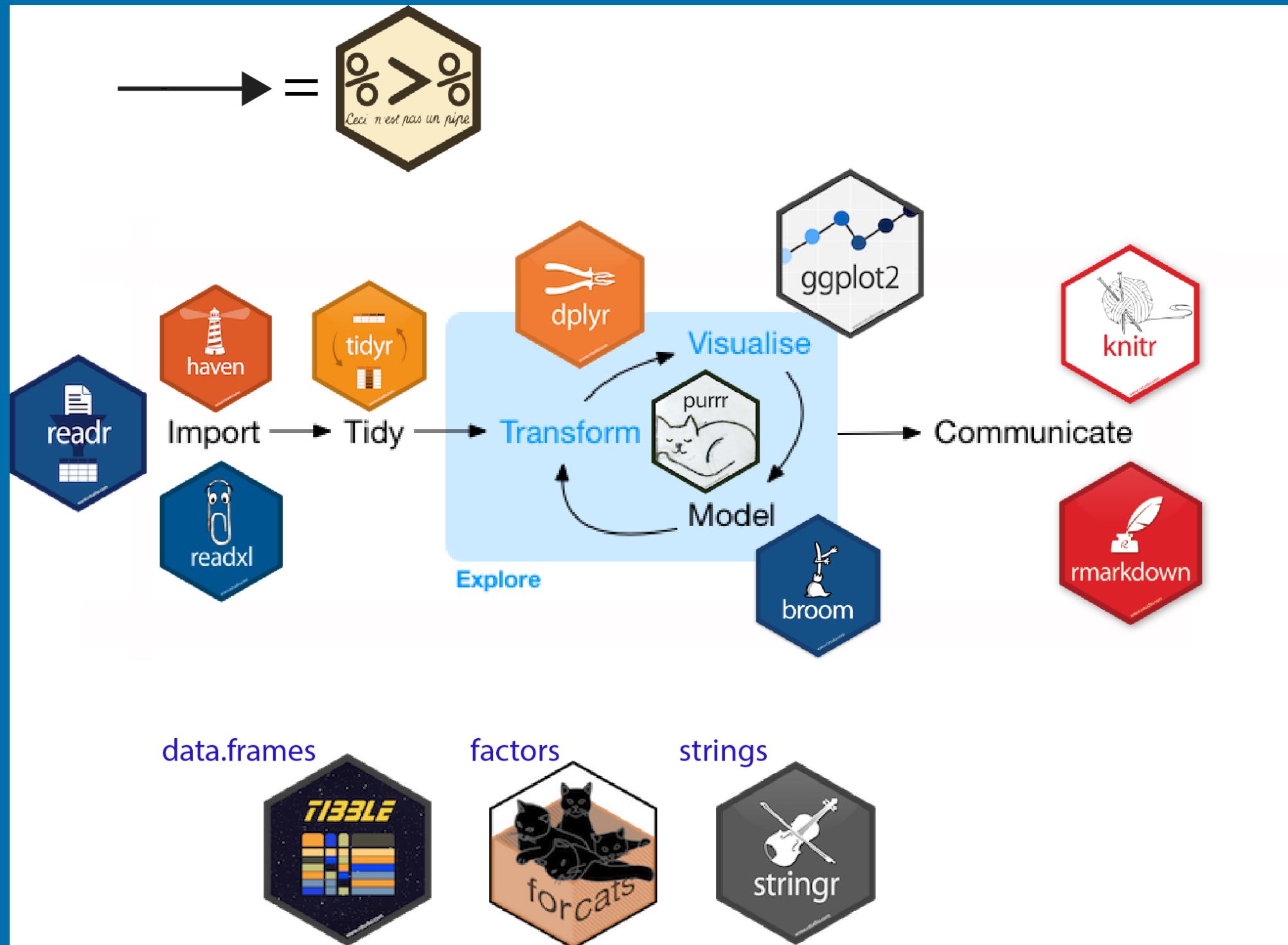
今天從心法開始談 THE LANGUAGE OF DATA VIZ

常常我們學到的：

1. 「一張好的圖可以勝過千言萬語」
› 所以我要怎麼做？
2. XX 圖可以用 YY 方法做
› 我怎麼知道要畫 XX 圖？

資料視覺化，重點在「資料」

Tidyverse -- HADLEY WICKHAM



資料視覺化的心法

圖表如何從無到有？

1. ISSUES: 這張圖表想解決的問題是什麼？

2. GEOMS: 要畫什麼樣的圖？

› BAR CHART, LINE CHART, HEAT MAP, ...

3. VARIABLES: 需要那些變數？

› 我的資料有這些變數嗎？

4. AESTHETIC MAPPING

5. LAYERS

6. STACKING

在 GRAMMAR OF GRAPHICS 裡面最重要的概念就是

AESTHETIC MAPPING

最簡單的例子



BAR CHART

Foreign banks' lending to Russia*

End-December 2013

\$bn

France

0 10 20 30 40 50

1.7

United States

1.1

Italy

3.5

Austria

4.9

Germany

0.8

Netherlands

1.4

Britain

0.5

Japan

0.5

Sweden

1.0

Spain

0.1

Canada

0.1

India

1.8

Share of total foreign lending, %

*Adjusted for credit risk

Source: BIS

最簡單的例子



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Share of total foreign lending, %

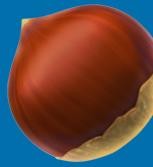
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Source: BIS

BAR CHART

> GEOM: BAR

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Source: BIS

*Adjusted for credit risk

BAR CHART

- > GEOM: BAR
- > X: PERCENTAGE

最簡單的例子



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Share of total foreign lending, %

1.7

United States

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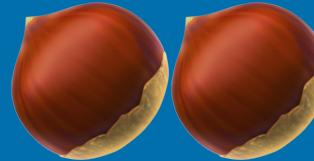
Source: BIS

*Adjusted for credit risk

BAR CHART

- > GEOM: BAR
- > X: PERCENTAGE
- > Y: FOREIGN COUNTRIES

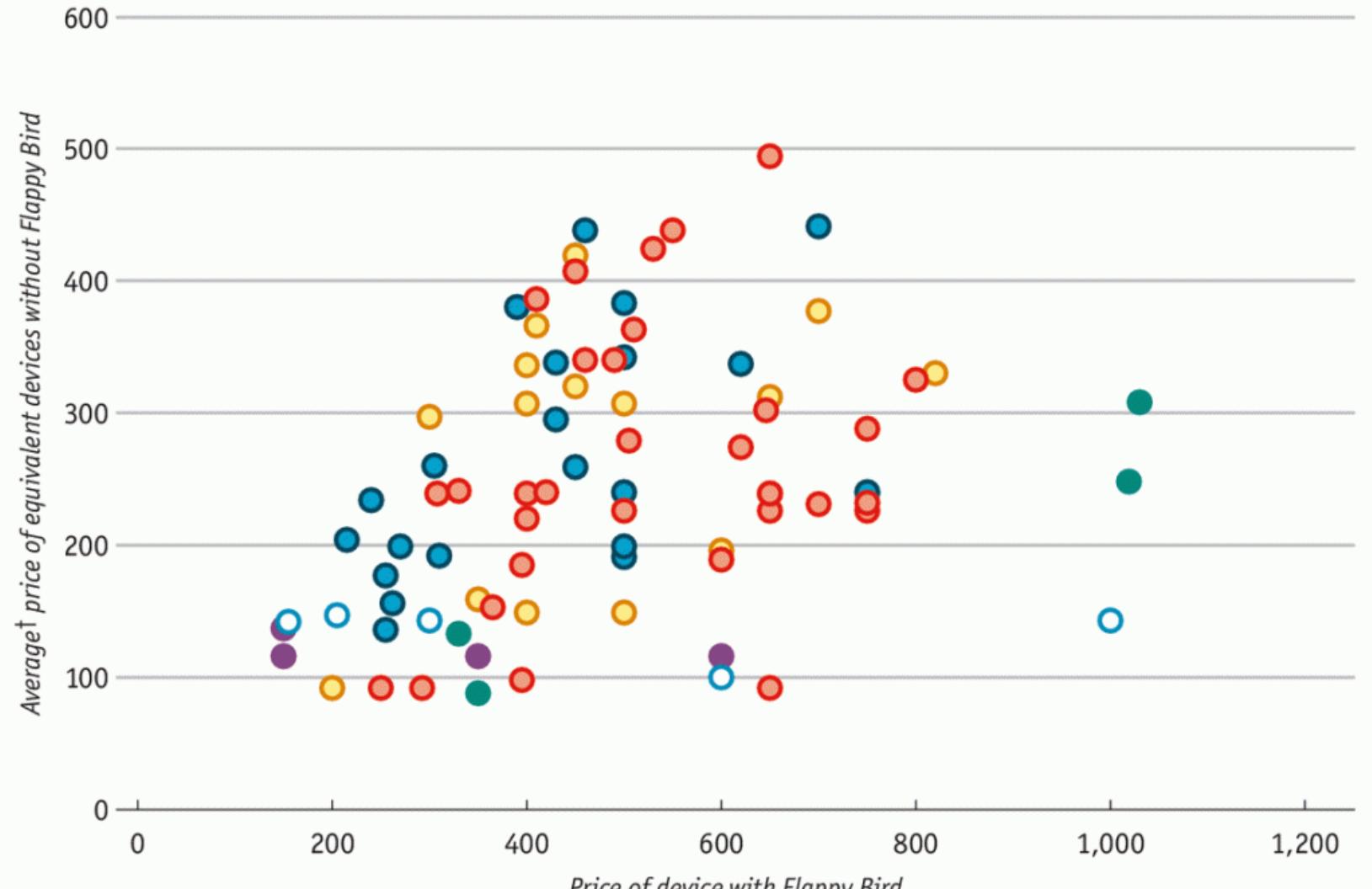
例子1



Estimating the value of Flappy Bird

Prices on Ebay*, February 14th 2014, £

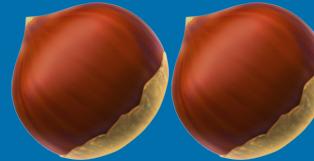
Ipad Iphone 5 Iphone 4 Ipod
Samsung Galaxy S4 Samsung Galaxy S3



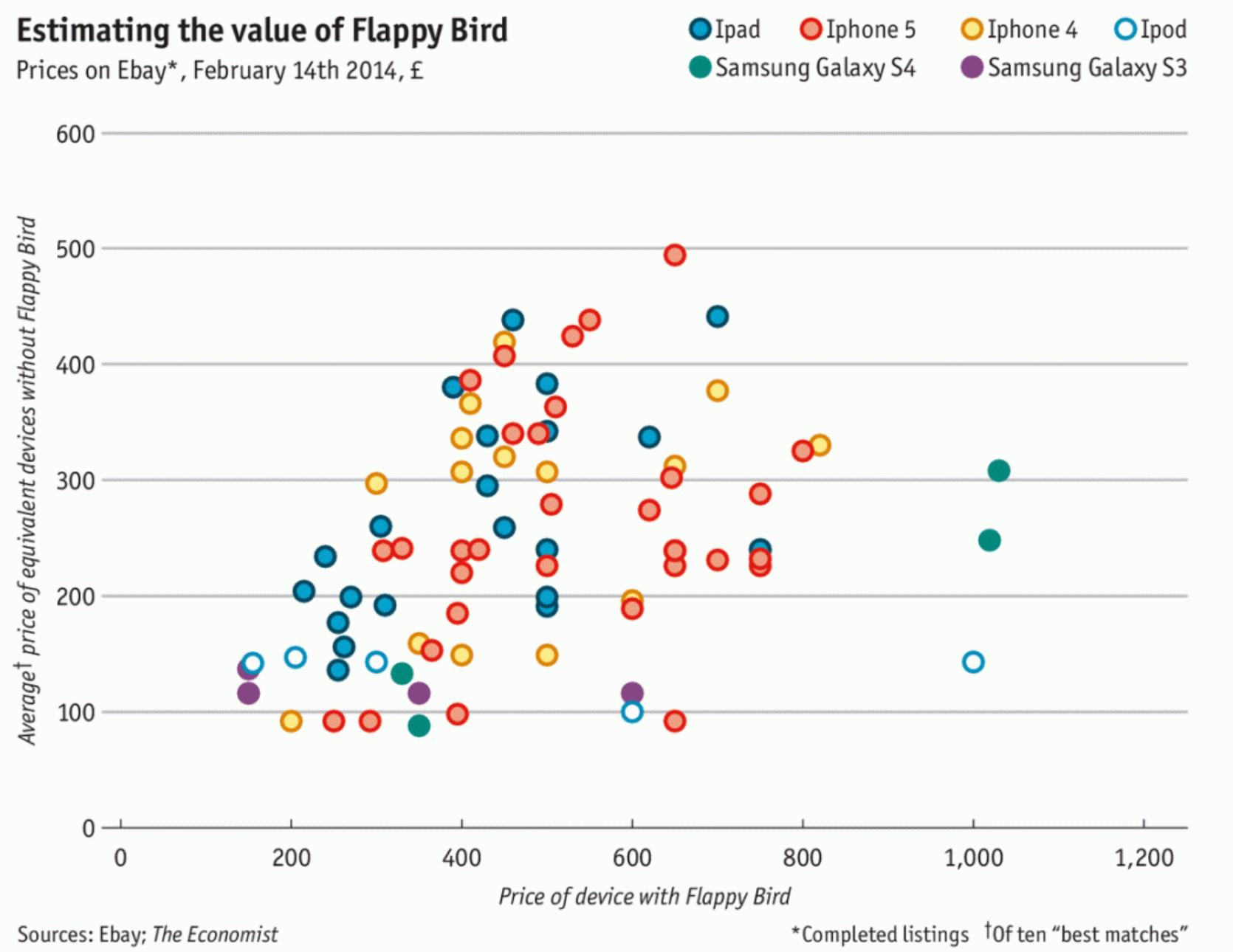
Sources: Ebay; The Economist

*Completed listings †Of ten "best matches"

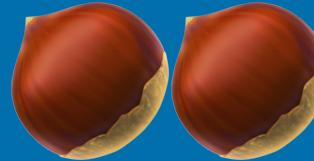
例子1



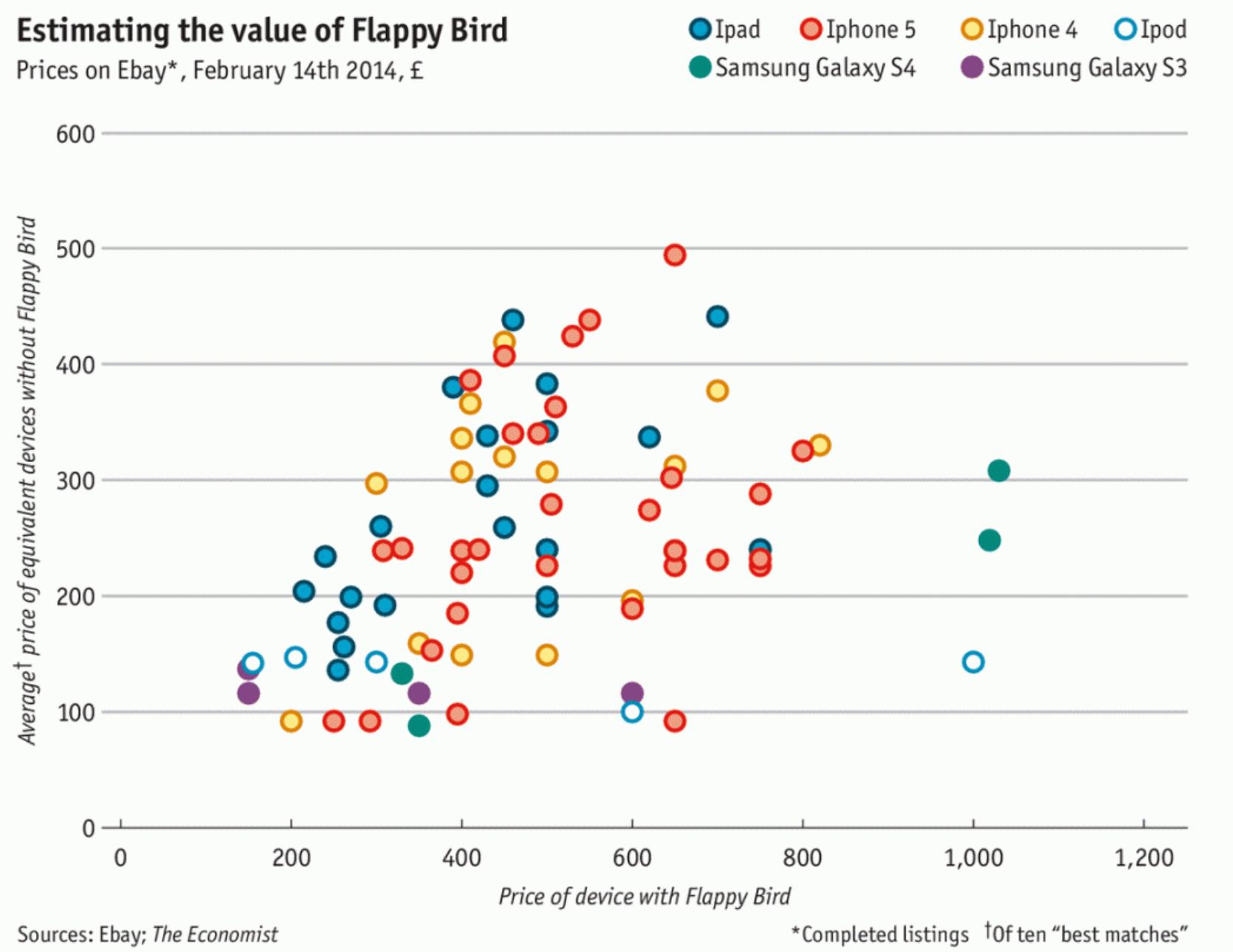
> GEOM: POINT



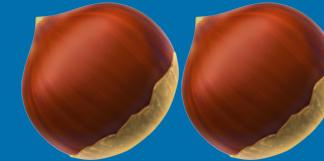
例子1



- > GEOM: POINT
- > X: PRICE



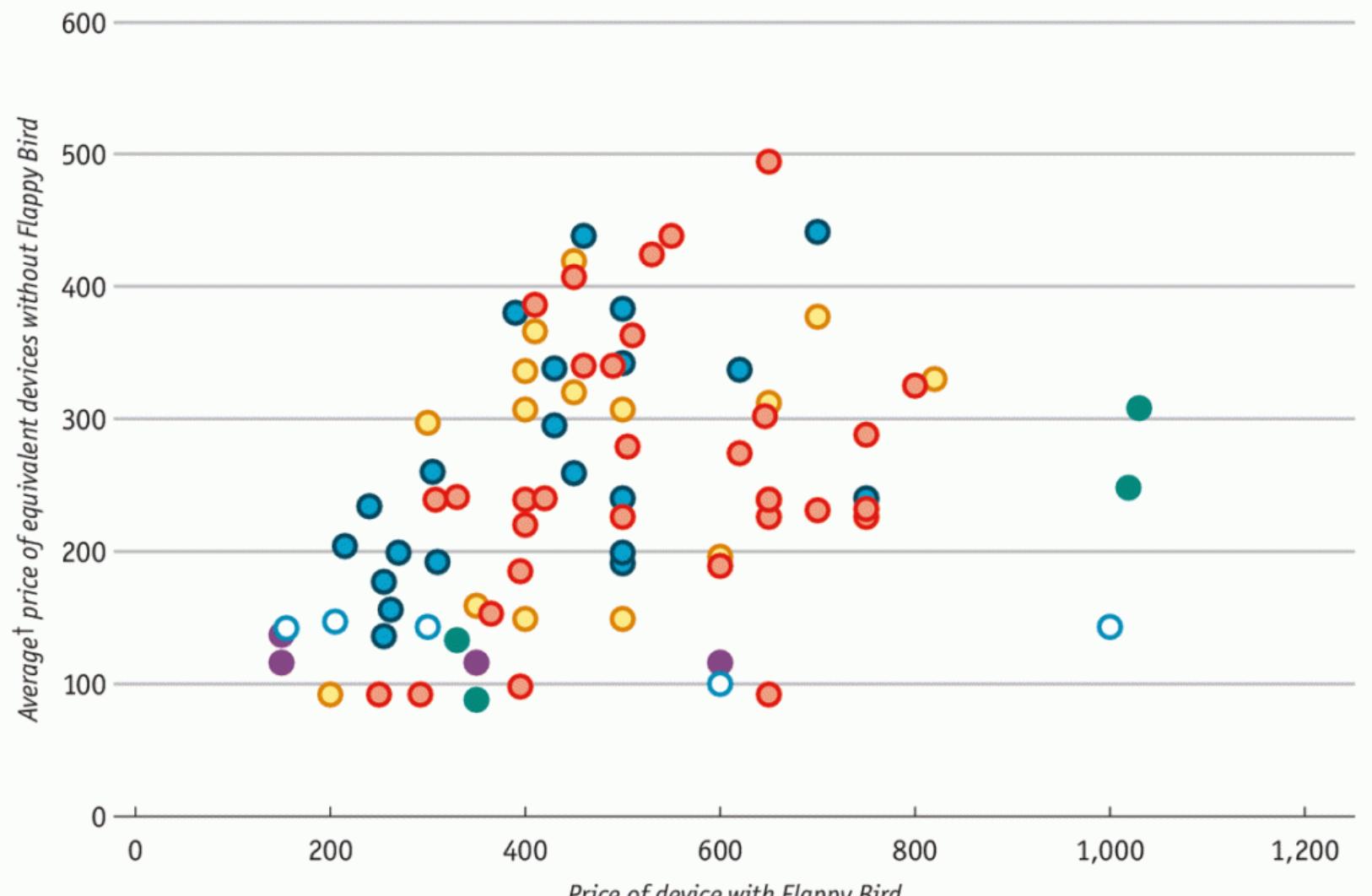
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Ipad Iphone 5 Iphone 4 Ipod
Samsung Galaxy S4 Samsung Galaxy S3

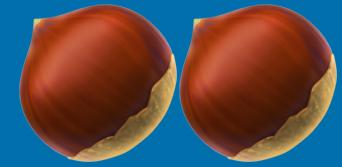


> GEOM: POINT

> X: PRICE

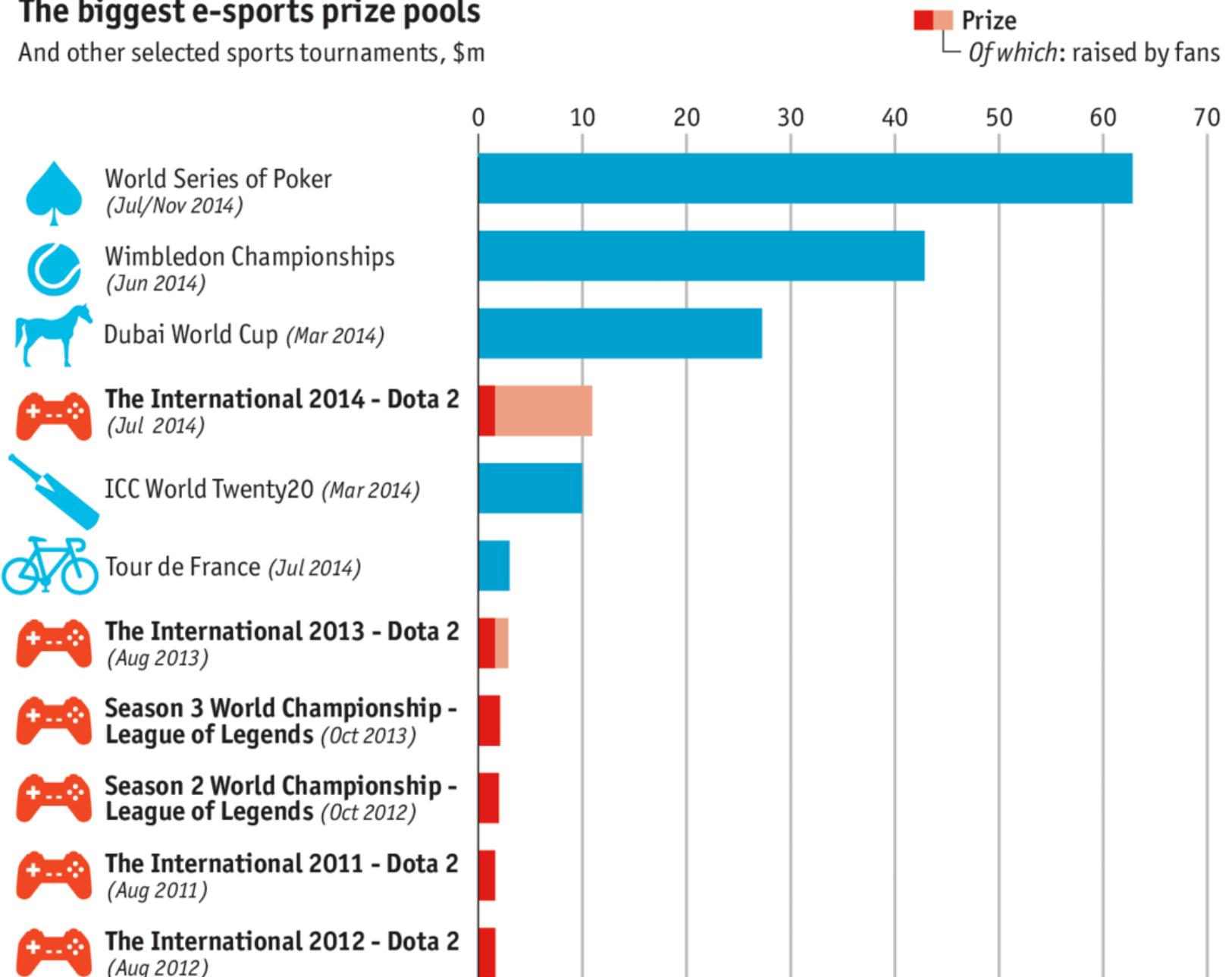
> Y: AVG PRICE WITHOUT FLAPPY BIRD

例子2



The biggest e-sports prize pools

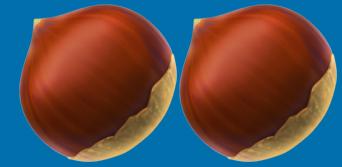
And other selected sports tournaments, \$m



Sources: E-Sports Earnings; company reports; press reports

Economist.com/graphicdetail

例子2

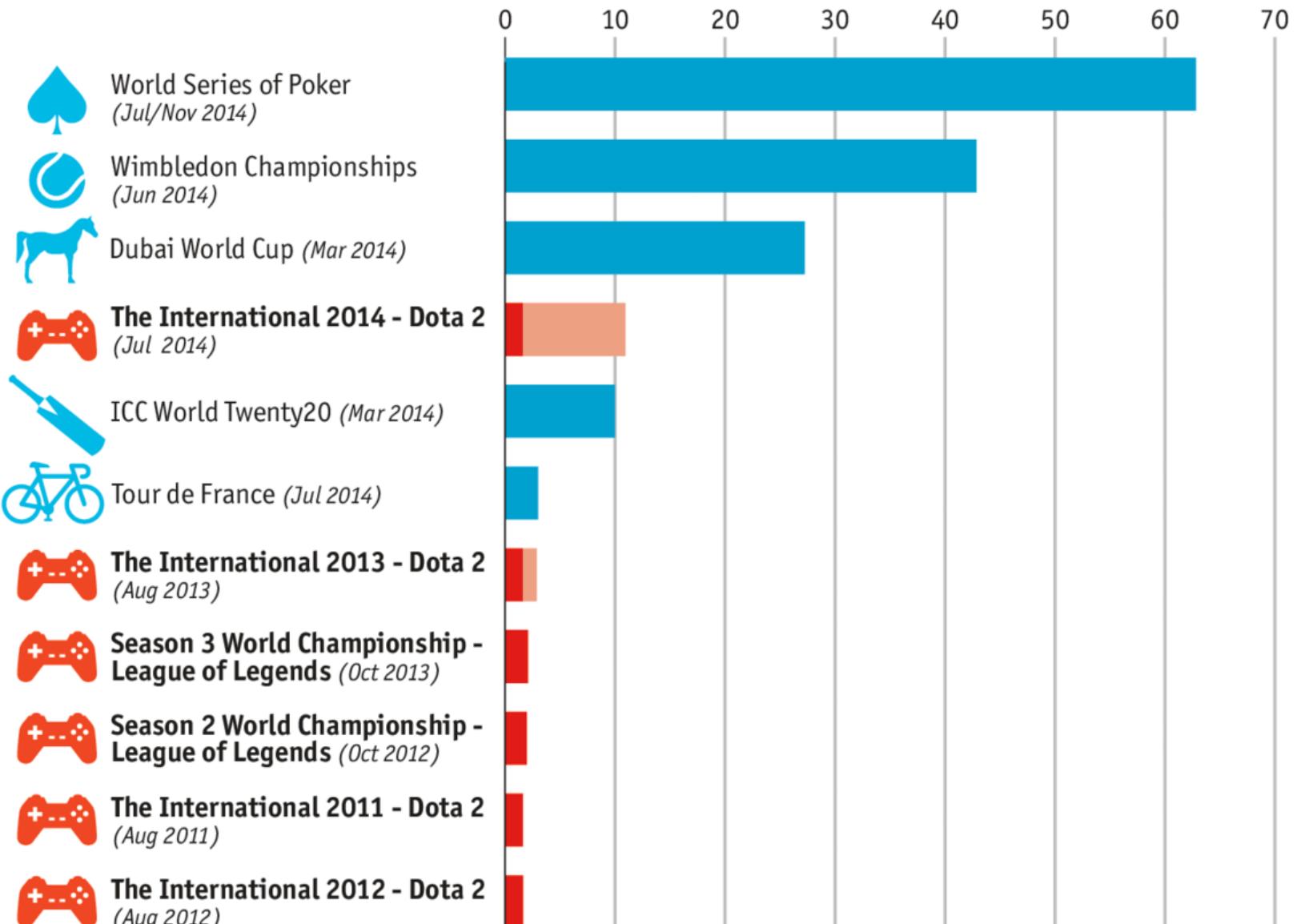


> GEOM: BAR

The biggest e-sports prize pools

And other selected sports tournaments, \$m

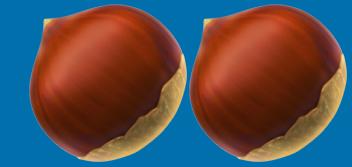
Prize
Of which: raised by fans



Sources: E-Sports Earnings; company reports; press reports

Economist.com/graphicdetail

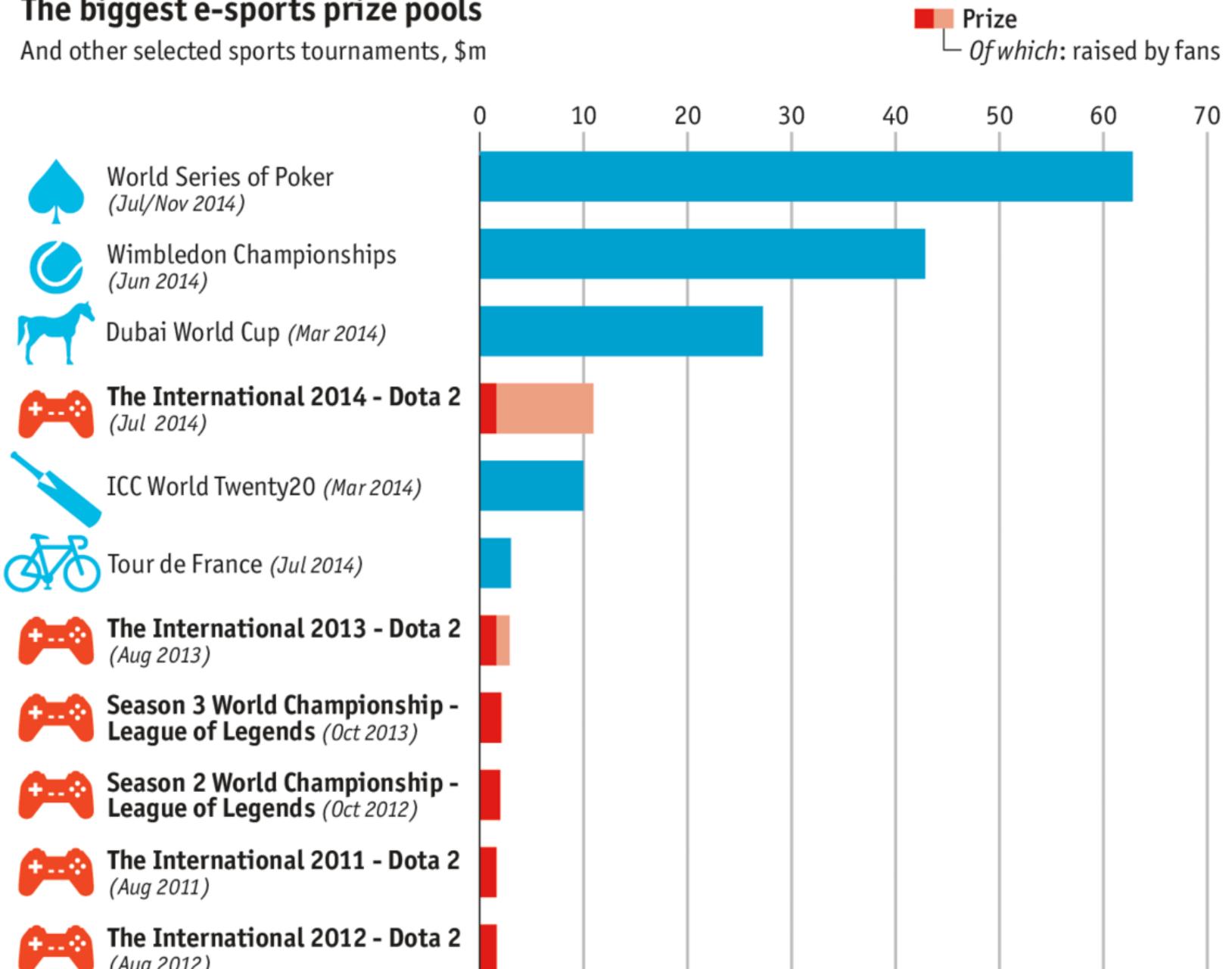
例子2



- > GEOM: BAR
- > X: PRIZE POOL

The biggest e-sports prize pools

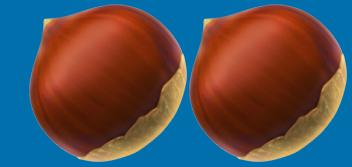
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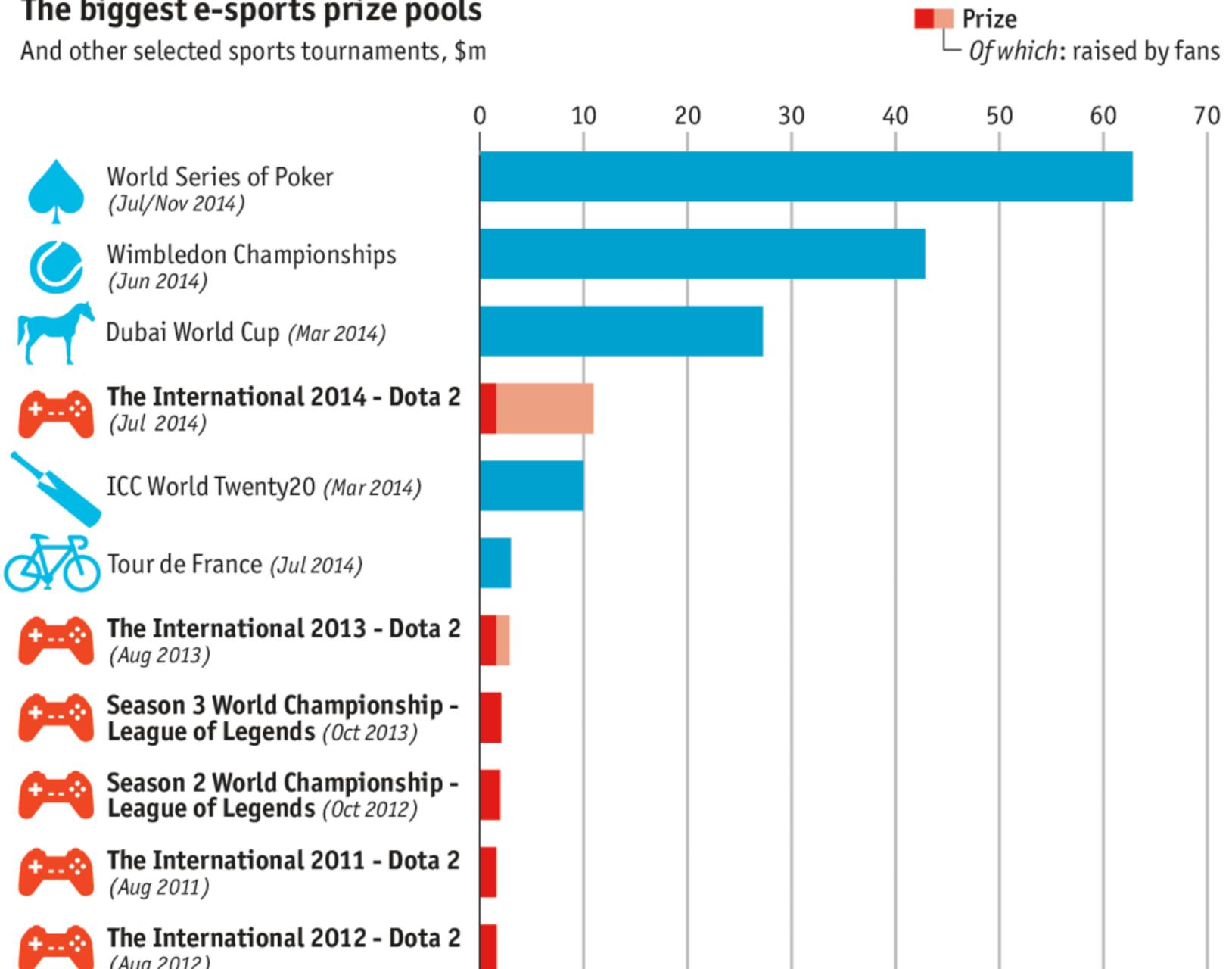
例子2



- GEOM: BAR
- X: PRIZE POOL
- Y: E-SPORTS

The biggest e-sports prize pools

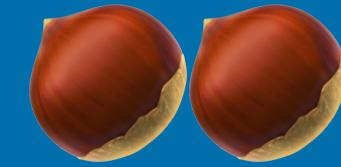
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Sources: E-Sports Earnings; company reports; press reports

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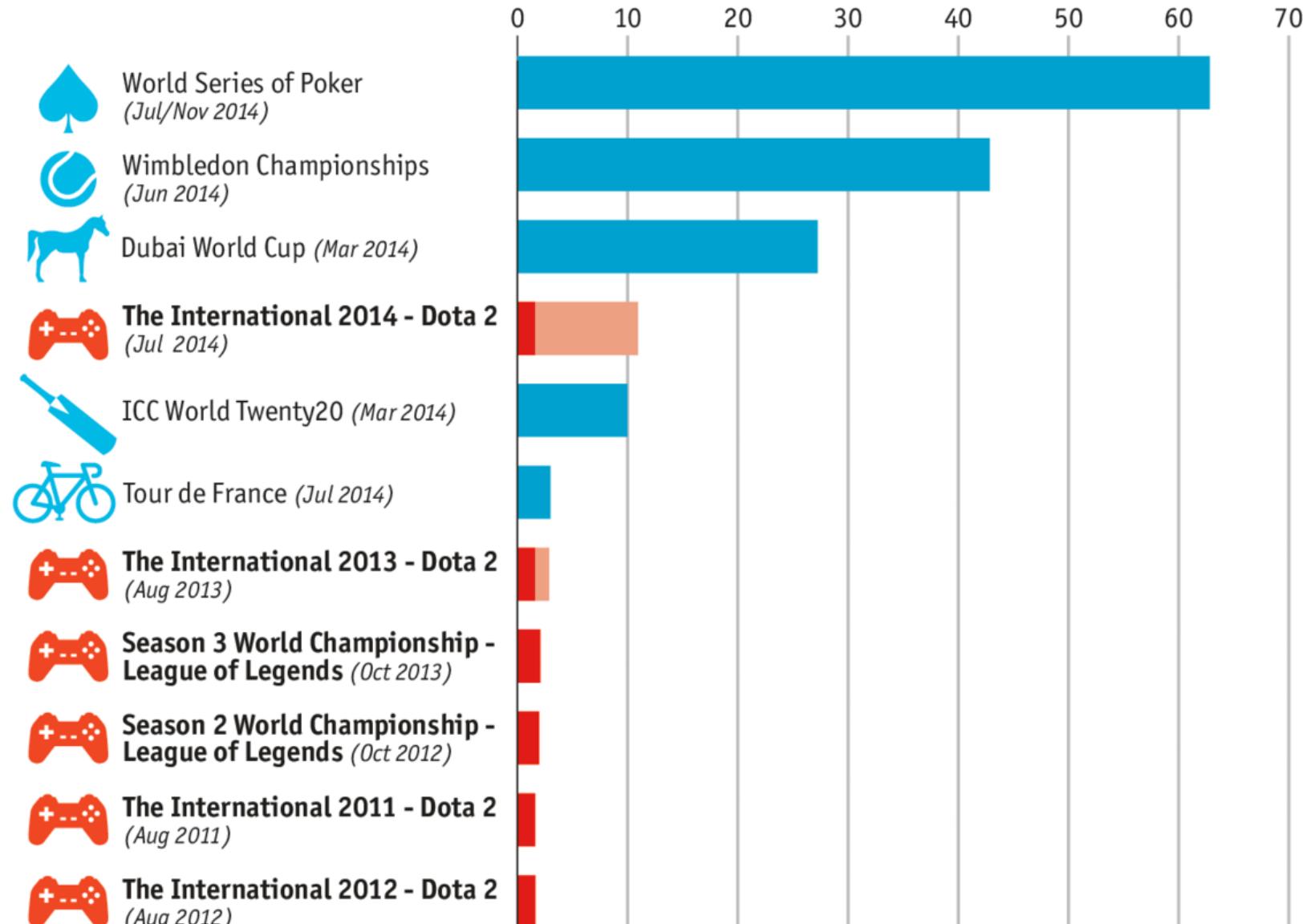


- > GEOM: BAR
- > X: PRIZE POOL
- > Y: E-SPORTS
- > FILL COLOR: RAISED BY FAN / NOT FAN

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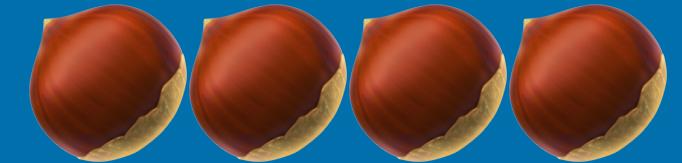
Prize
Of which: raised by fans



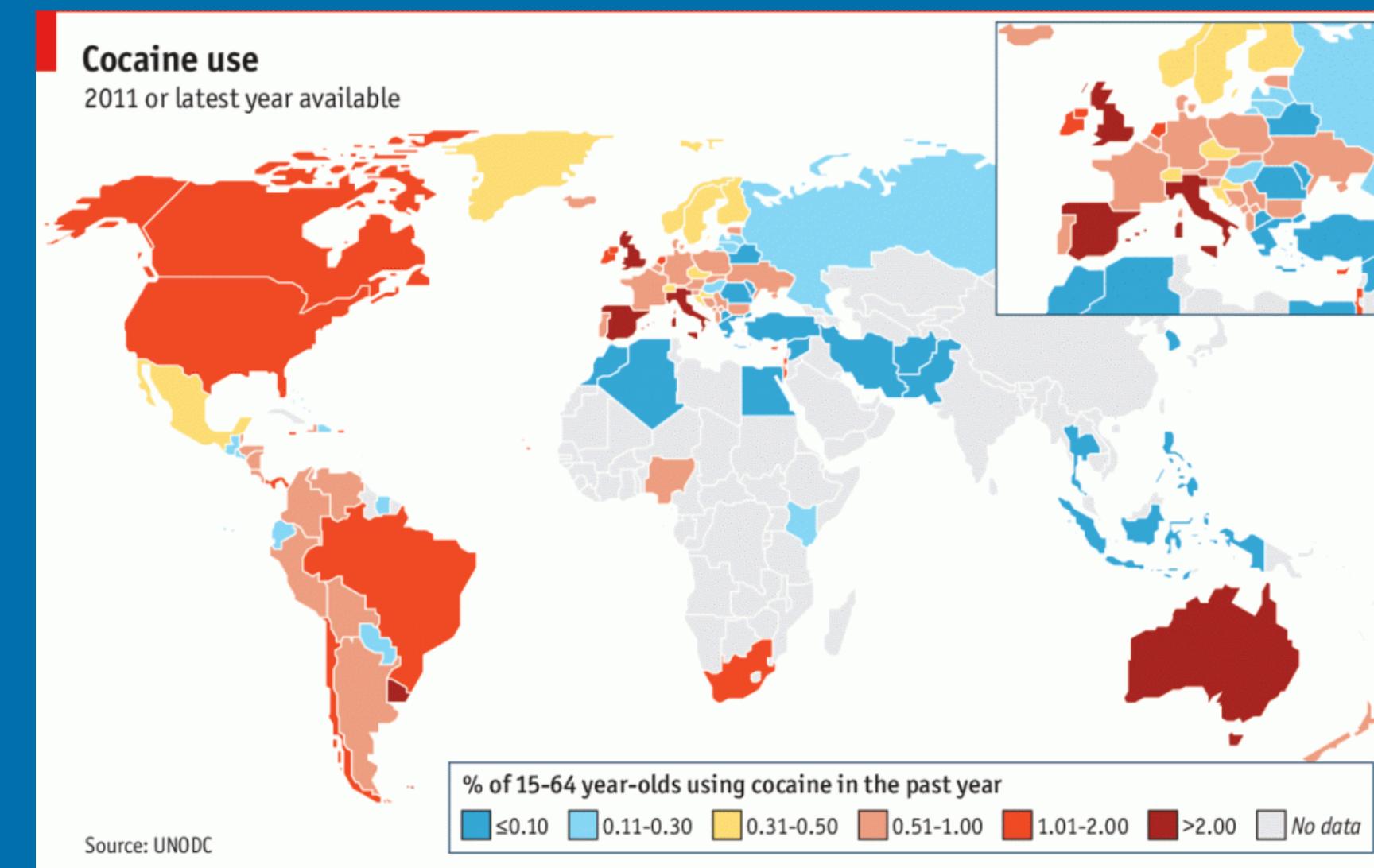
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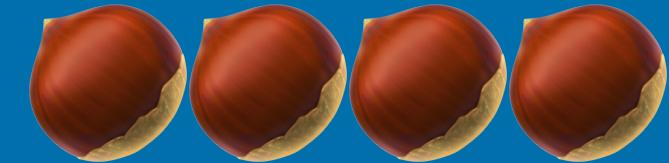
例子3



地圖

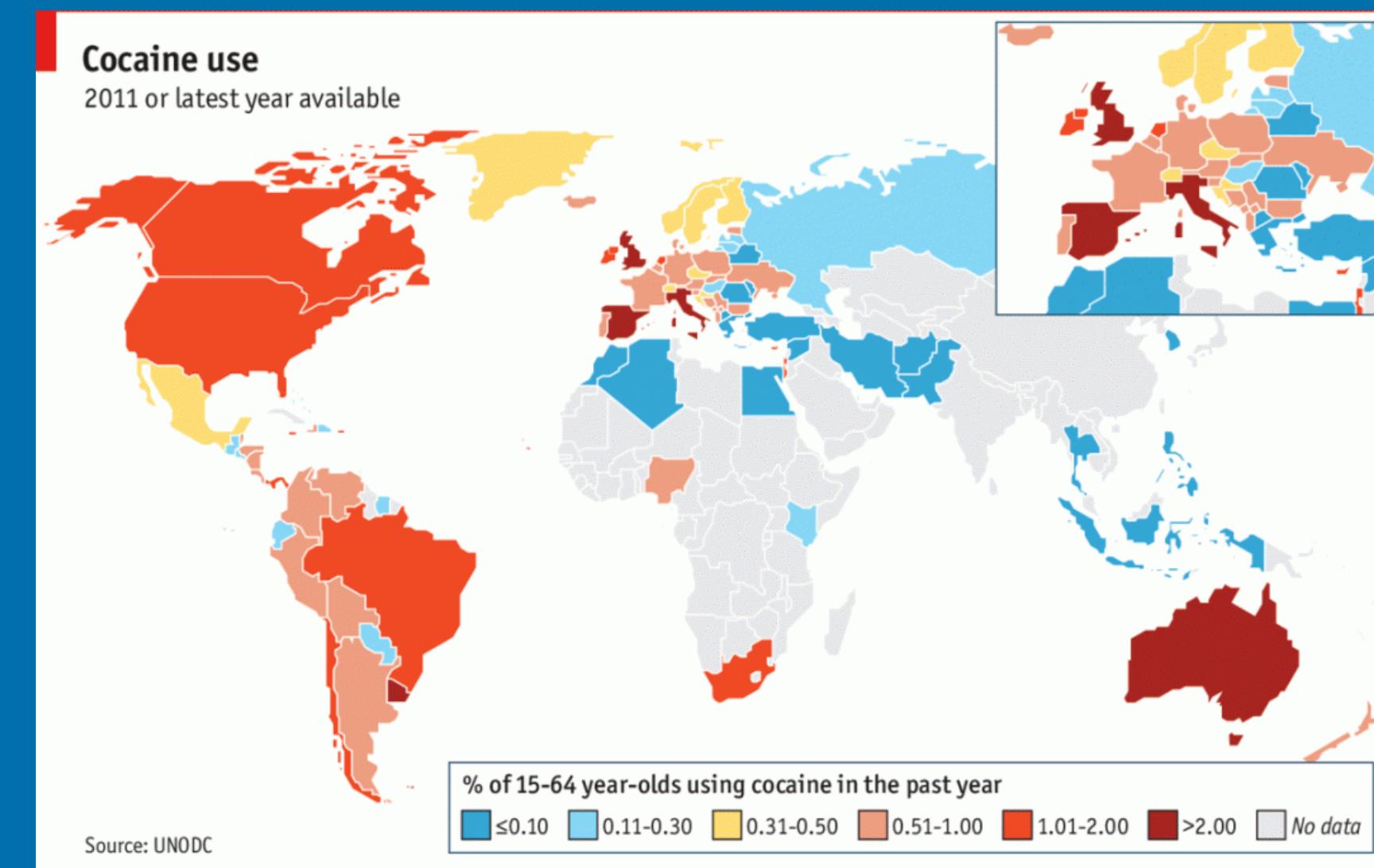


例子3

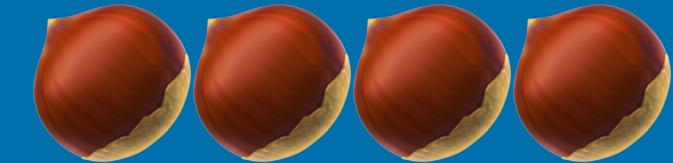


地圖

> GEOM: MAP RASTER

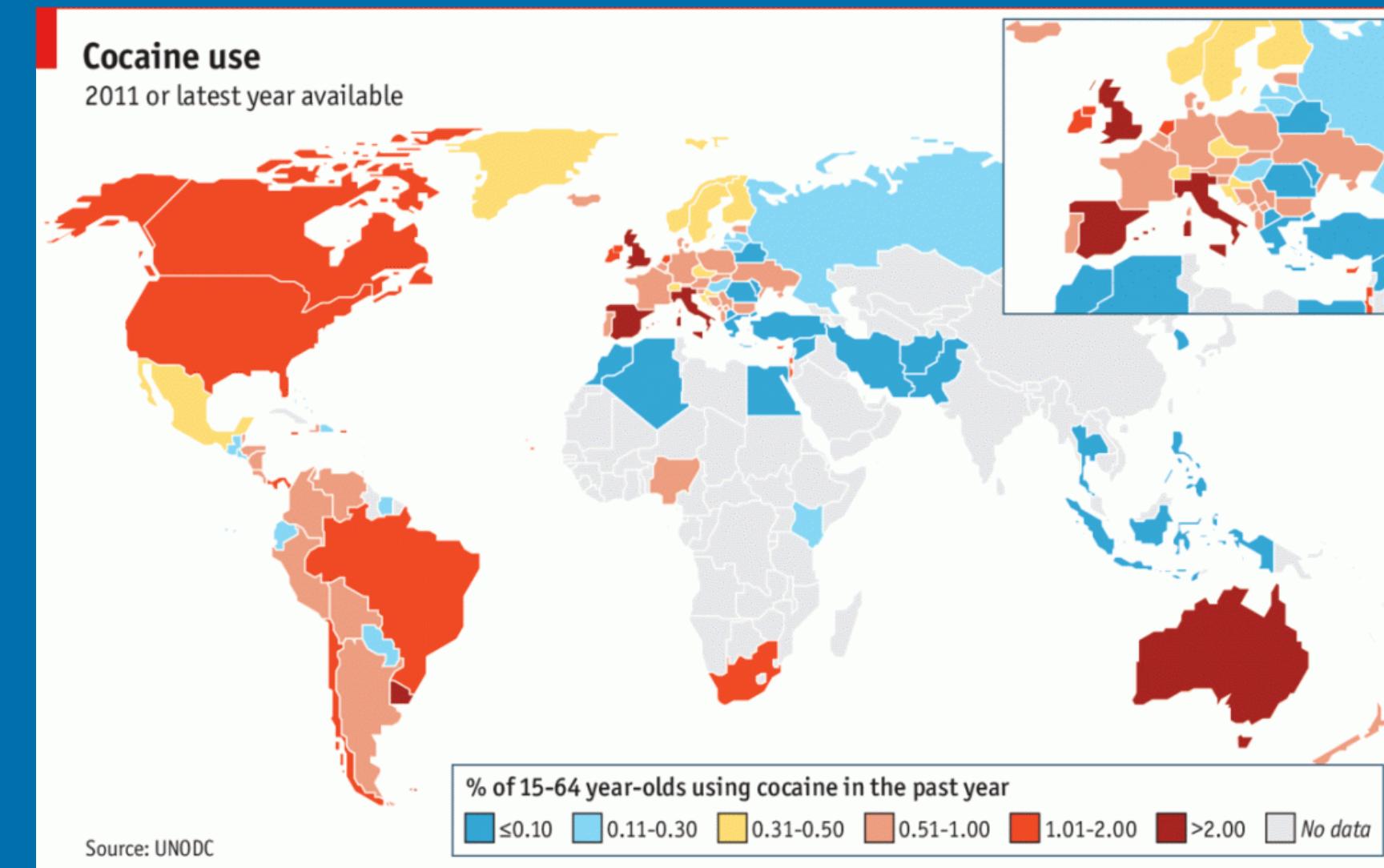


例子3

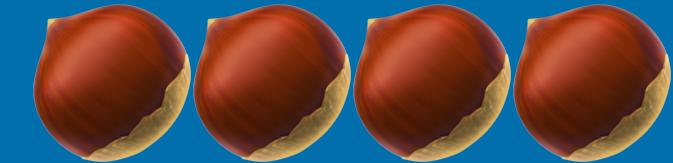


地圖

- › GEOM: MAP RASTER
- › RASTER: COUNTRIES

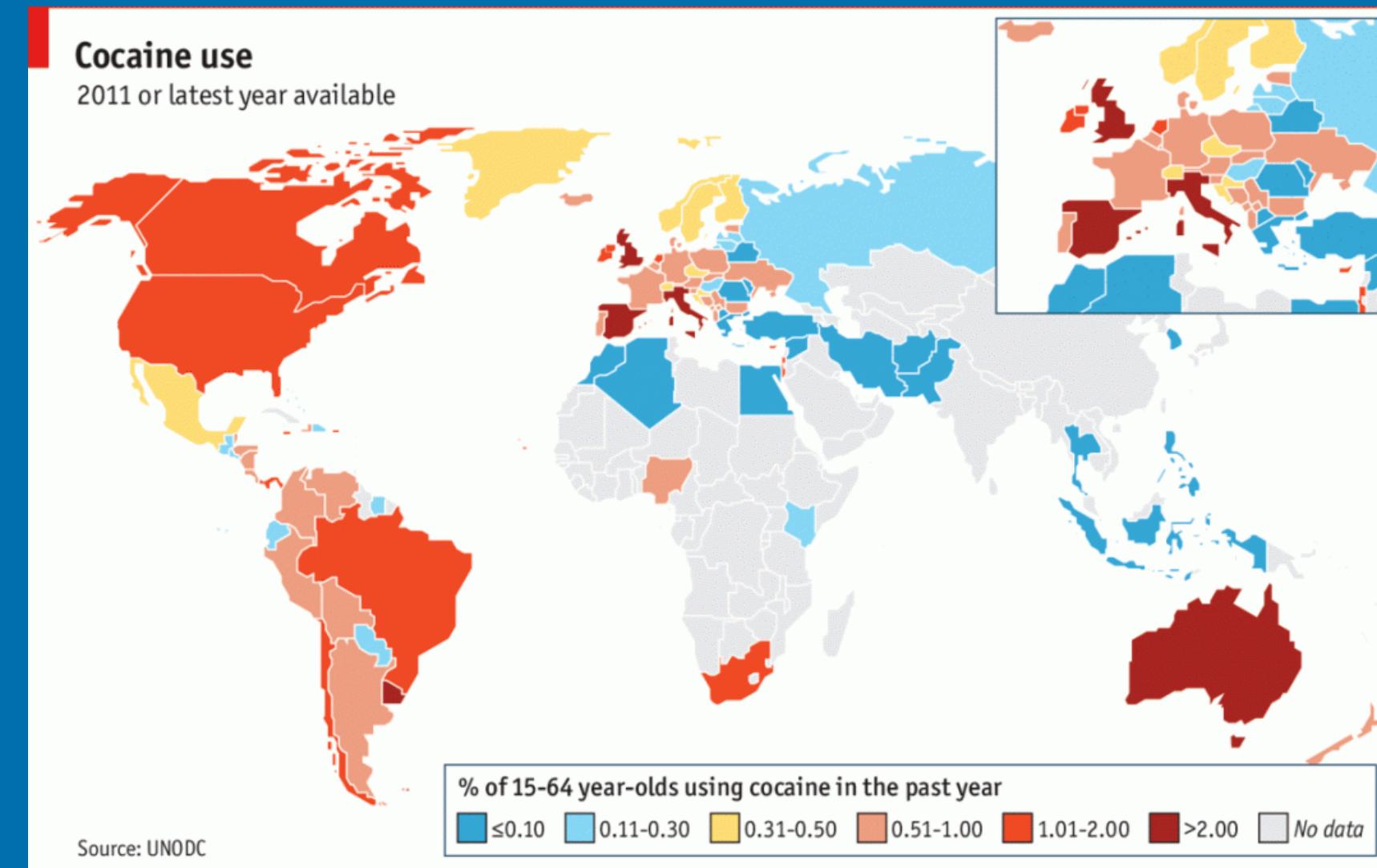


例子3



地圖

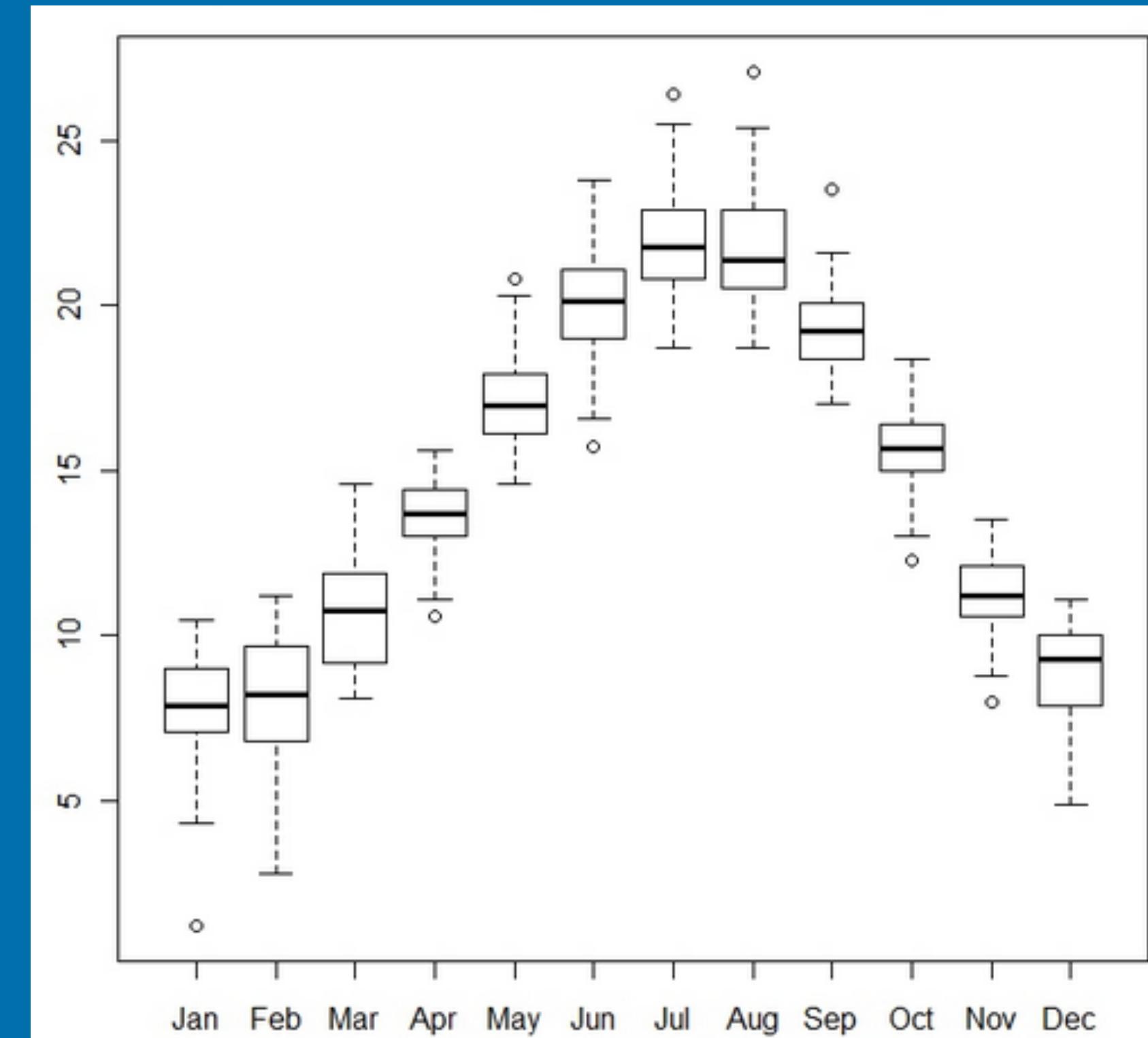
- > GEOM: MAP RASTER
- > RASTER: COUNTRIES
- > FILL COLOR: PERCENTAGE



例子4



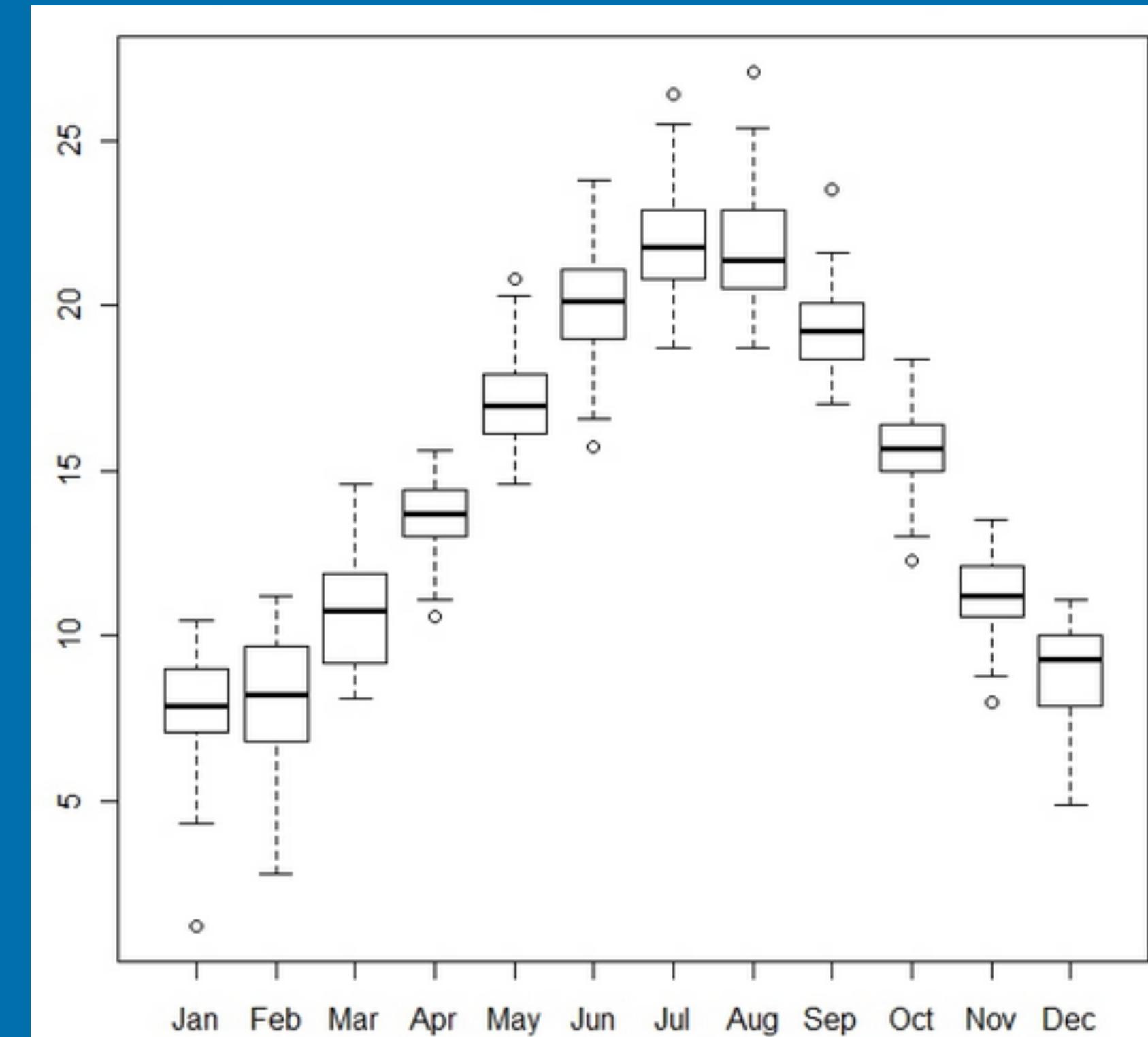
BOXPLOT -- JOHN W. TUKEY



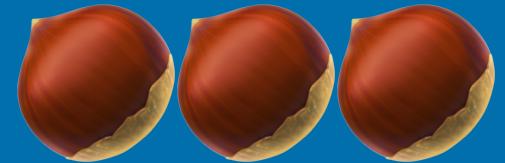
例子4



BOXPLOT -- JOHN W. TUKEY
➤ STATISTICAL PURPOSE

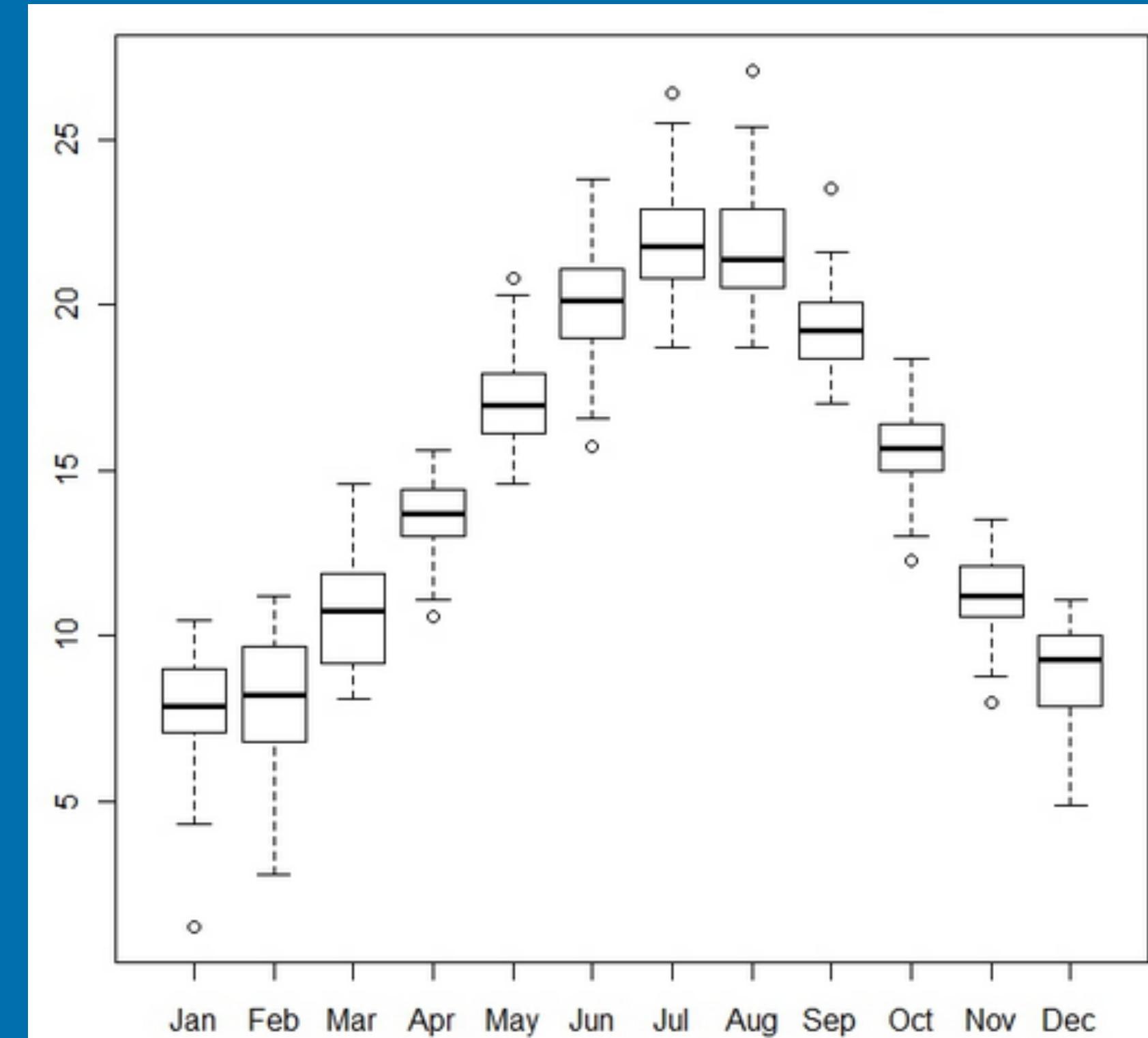


例子4

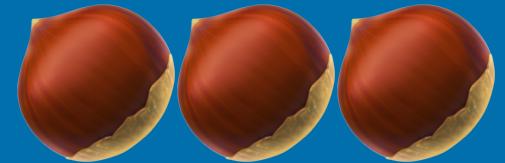


BOXPLOT -- JOHN W. TUKEY

- › STATISTICAL PURPOSE
- › GEOM: BOXPLOT

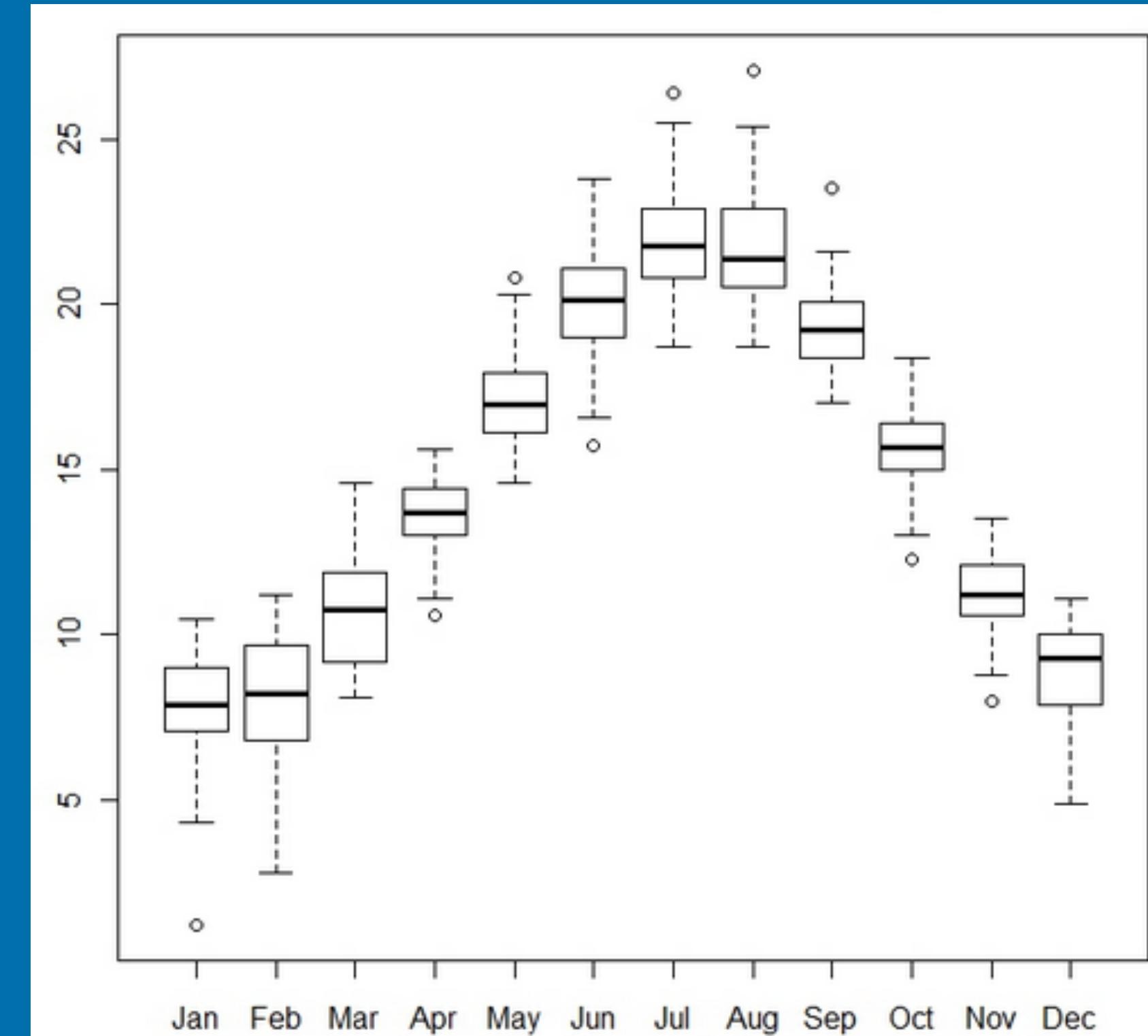


例子4

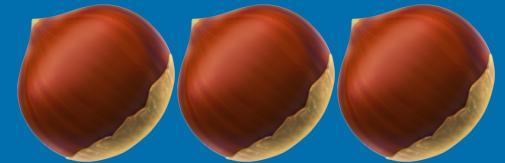


BOXPLOT -- JOHN W. TUKEY

- > STATISTICAL PURPOSE
- > GEOM: BOXPLOT
- > X: ...

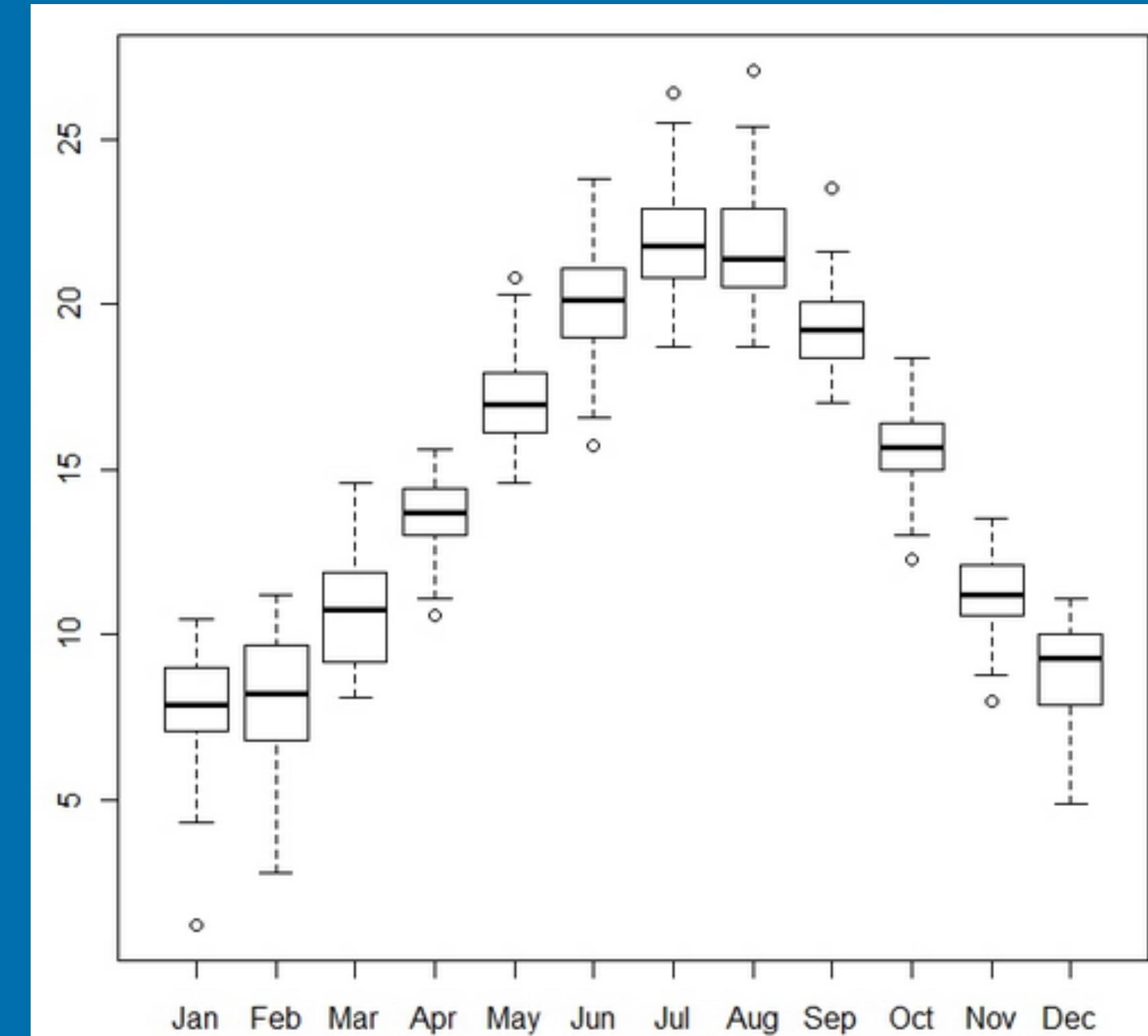


例子4

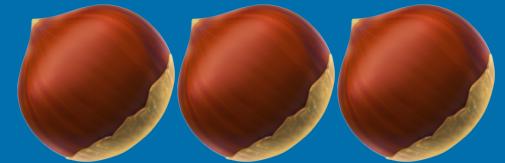


BOXPLOT -- JOHN W. TUKEY

- > STATISTICAL PURPOSE
- > GEOM: BOXPLOT
- > X: ...
- > Y: ...

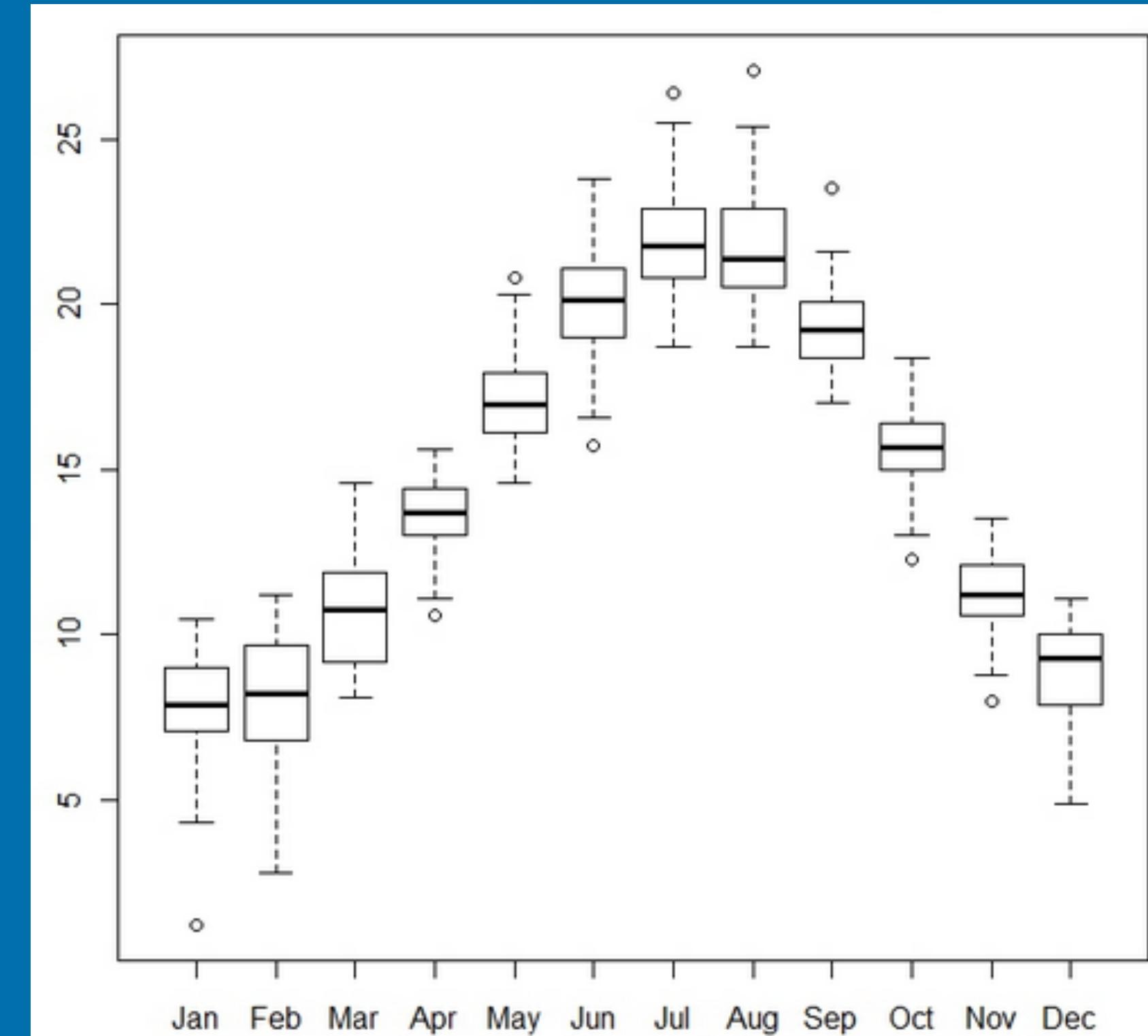


例子4

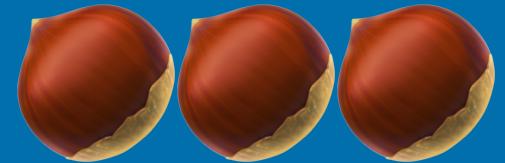


BOXPLOT -- JOHN W. TUKEY

- > STATISTICAL PURPOSE
- > GEOM: BOXPLOT
 - > X: ...
 - > Y: ...
- > 1ST QUANTILE

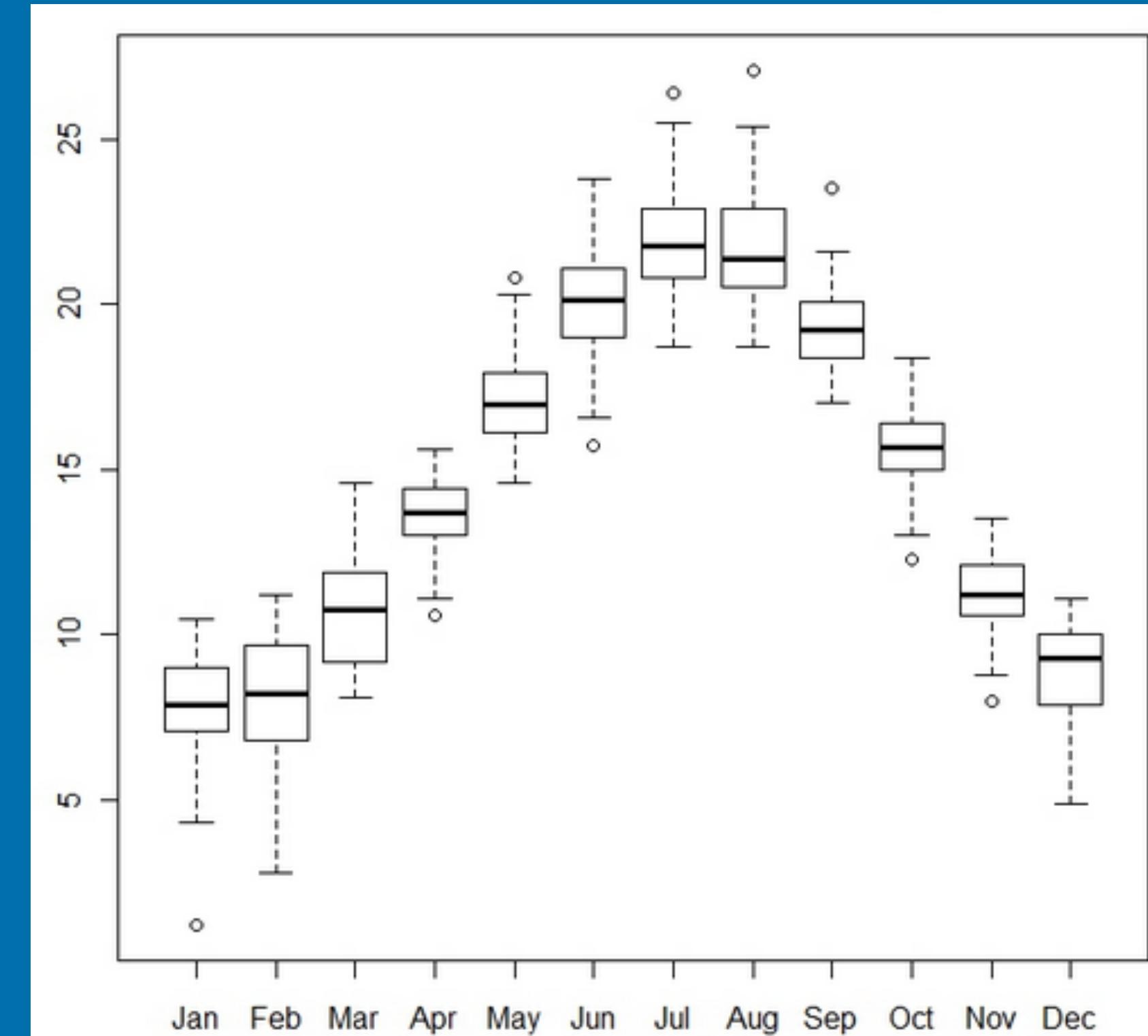


例子4

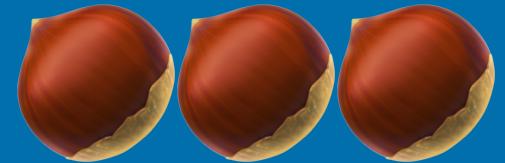


BOXPLOT -- JOHN W. TUKEY

- > STATISTICAL PURPOSE
- > GEOM: BOXPLOT
 - > X: ...
 - > Y: ...
- > 1ST QUANTILE
- > MEDIAN

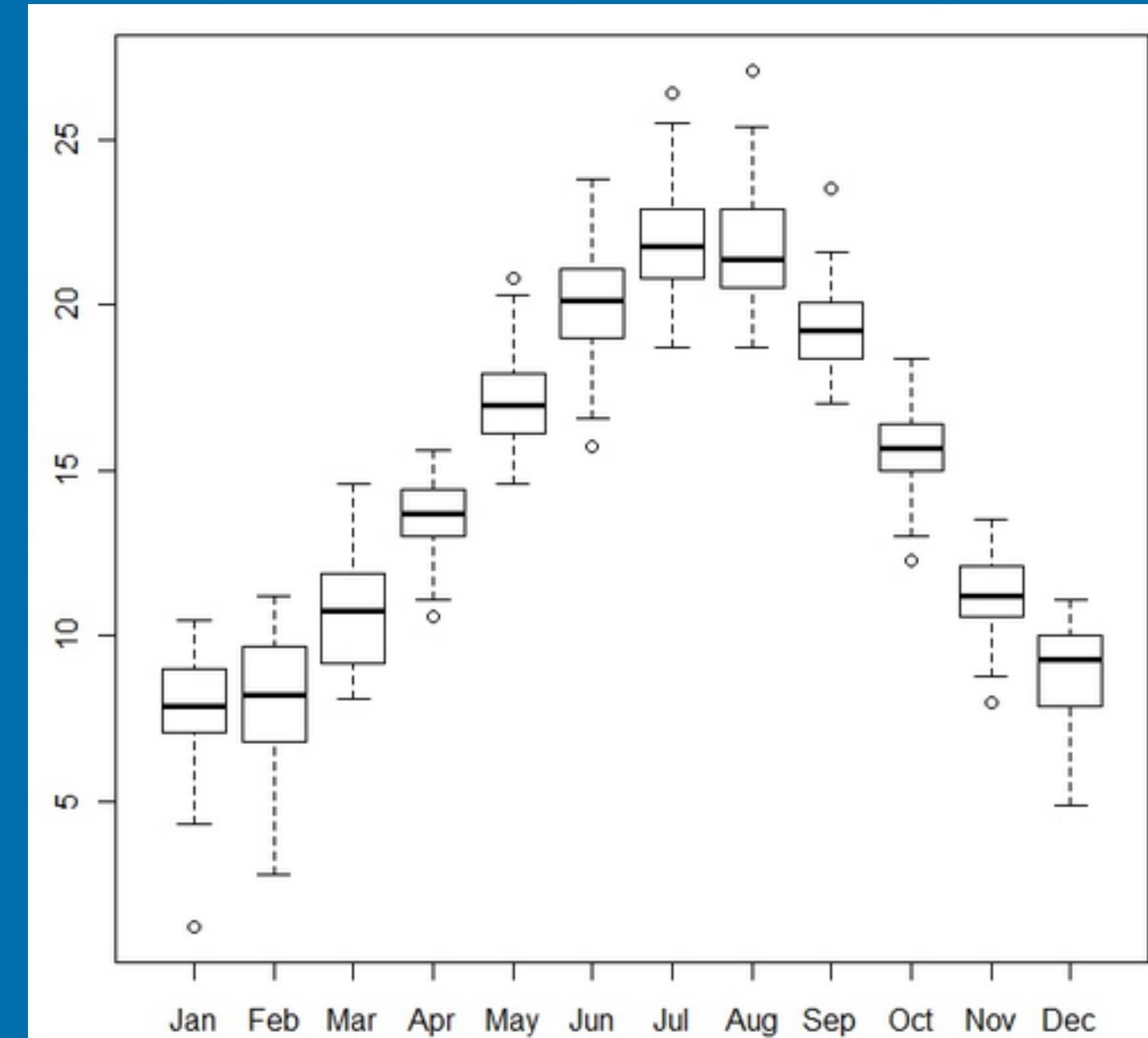


例子4



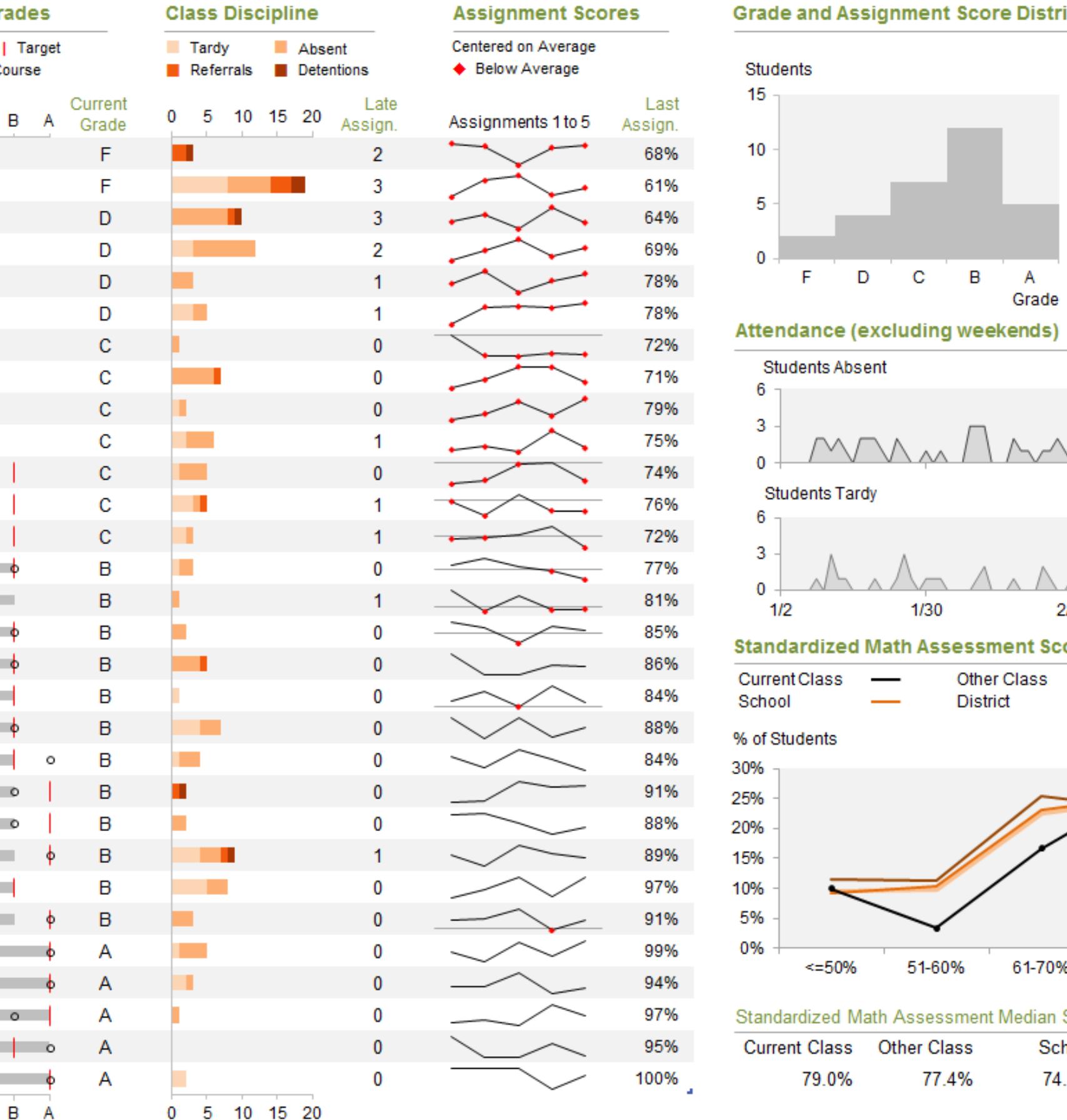
BOXPLOT -- JOHN W. TUKEY

- > STATISTICAL PURPOSE
- > GEOM: BOXPLOT
 - > X: ...
 - > Y: ...
- > 1ST QUANTILE
- > MEDIAN
- > 3RD QUANTILE

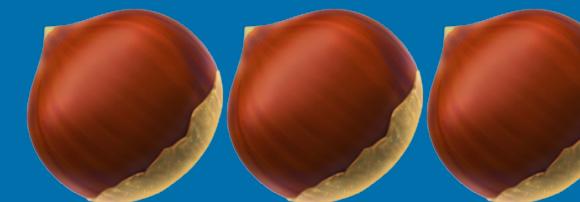


Grade 10 Algebra Course

Note: All scores
points earned



例子5



STEPHEN FEW -- DASHBOARD

➤ GEOM: TOO MANY

> GRILL

2

例子6



表格??

Best cities

Based on liveability index*

Rank	City	Country
1	Melbourne	Australia
2	Vienna	Austria
3	Vancouver	Canada
4	Toronto	Canada
5	Calgary	Canada
5	Adelaide	Australia
7	Sydney	Australia
8	Helsinki	Finland
9	Perth	Australia
10	Auckland	New Zealand

* Based on 30 factors spread across five areas: stability, infrastructure, education, health care and environment

Source: Economist Intelligence Unit

例子6



表格??

› GEOM: 表格

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例子6



表格??

- > GEOM: 表格
- > X: VARIABLES

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例子6



表格??

- > GEOM: 表格
- > X: VARIABLES
- > Y: RECORDS

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視覺化心法的語言實現 R 的 ggplot2 實做

GGPLOT2 IN R

- › GGPLOT2 是一個很強大的資料探索及視覺化工具，是最有影響力的 R 套件開發者 HADLEY WICKHAM 所開發
- › 所有繪圖函數都有背後的視覺化邏輯 (GRAMMAR OF GRAPHICS)

GRAMMAR OF GRAPHICS 的作用就是幫助我們：

- › 將圖表拆解成個別元素
- › 將這些元素按照邏輯個別操作
- › 正確又簡單地達到圖表的目的

A wide-angle photograph of a mountainous landscape. In the foreground, there are dark, rocky slopes covered with sparse, dry vegetation. A prominent, rounded peak rises in the center, its slopes covered in dense green forests. The background features more mountain ridges, fading into a hazy blue under a clear, light blue sky.

LIVE DEMO

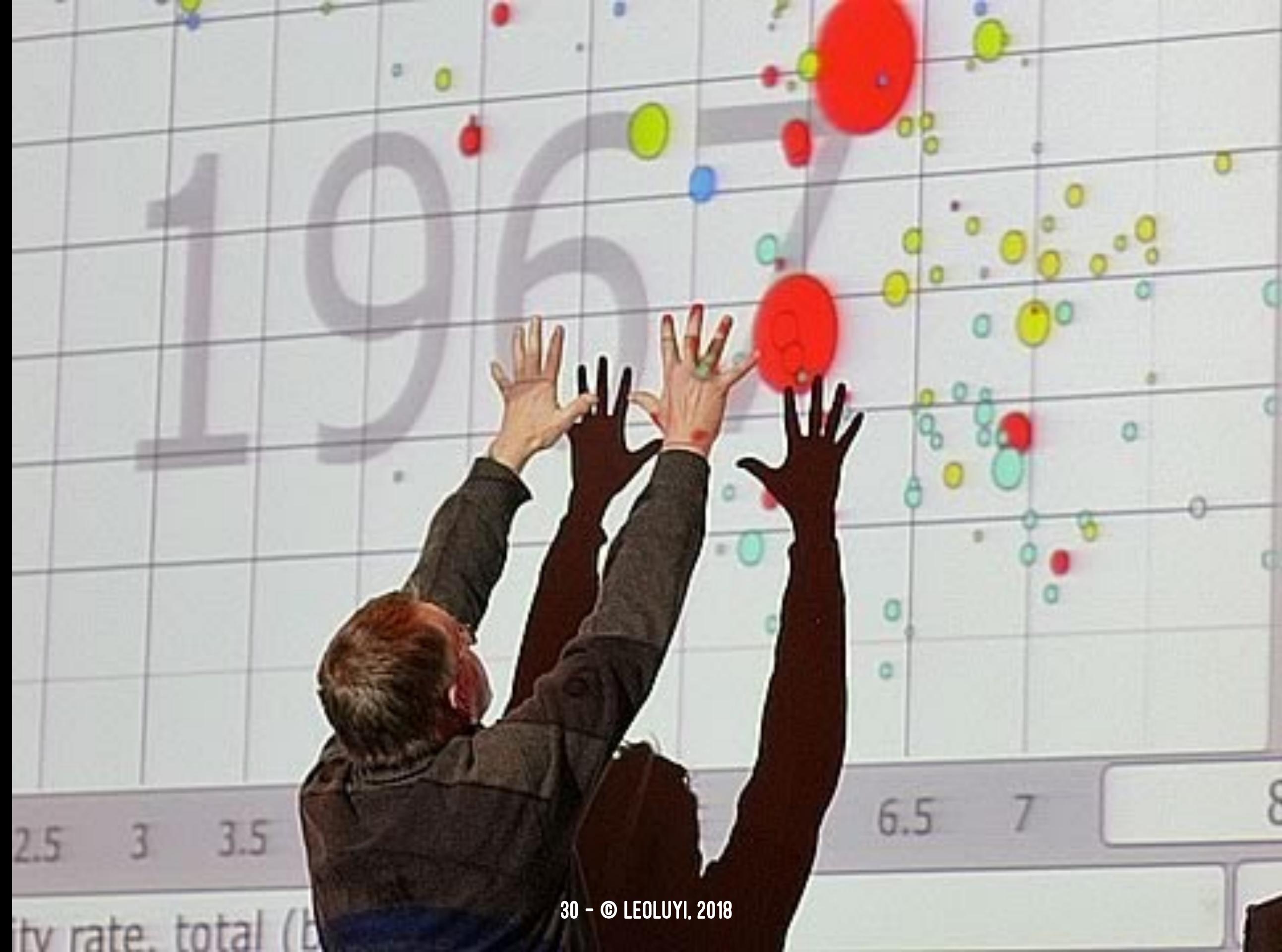
VISUALISE THE MODEL

VIZ IS FUNDAMENTALLY A HUMAN
ACTIVITY.

MODEL + VIZ == GOOD BUSINESS

- > WE CANNOT SCALE GOOD VIZ
- > BUT MODELING CAN!

把你(複雜的)想法塞到別人腦中



A scenic view of a mountain range under a clear blue sky. In the foreground, there are green hills with some brownish vegetation. In the background, there are more mountains, creating a layered effect.

LIVE DEMO AGAIN

SUMMARY

SUMMARY

- › FROM DATA. TO MODEL. TO VIZ

SUMMARY

- › FROM DATA, TO MODEL, TO VIZ
- › LEARN A VIZ LANGUAGE WITH ITS TOOLS

SUMMARY

- › FROM DATA, TO MODEL, TO VIZ
- › LEARN A VIZ LANGUAGE WITH ITS TOOLS
 - › PLAY WITH YOUR DATA