Visual Analytics

Communicating data-driven insights through data visualization techniques and useful dashboards

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0. Introduction

0.1 Key points

- **Data driven**: as seen in Onieva's and Lorenzo's lectures
- **Insights**: que usen las características gráficas
- **Data visualization techniques**: para obtener las los insights
- **Dashboards**: as *situattion awareness* tools

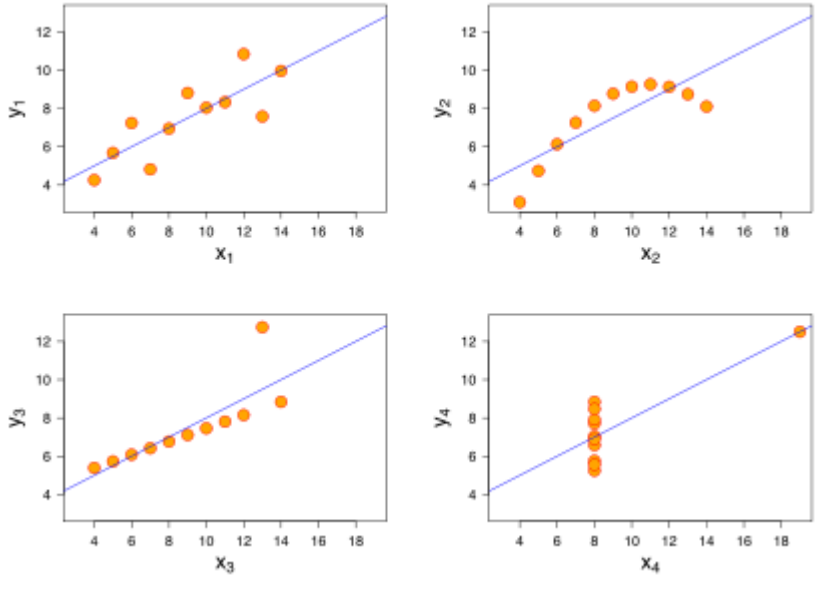
Tableau Desktop para prácticar

0.2 Why use visualizations

Anscombe's quartet

I		II		III		IV	
x	y	x	y	x	y	x	y
10.0	8.04	10.0	9.14	10.0	7.46	8.0	6.58
8.0	6.95	8.0	8.14	8.0	6.77	8.0	5.76
13.0	7.58	13.0	8.74	13.0	12.74	8.0	7.71
9.0	8.81	9.0	8.77	9.0	7.11	8.0	8.84
11.0	8.33	11.0	9.26	11.0	7.81	8.0	8.47
14.0	9.96	14.0	8.10	14.0	8.84	8.0	7.04
6.0	7.24	6.0	6.13	6.0	6.08	8.0	5.25
4.0	4.26	4.0	3.10	4.0	5.39	19.0	12.50
12.0	10.84	12.0	9.13	12.0	8.15	8.0	5.56
7.0	4.82	7.0	7.26	7.0	6.42	8.0	7.91
5.0	5.68	5.0	4.74	5.0	5.73	8.0	6.89

Property	Value	Accuracy
Mean of *x*	9	exact
Sample variance of *x*	11	exact
Mean of *y*	7.50	to 2 decimal places
Sample variance of *y*	4.125	plus/minus 0.003
Correlation between *x* and *y*	0.816	to 3 decimal places
Linear regression line	$y = 3.00 + 0.500x$	to 2 and 3 decimal places, respectively

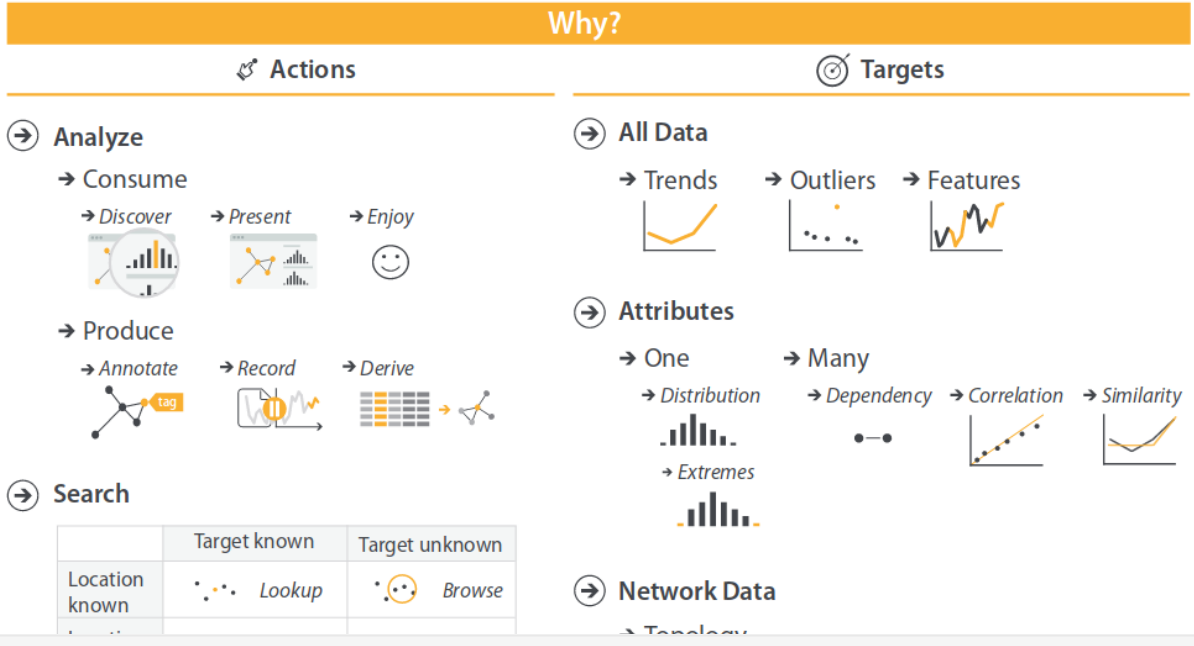


Anscombe's Quartet

Speaker notes

Baina honek ez du esan nahi teknika estatistikoak alde batera utzi behar direnik; batak besteari lagundu behar diote (estatistika tradizionalak bisualizazioari eta alderantziz)

0.2 Why use visualizations



Speaker notes

Honek erantzungo lioke “insights” parteari:

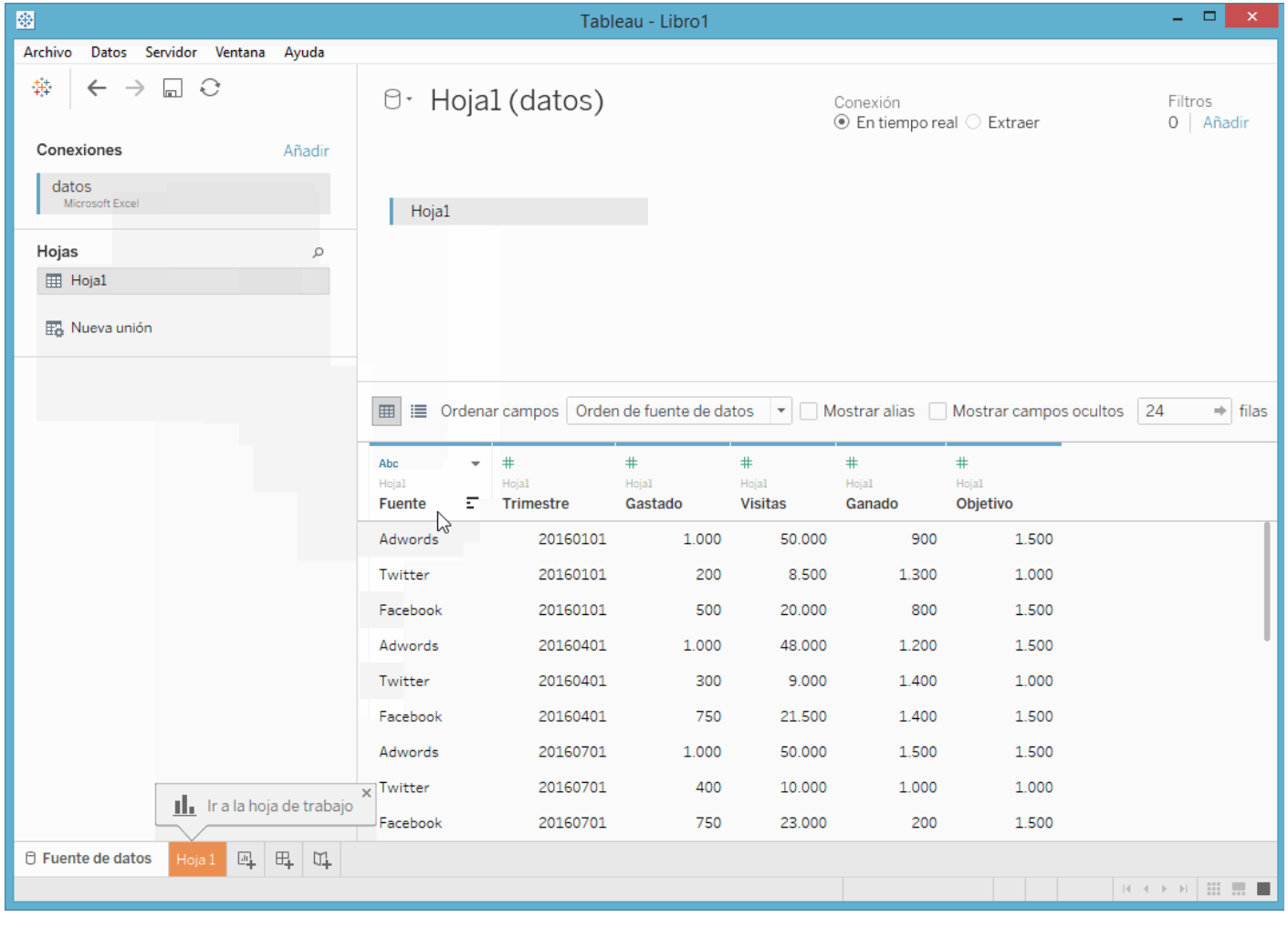
- *Targets* lehenbizi (benetako insighten oinarriak)
- Ondoren *actions*
  - Search (ze target eta non)
  - Query (identifikatu target, baldin eta badago)
  - Azkenik analyze, komunikatu eta datu/modelo berriak sortu

Tableau

(oinarrizko ezaugarriak) `data.xls`

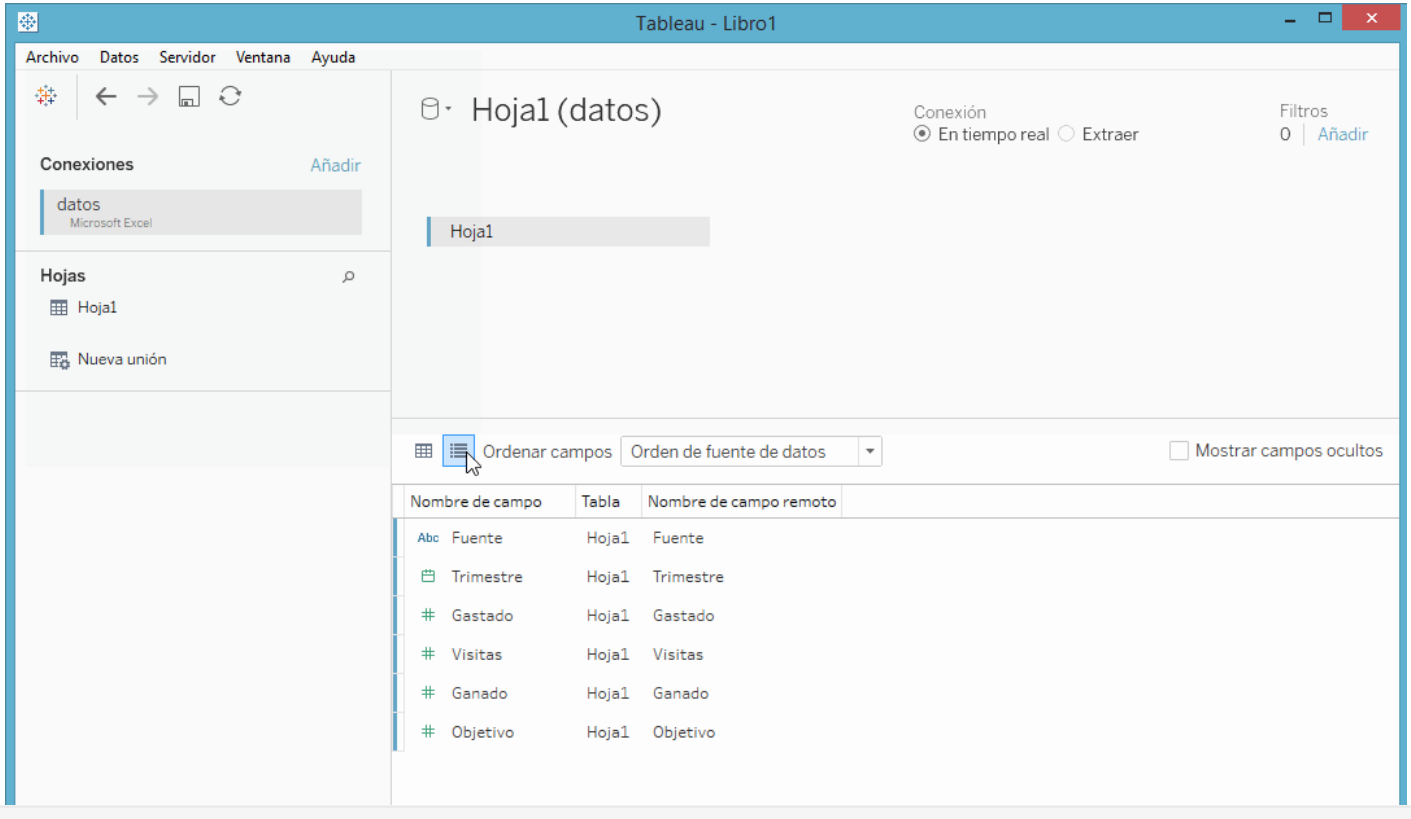
Fake data for online marketing tools and Goals

Tableau 0.1



Load data

Tableau 0.2



Speaker notes

- datuak tableaura kargatu
- “data” bistan bariableak pixkat aztertu
  - sinbolotxoa eta kolorea, tableauk datua nola interpretatu duen jakiteko
  - ze bariable dauden, gero hortik datu kalkulatuak ateratzeko, adibidez irabazitakoa / gastatutakoa oinarrizko KPI modura

1. Graphics

1.1 Reminder: variable types

- Quantitative
  - Discrete
  - Continuous
- Qualitative
  - Ordinal
  - Nominal

1.1 Reminder: variable types
A question of time

Spatial and time/hour variables are special variable types.
Time variables are specially complex:

- are there 365 days in every year? 30 days in every month? 24 hours in every day?
- *timezones* make it even more complex to use hours or time of day

1.1 Reminder: variable types
A question of time

Time may be used as a continuous or as a qualitative variable.

- as a qualitative variable, it has a hierarchy: year > month > (week >) day > hour > minute
- but different hierarchies may be necessary: bimonthly publications, multiple work shifts in a day…

1.2 Mapping variables to graphics

Qualitative **Nominal**	Qualitative **Ordinal**	Quantitative **Interval, Ratio**
Position	Position	Position
Colour (Hue)	Pattern (Density)	Size (Length)
Pattern (Texture)	Colour (Lightness)	Angle/Slope
Connection/Edge	Colour (Hue)	Size (Area)
Containment	Pattern (Texture)	Size (Volume)
Pattern (Density)	Connection/Edge	Pattern (Density)
Colour (Lightness)	Containment	Colour (Lightness)
Symbol/Shape	Size (Length)	Colour (Hue)
Size (Length)	Angle/Slope	Pattern (Texture)
Angle/Slope	Size (Area)	Connection/Edge
Size (Area)	Size (Volume)	Containment
Size (Volume)	Symbol/Shape	Symbol/Shape

Speaker notes

Grafikoagoa egitea komeniko litzateke

1.3 Graphs typology

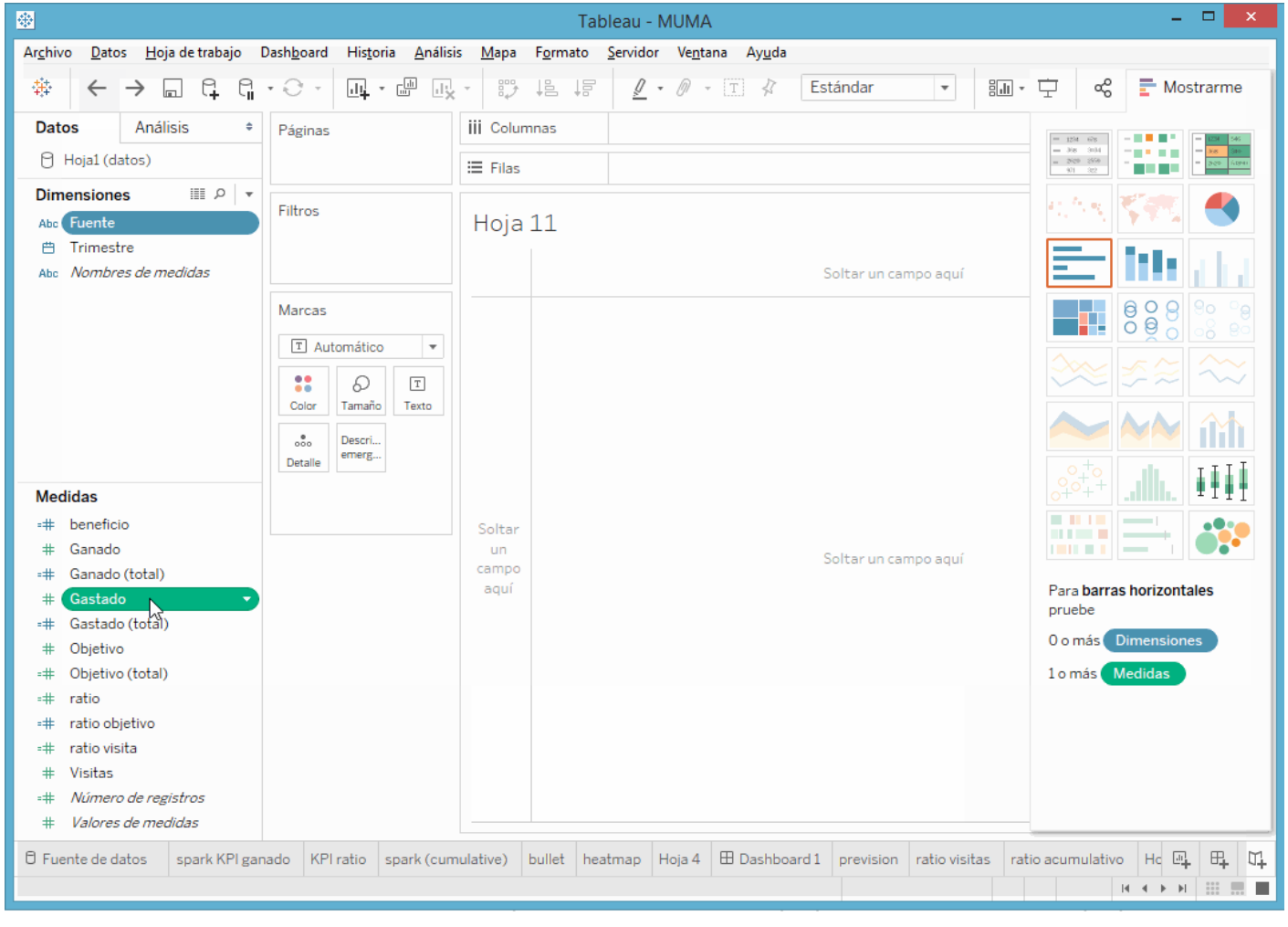
Variable types and insights (Munzner's "targets") as *ingredients*

The Data Visualisation Catalogue

Speaker notes

Si eso Kirken taula sartu, baina taula sortzeko kodea nahiko liosoa da

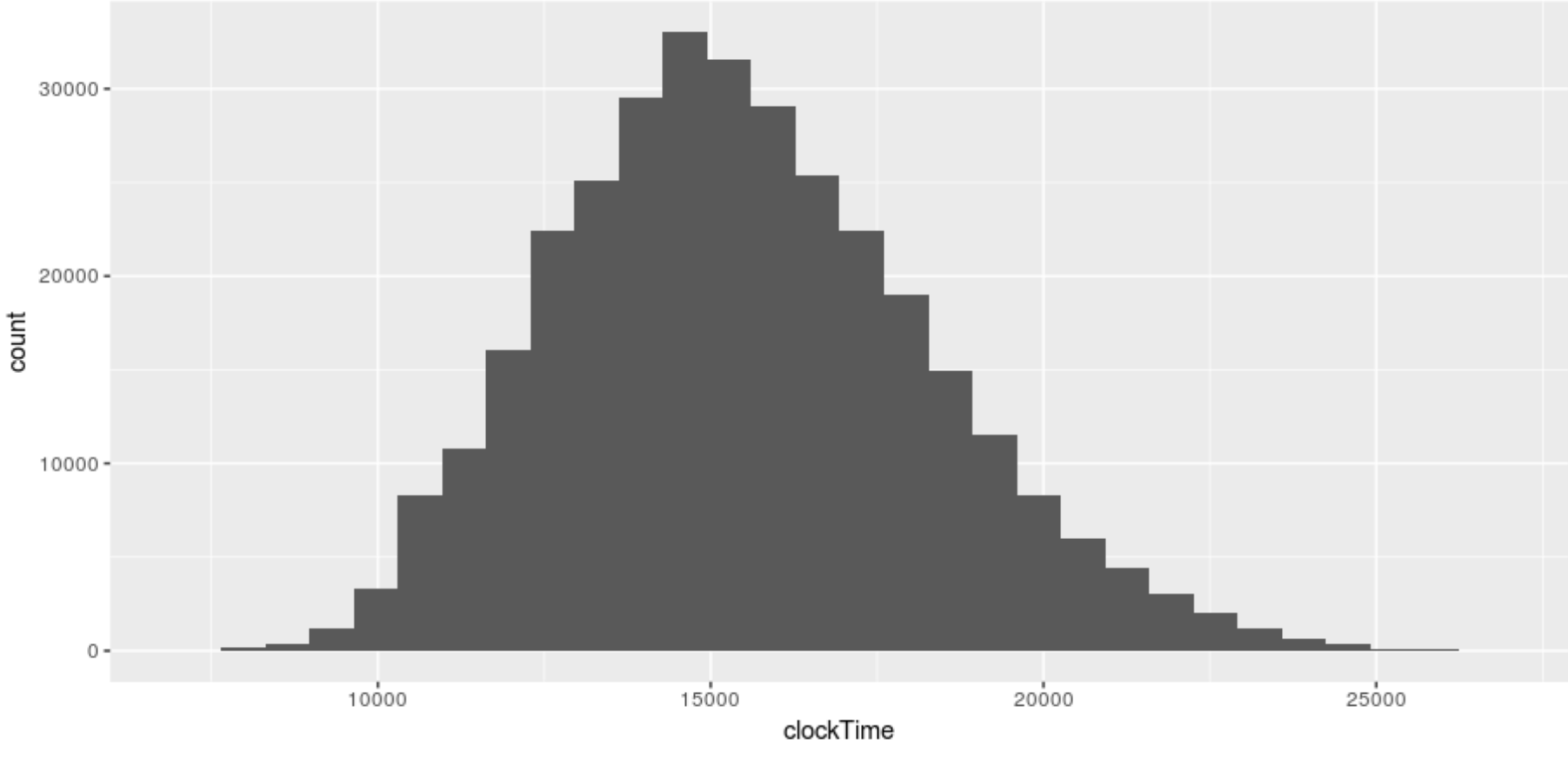
Tableau: Show me



Show me

2. Provide easier analysis

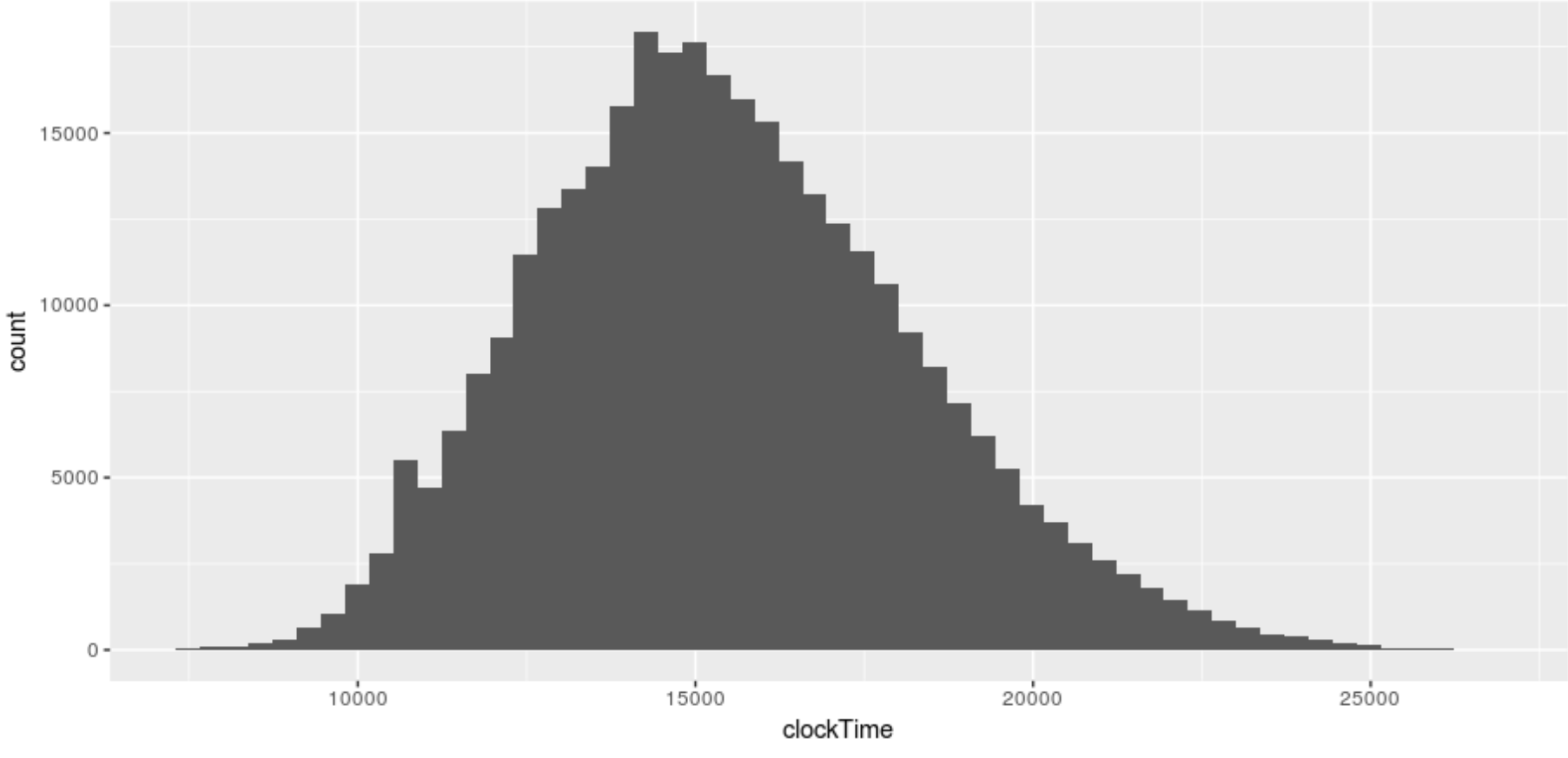
2.1 Change default settings



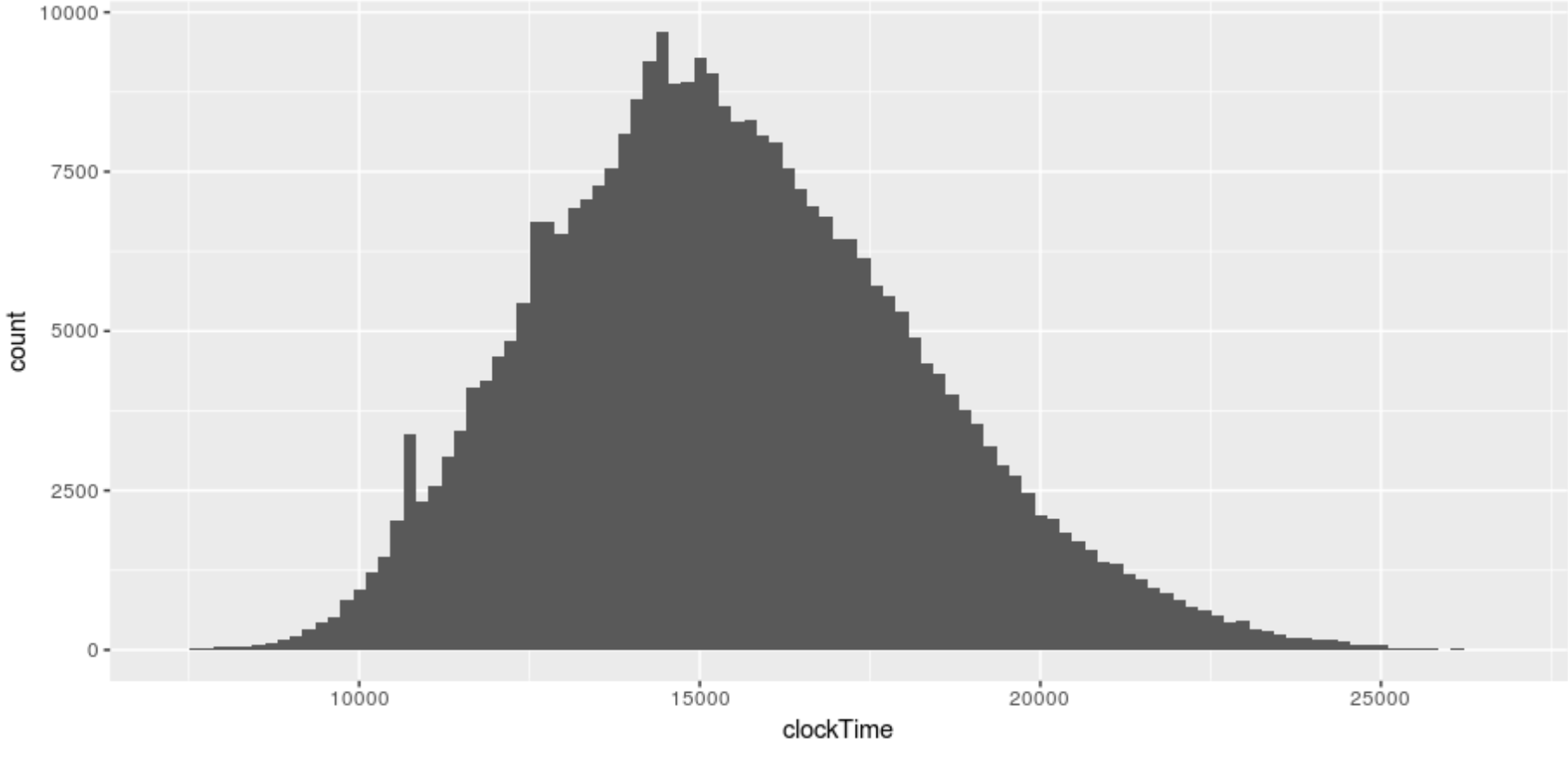
Speaker notes

Data: Berlin Marathon

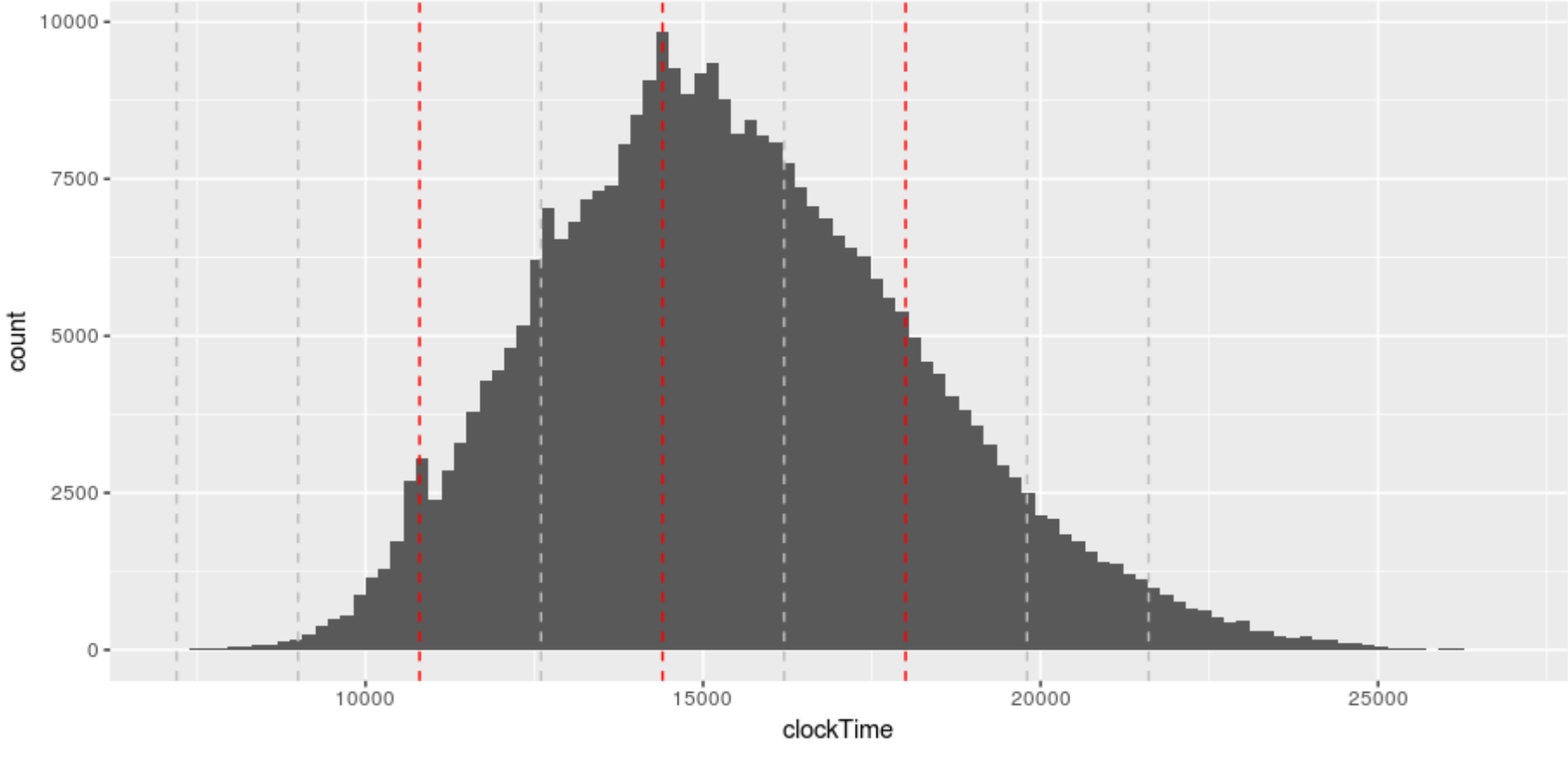
2.1 Change default settings



2.1 Change default settings



2.1 Change default settings



2.2 Make simpler graphs

> *Data-ink is the non-erasable core of the graphic, the non-redundant ink arranged in response to variation in the numbers represented. (Tufte 1983)*

2.2 Make simpler graphs

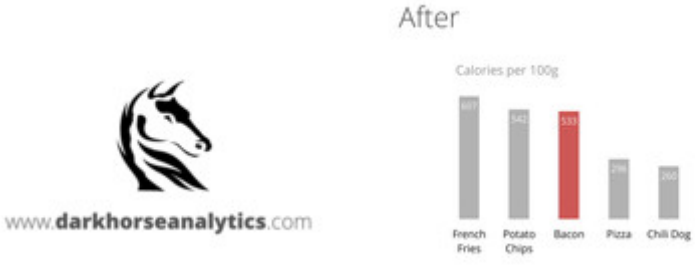
A step-by-step example: Data looks better naked

Speaker Deck

Talk by Joey Cherdarchuk

Full Screen

Previous Slide Next Slide
Previous Next
share

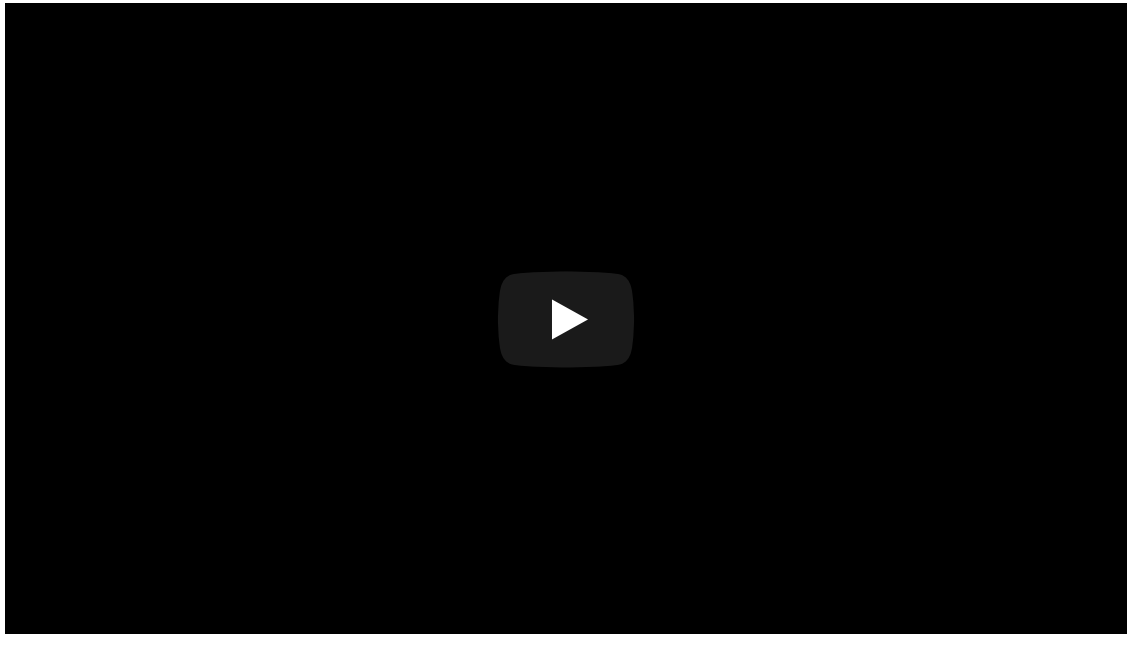


Speaker notes

Embedeatzea zaila izan da eta diapoak pasatzerakoan izan daiteke efekto arraroren bat egitea

2.2 Make simpler graphs

(denborakin ikusteko)



Nussbaumer, Declutter Your Data Visualizations

2.3 Highlight observations

Preattentive attributes

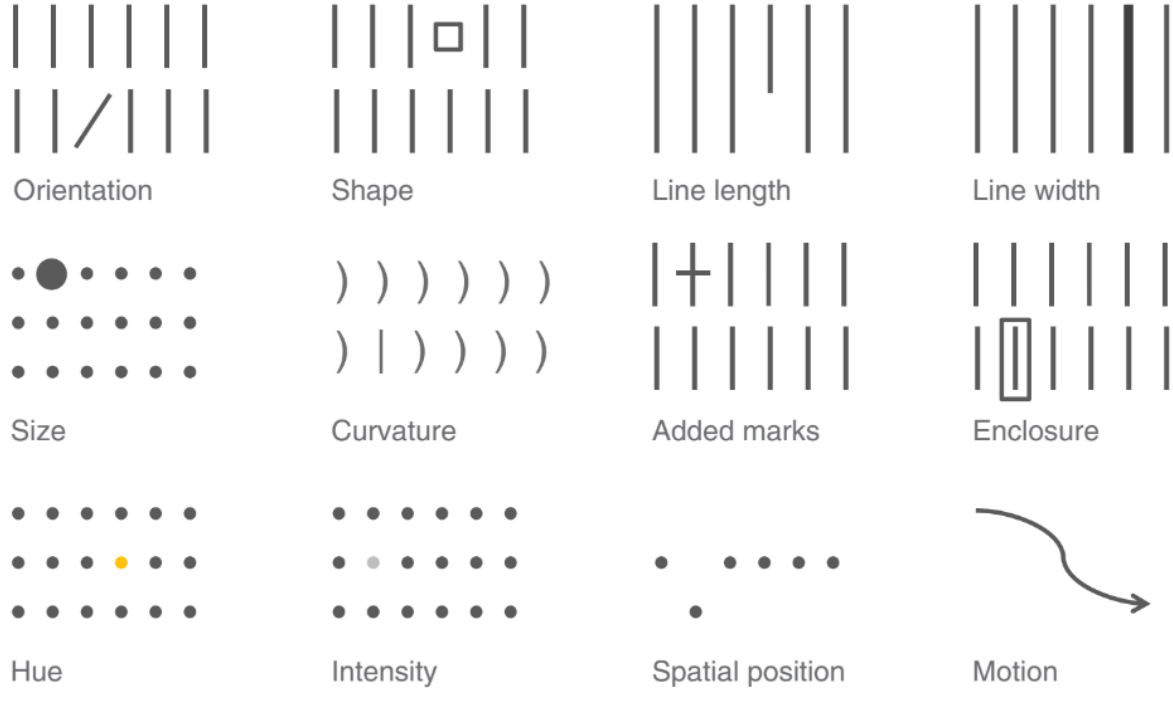


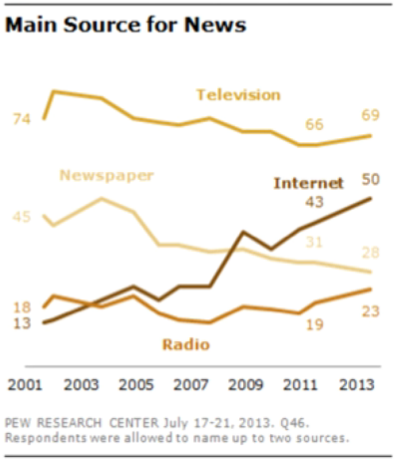
FIGURE 4.4 Preattentive attributes

Source: Adapted from Stephen Few's *Show Me the Numbers*, 2004.

Nussbaumber 2015, p.105

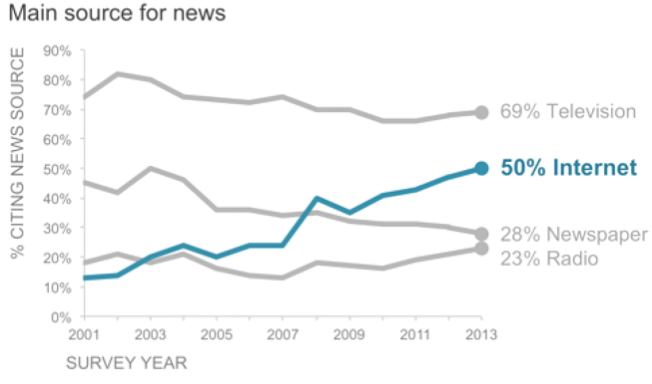
2.3 Highlight observations

1. More Americans get news online... 50% of the public now cites source for national and international news, still below television, newspapers and radio. (Report)



More Americans get news online

50% of the public cite the **internet** as a main source for national & international news. This remains below television, but is far above newspapers and radio.



Source: http://www.pewresearch.org/fact-tank/2013/10/16/12-trends-shaping-digital-news/

storytelling with data

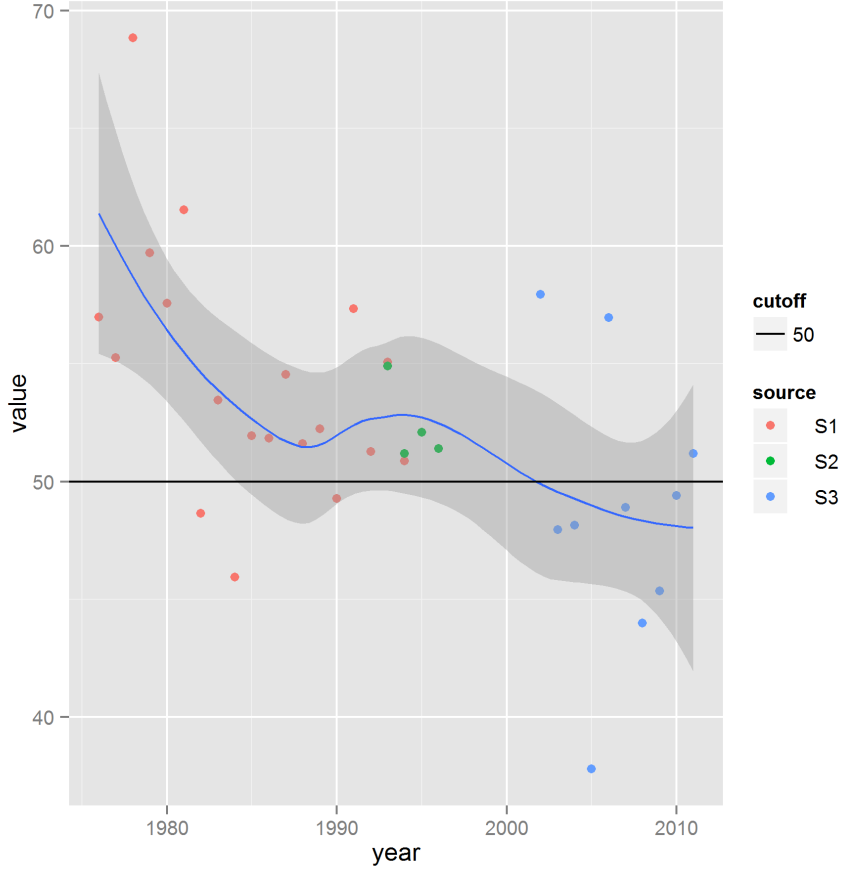
Nussbaumber, Do you see it? The importance of contrast when communicating with data [video]

2.4 Add variables (as context)

- Adding preexisting variables (con **mesura**)
- Creating conditional variables from preexisting variables
  - binaries or with few levels are best
  - example of calculated field or variable: weekend date

2.5 Add statistical information

- statistical summaries
- models

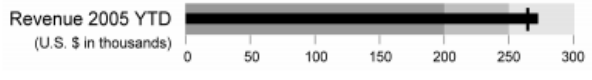


source

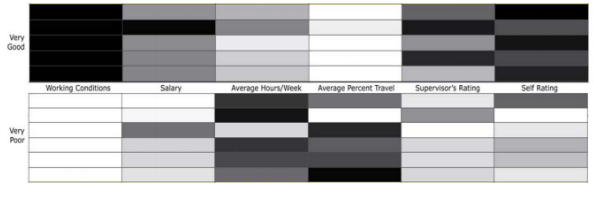
Tableau: (not so) basic graphs

- Sparklines (Tufte 2006)

- Bulletgraphs (Few 2007)



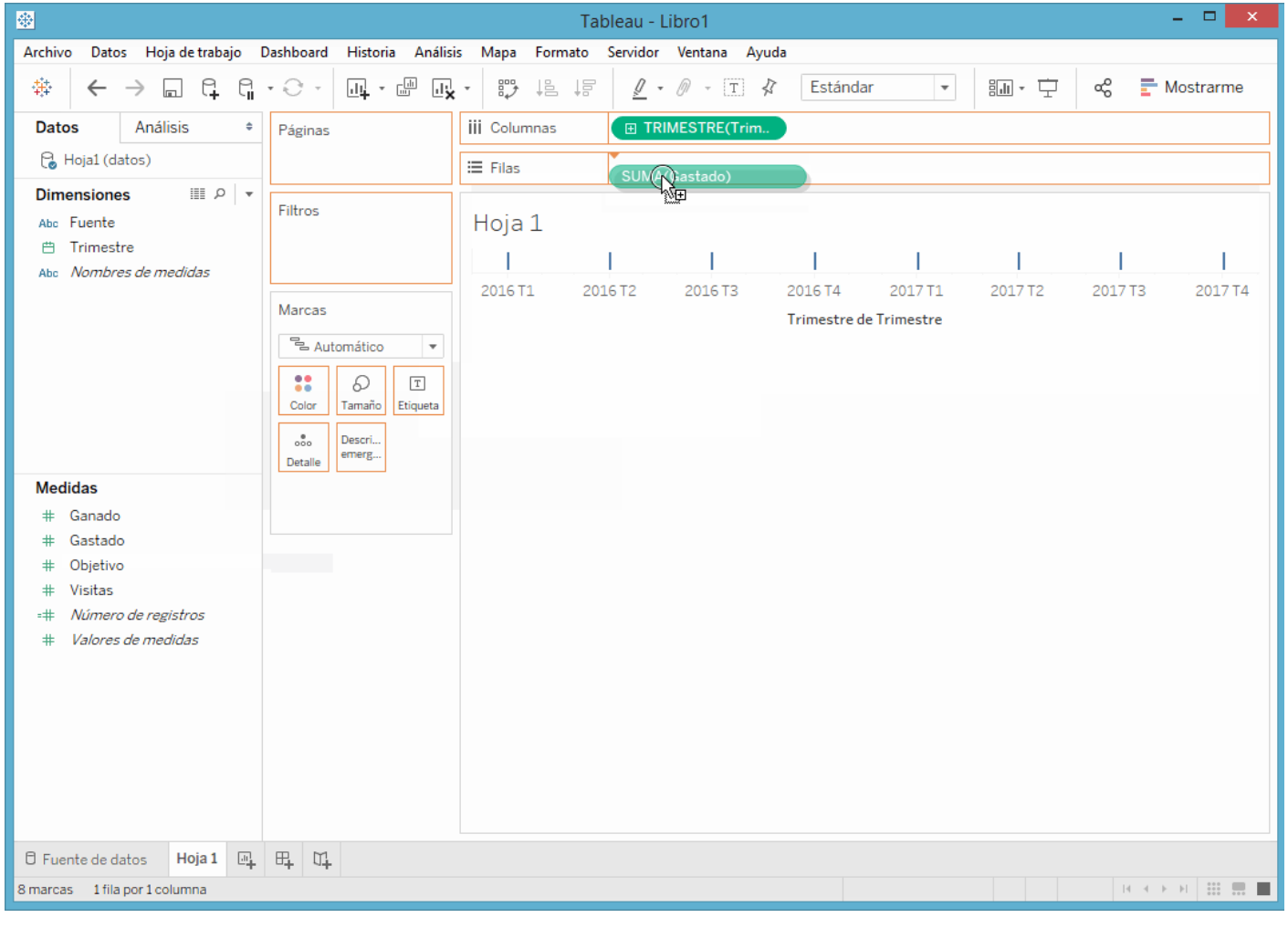
- Heatmaps (Few 2006)



Speaker notes

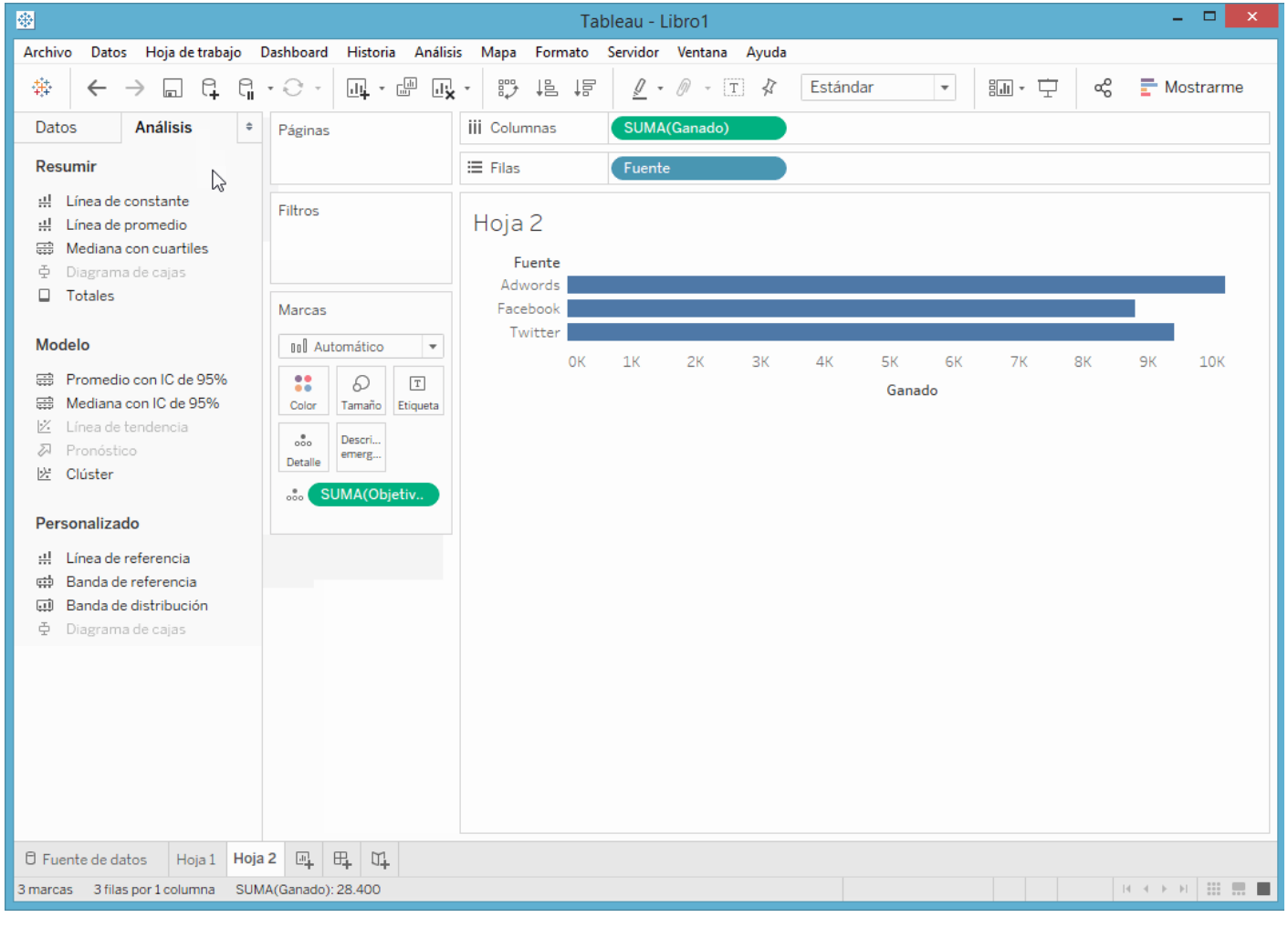
Nahi badezu bat azaldu eta ondoren tableaun egin, ala hiruak azaldu ta gero hiruak tableaun egin

Tableau 1.1: Timelines



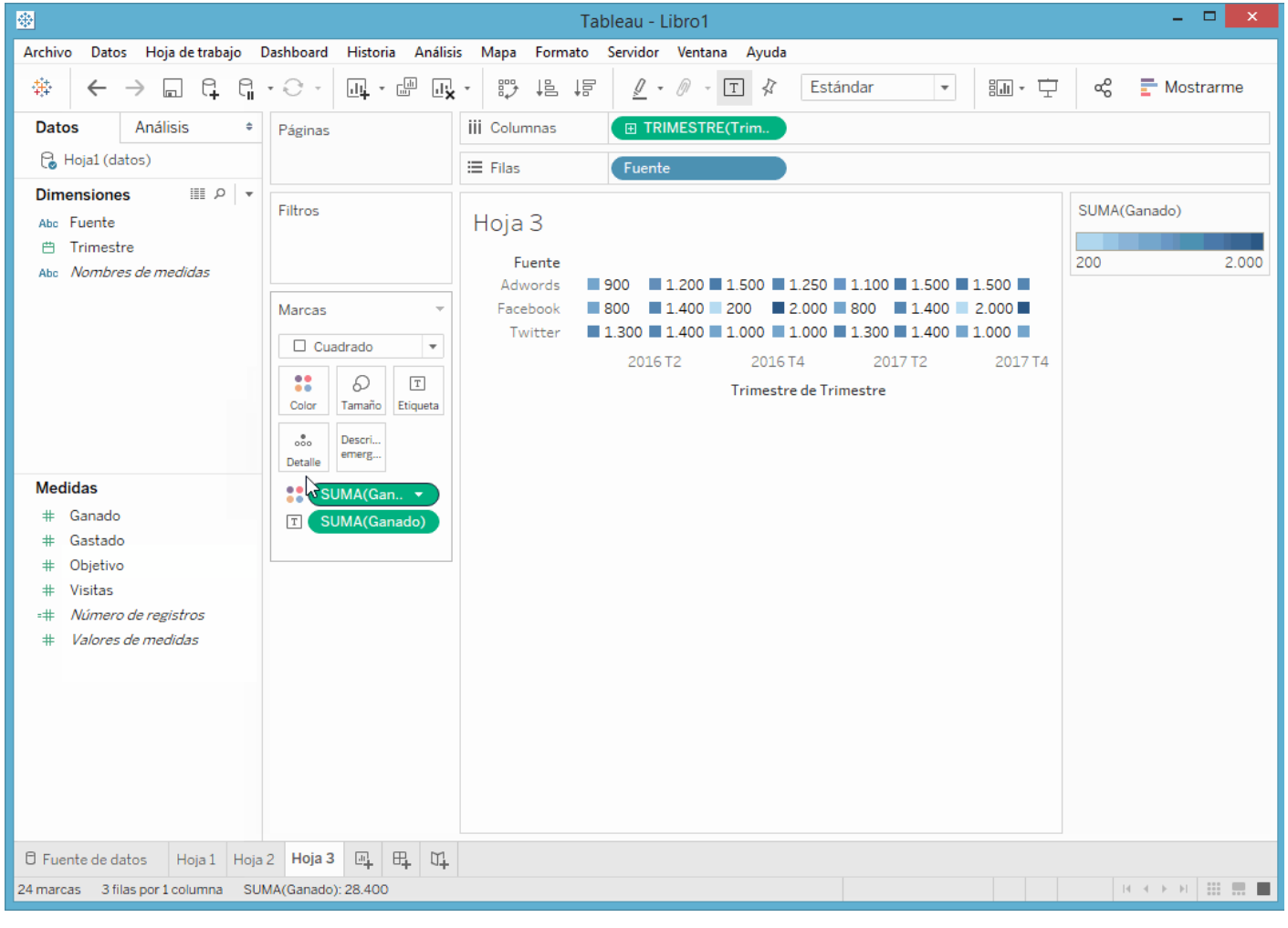
Timelines

Tableau 1.2: Bulletgraphs



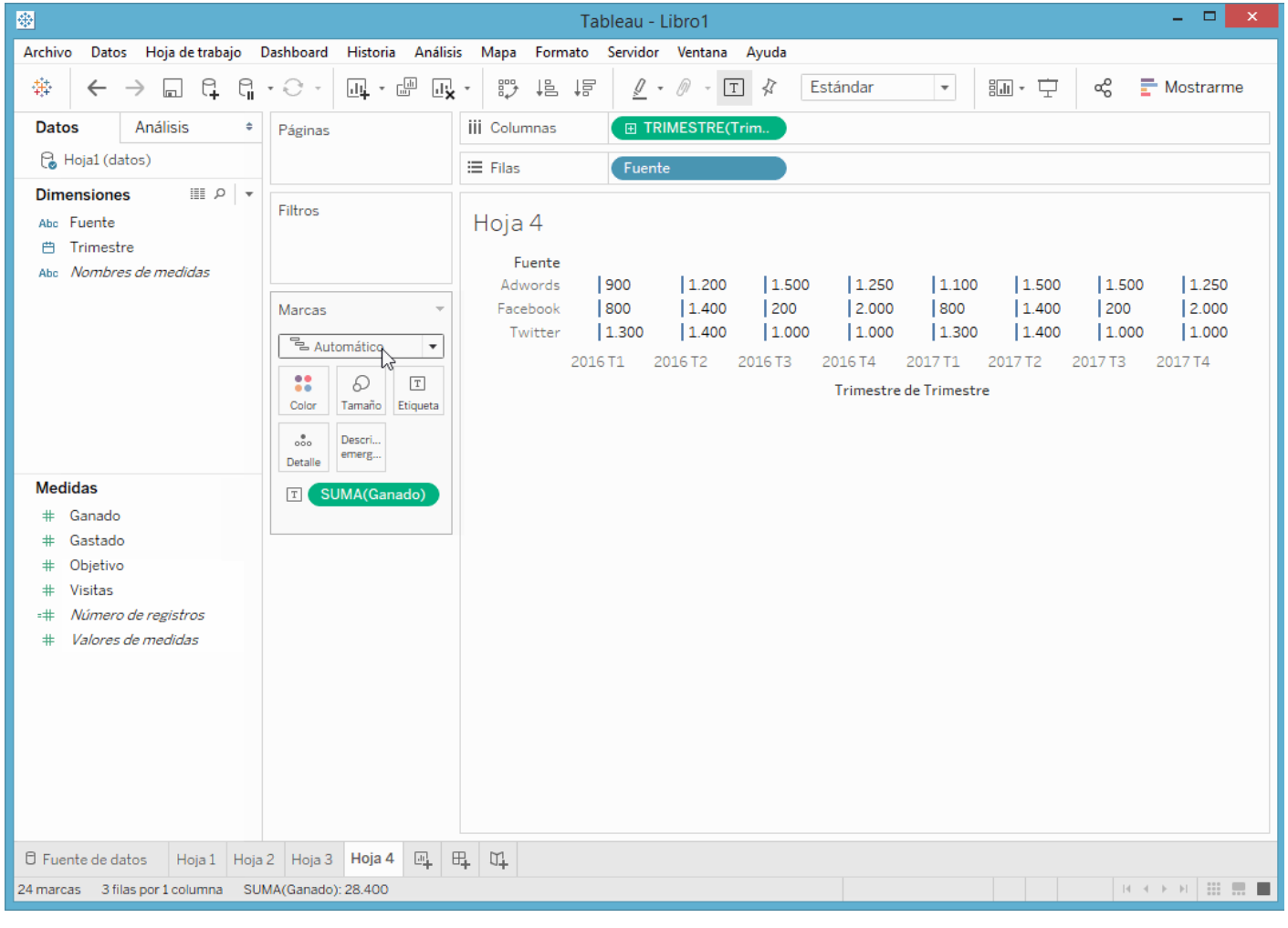
Bulletgraphs

Tableau 1.2: Heatmaps



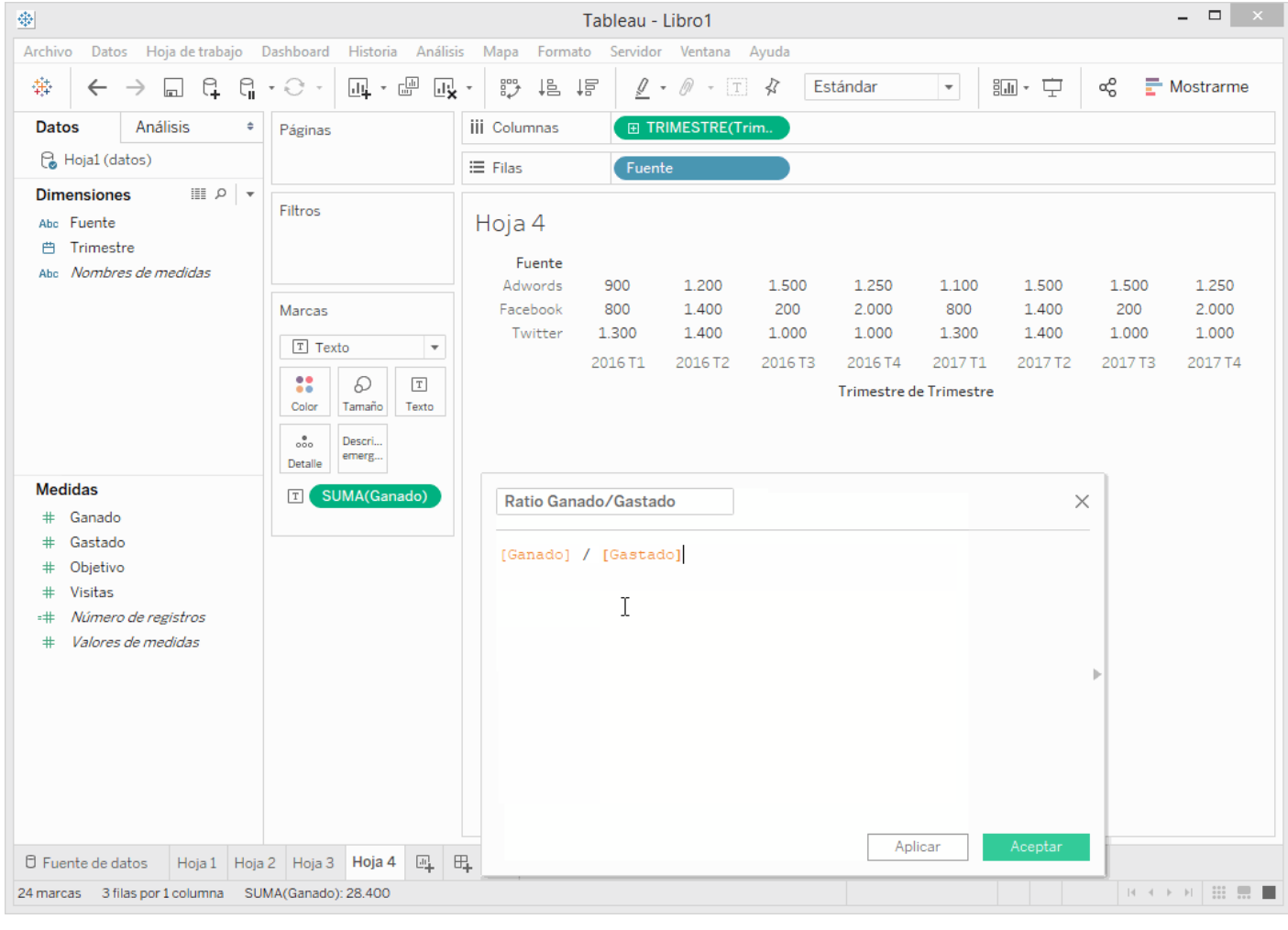
Heatmaps

Tableau 2.1: automatic aggregation



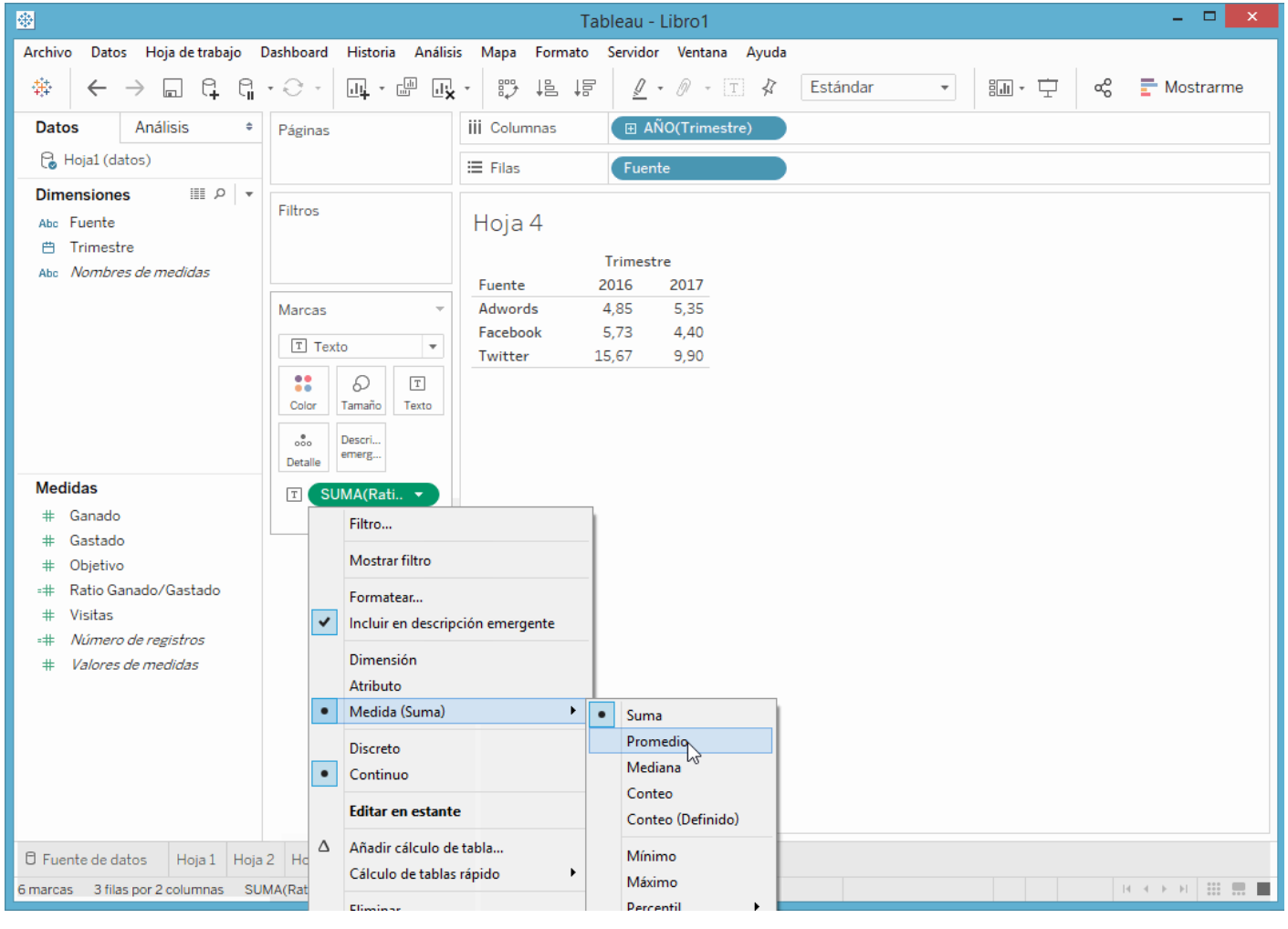
Automatic aggregation

Tableau 2.2: calculated fields



Calculated fields

Tableau 2.3: aggregation on calculated fields



Aggregation on calculated fields

Tableau 2.4: adding KPIs to timelines 1

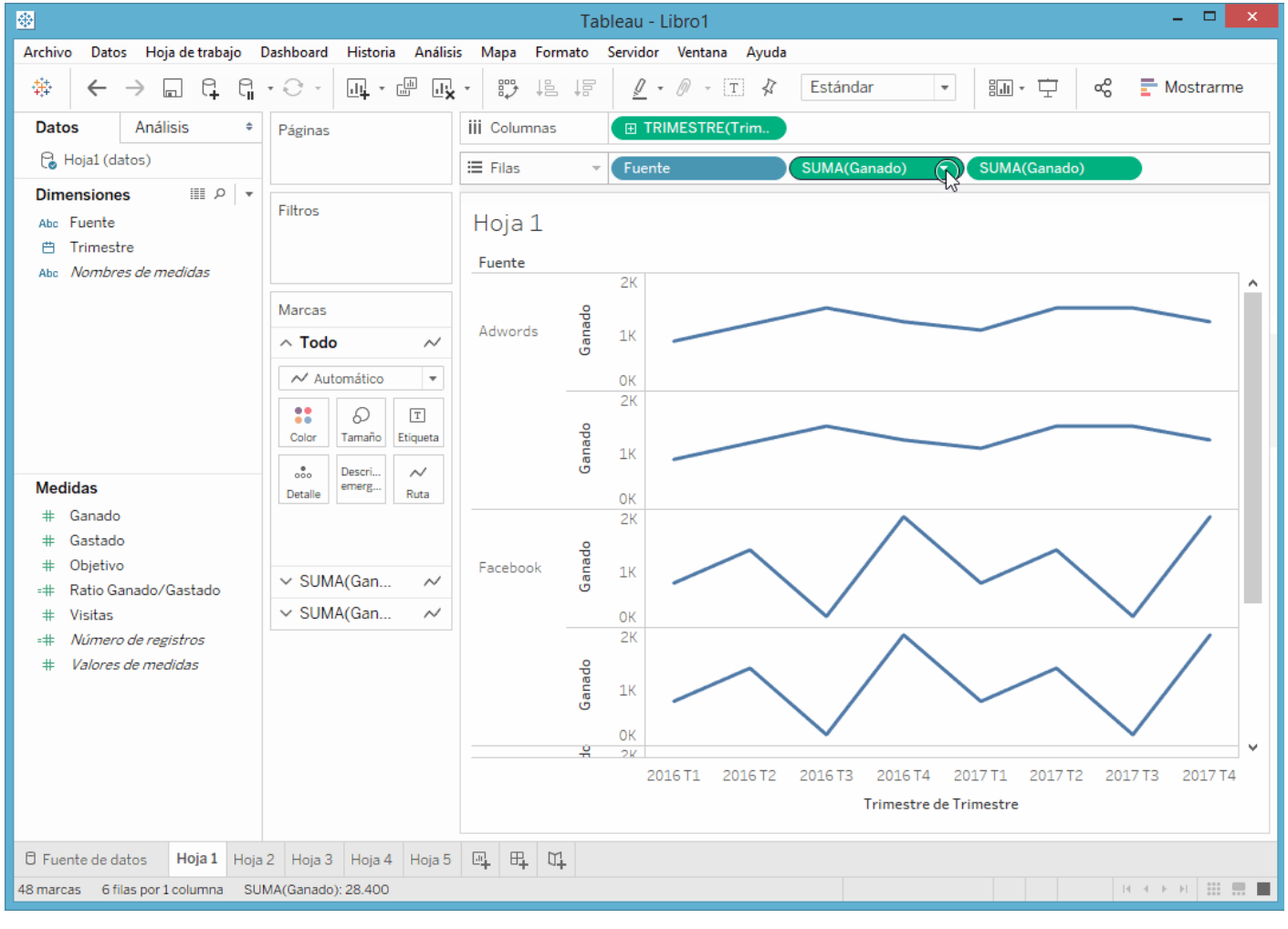
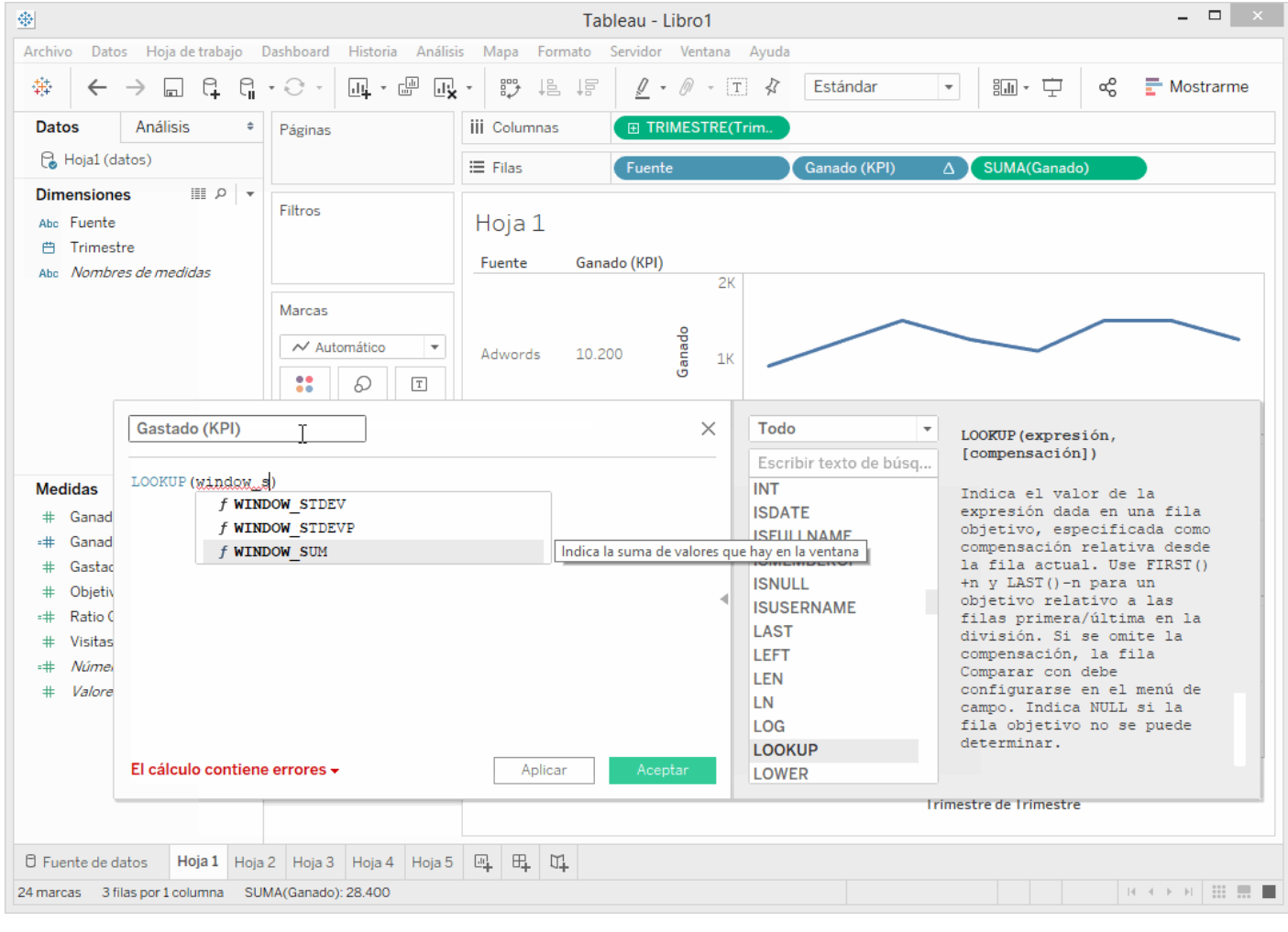


Tableau 2.5: adding KPIs to timelines 2



3. Dashboards

3.1 Dashboards for *situation awareness*

Few (liburua, laburpena 2007)

> *The term "dashboard" refers to a single screen information display that is used to monitor what's going on in some aspect of the business.*

- Perception of own's environment
- Comprehension of it's meaning
- Projection of that understanding into the future

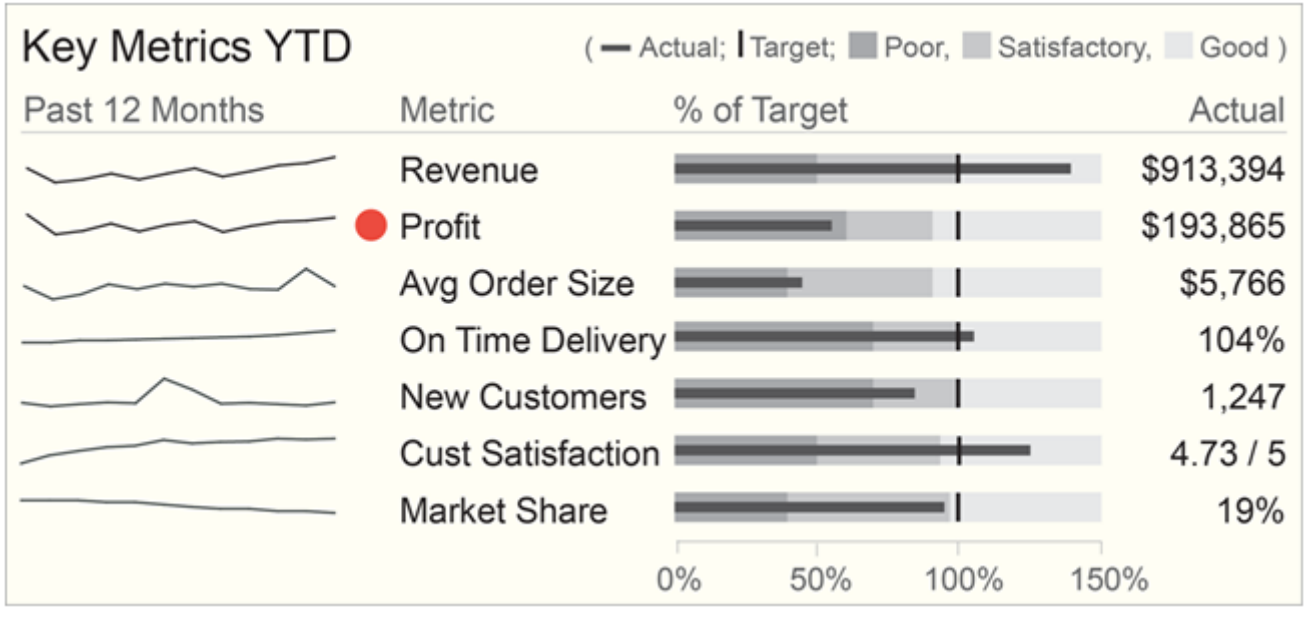
3.2 Do's : Principles you should follow

- Use flicker and sound to grab attention
- Encourage active thinking about the data, not just passive reaction to alarms
- Don't over-automate actions to the point where people become disengaged
- Provide smooth and simple means to respond
- Provide a common picture for the whole team
- Support projections for proactive responses
- Match the mental model

3.3 … and dont's: Design problems you should avoid

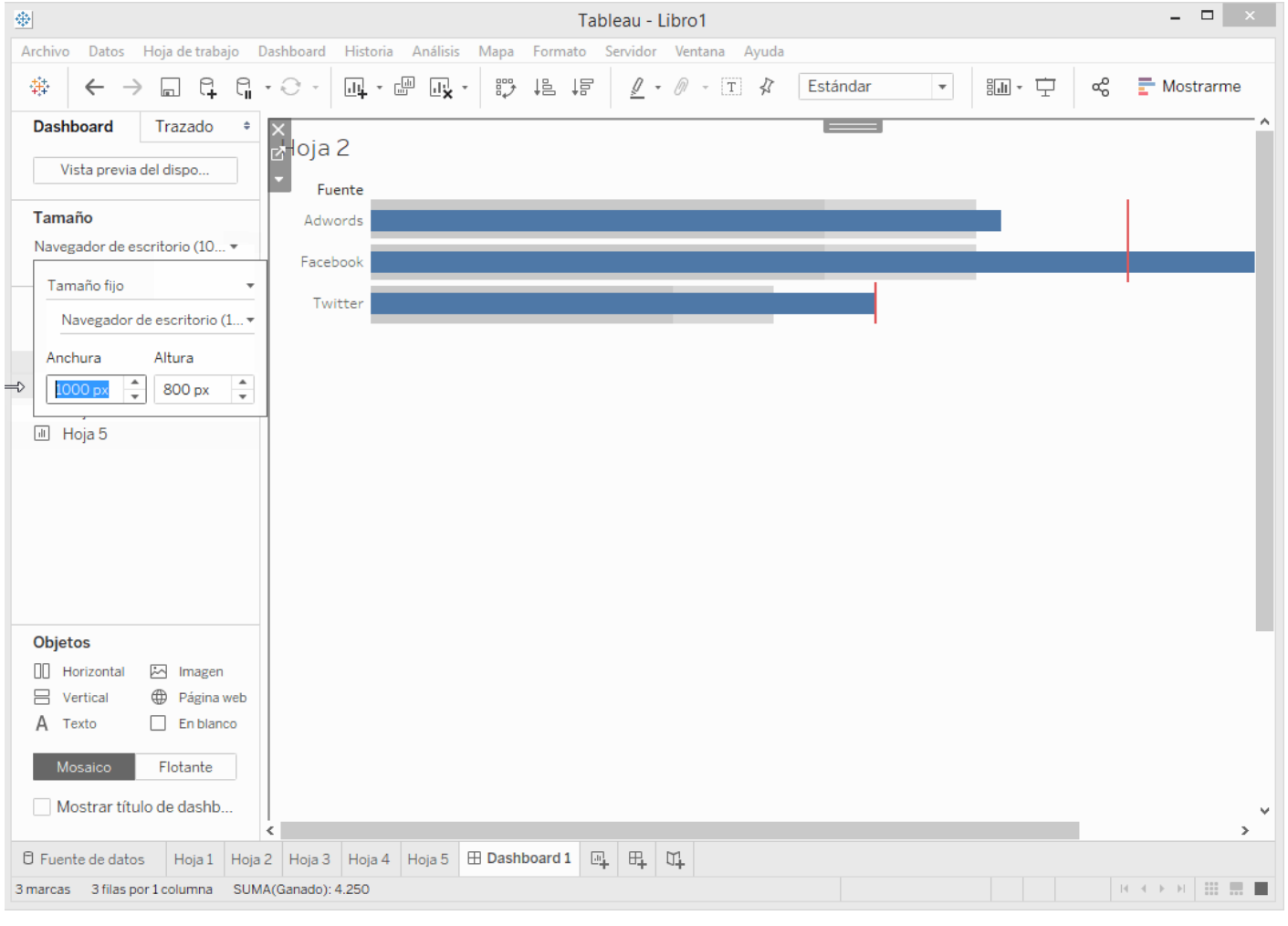
- Too much complexity
- Too many alert conditions
- Alerts that cannot be diff erentiated
- Overwhelming visuals
- Distracting visuals
- Inappropriate visual salience
- Mismatch between information and its visual representation
- Indirect expression of measures
- Not enough context

3.4 Few's few examples



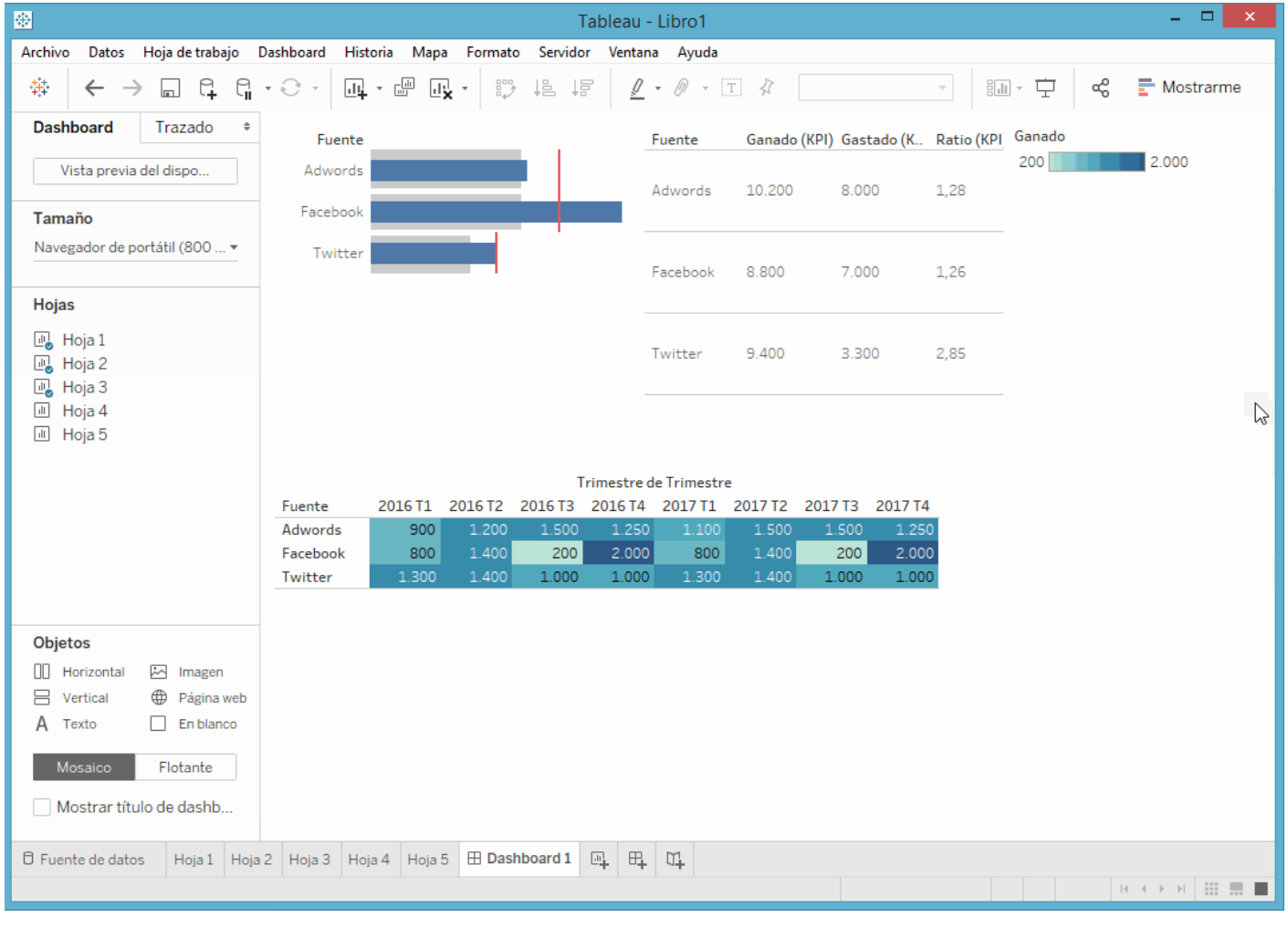
Dashboards in Tableau

Tableau 2.1: basic dashboard



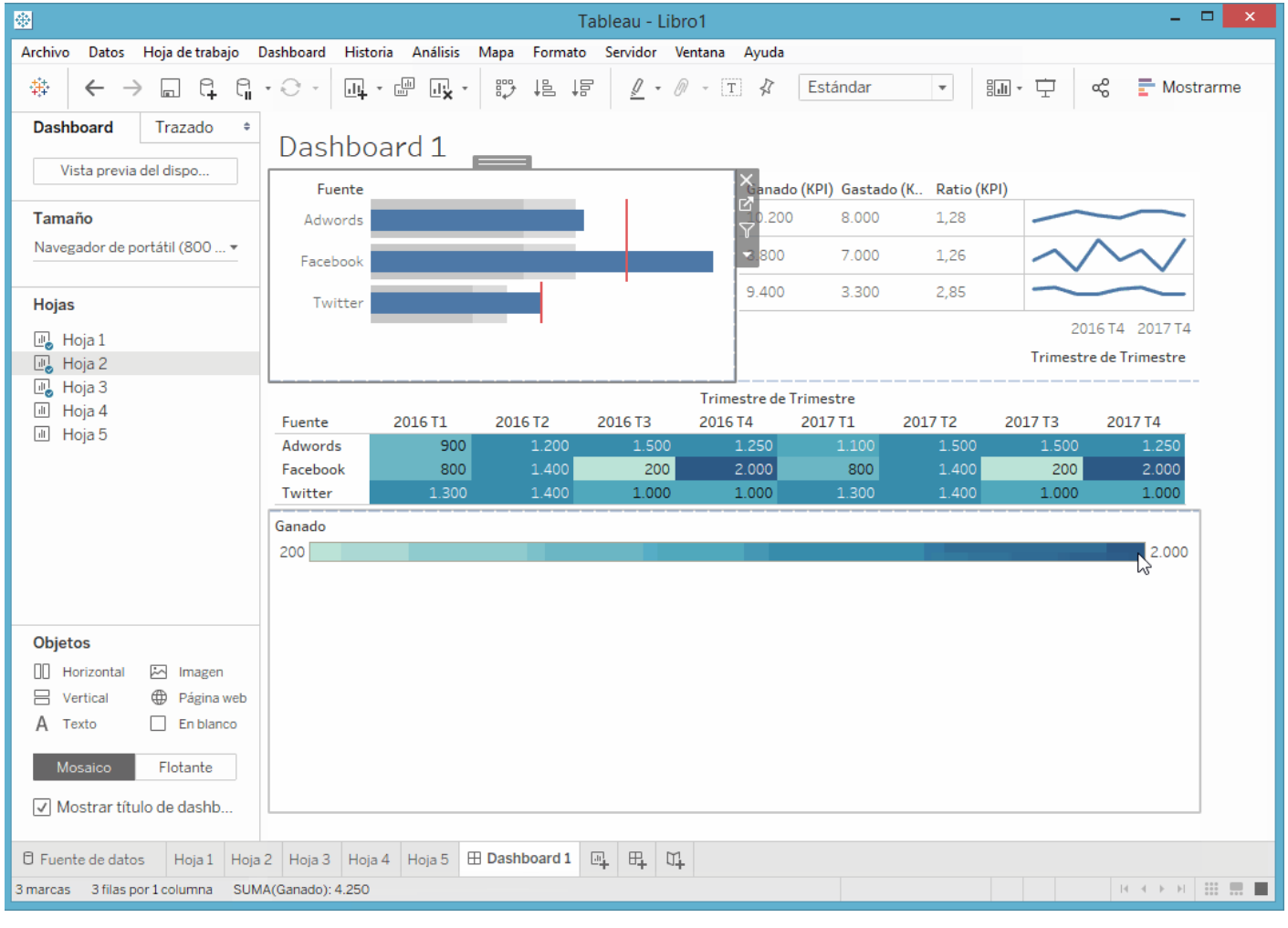
Basic dashboard

Tableau 2.2: basic formating



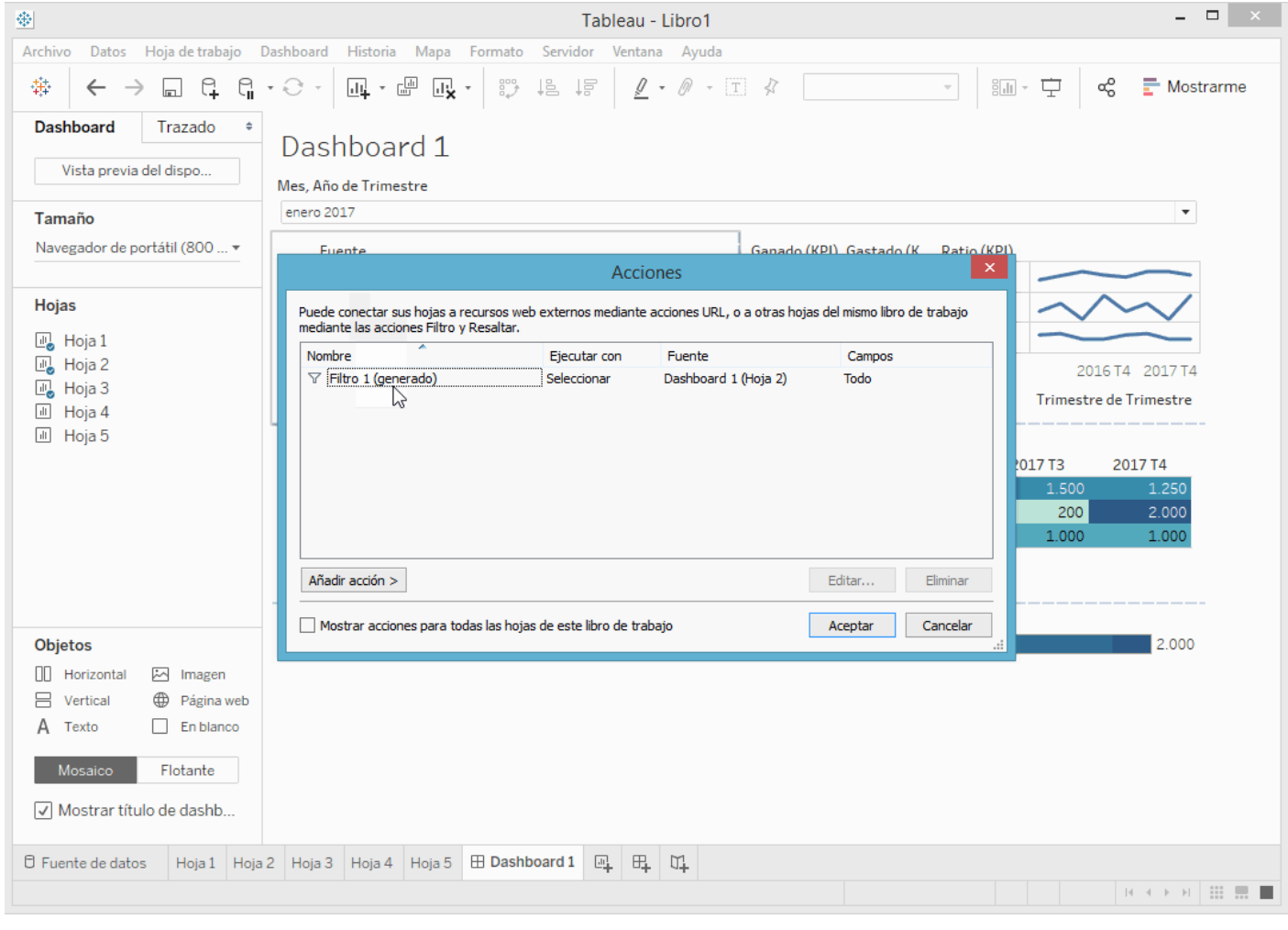
Basic formating

Tableau 2.3: show filters



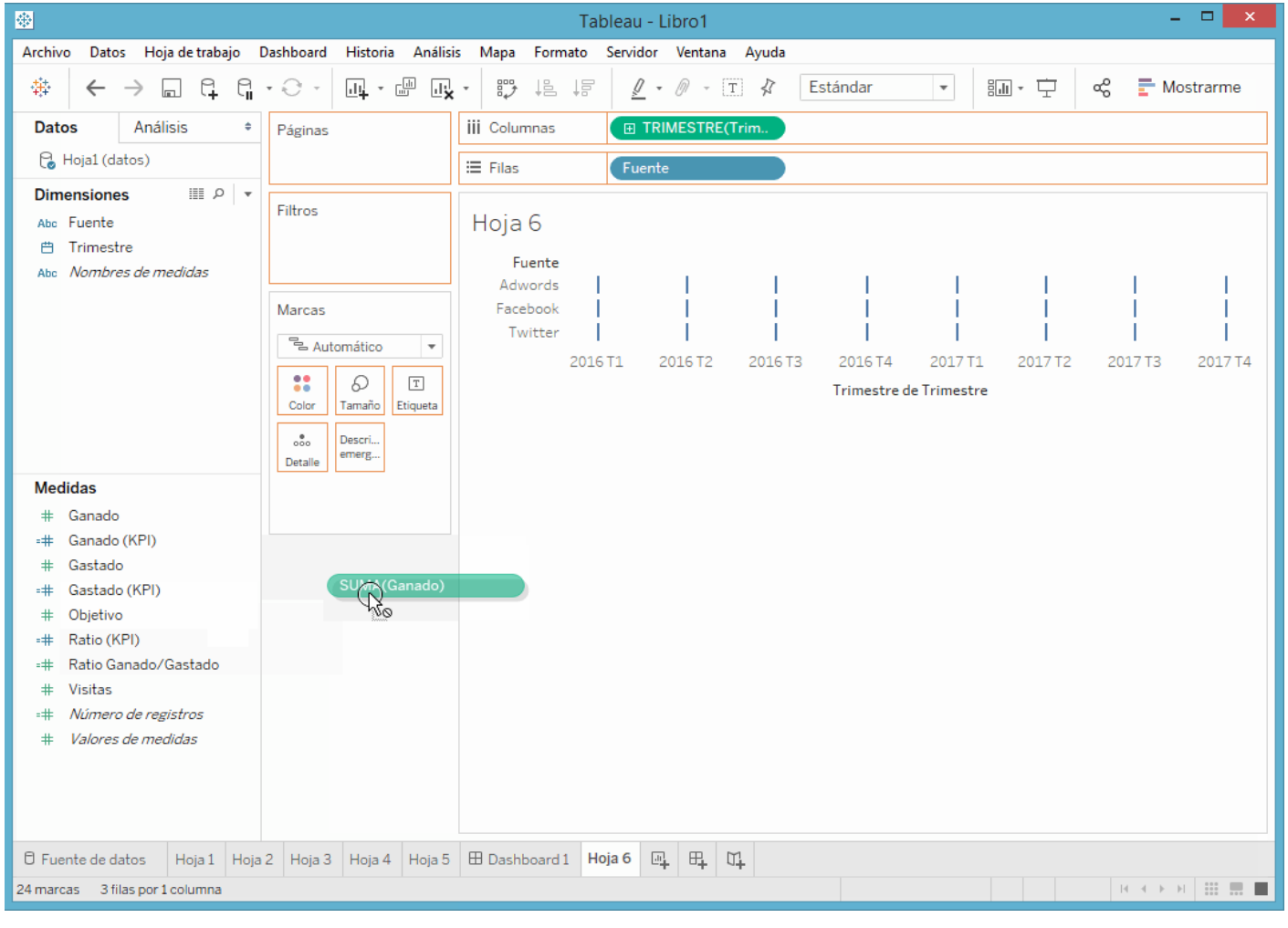
Show filters

Tableau 2.4: highlight action



Highlight action

Tableau 2.5: filter action



Filter action

References

Thank you!

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