

# IIC2026

# Visualización de Información

Alessio Bellino  
(2024 - 2 / Clase 07)

# Preguntas e ingredientes para una buena visualización

## Antes de comenzar

Excelencia grafica

# Sustancia, estadísticas y diseño

- **Definición del Punto Central:** La visualización debe tener un punto claro y bien definido que guíe la narrativa. Identificar este punto central es crucial para mantener la coherencia y el enfoque en la historia que se quiere contar.
- **Construcción de la Narrativa:** Desarrolla una historia que el espectador pueda seguir fácilmente. La historia detrás de los datos – estadísticas – debe dar sentido a la visualización, transformando gráficos en una narrativa envolvente que facilite la comprensión.
- **Impacto y Relevancia:** Asegúrate de que el diseño de la narrativa sea relevante para tu audiencia y que el mensaje principal sea claro. Una historia bien contada hace que los datos sean accesibles y memorables.

# Claridad, precisión y eficiencia

- **Claridad:** Comunica ideas complejas de forma fácil de entender. La visualización debe ser intuitiva y evitar ambigüedades, proporcionando una experiencia satisfactoria al usuario.
- **Precisión:** Asegura que la información se presenta de manera exacta. Cada elemento gráfico debe tener un propósito claro y representar los datos correctamente para reforzar el mensaje.
- **Eficiencia:** Maximiza la cantidad de información transmitida con el menor desperdicio de tinta y espacio. Basado en el "ink ratio" de Tufte, utiliza la tinta de manera efectiva para mostrar datos significativos, optimizando la comunicación.

# Sobre la Eficiencia

Mayor número  
de ideas posible

*En el menor tiempo posible*

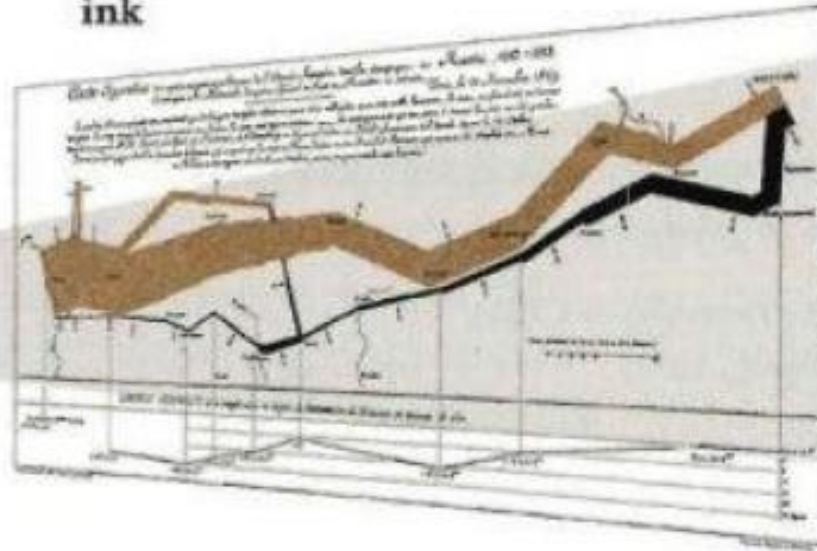
ideas

time

*Usando meno  
tinta possibile*

*En el menor  
espacio  
posible*

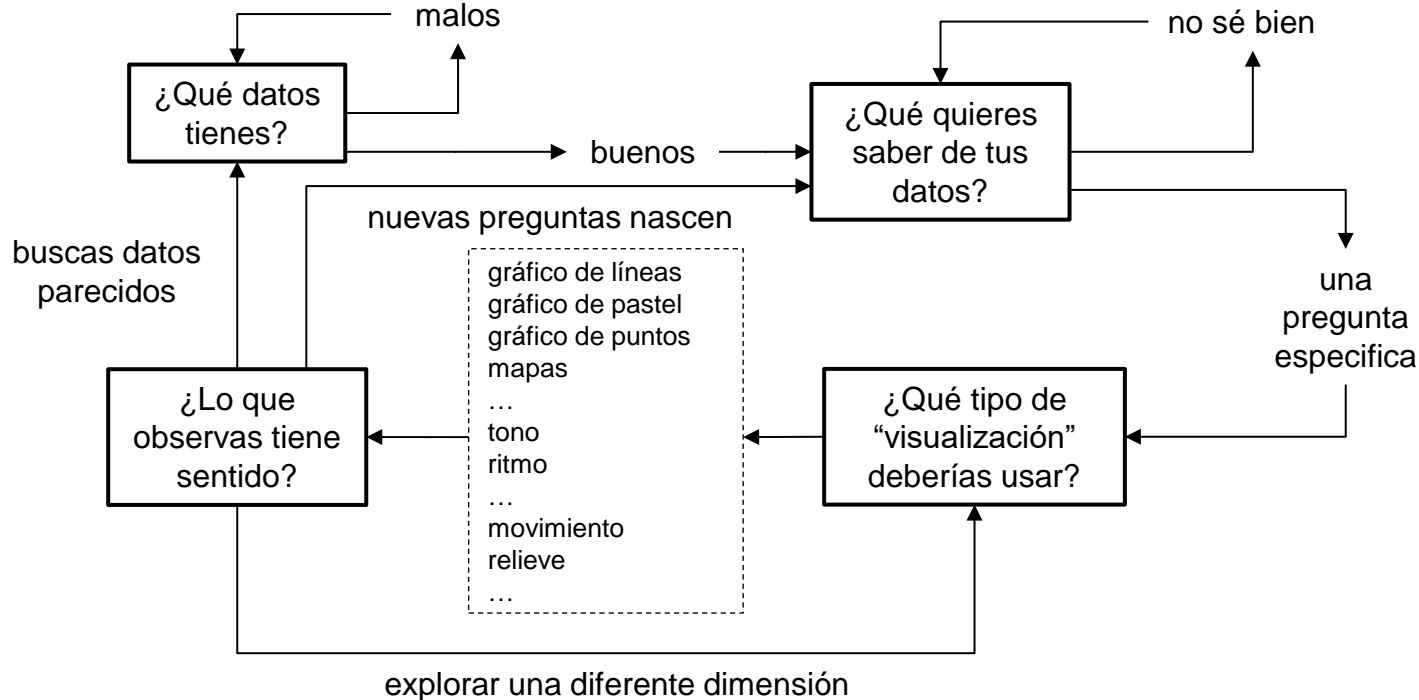
**space**



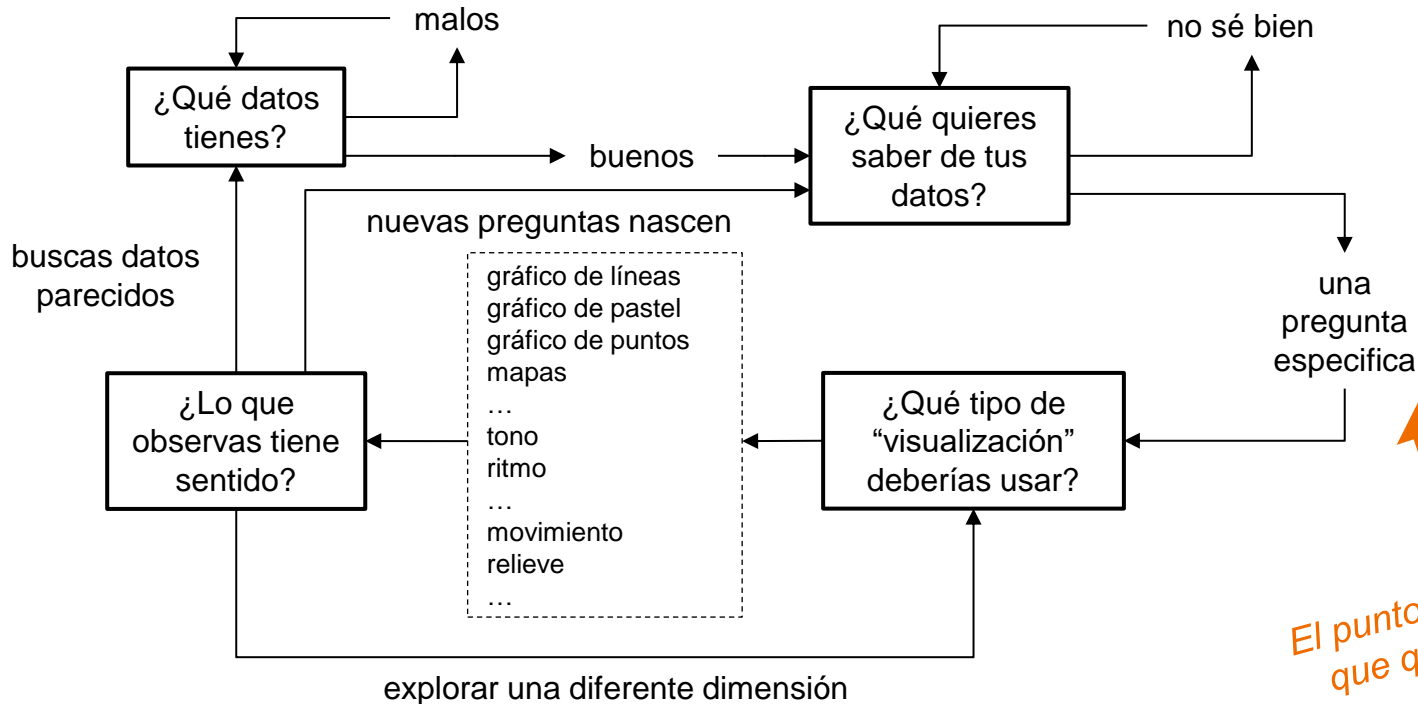
# Preguntas e ingredientes

¡Comencemos!

# Las preguntas adecuadas



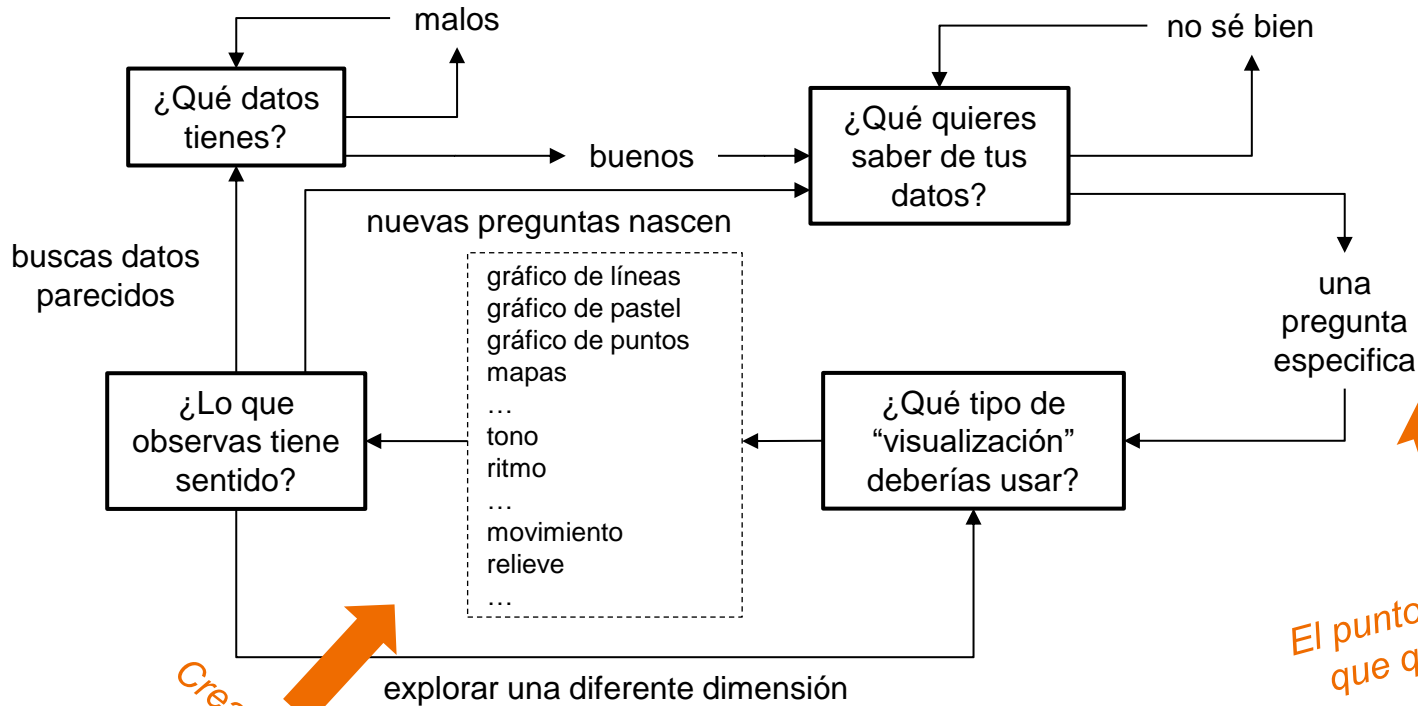
# Las preguntas adecuadas



*El punto de la historia  
que quieres contar*



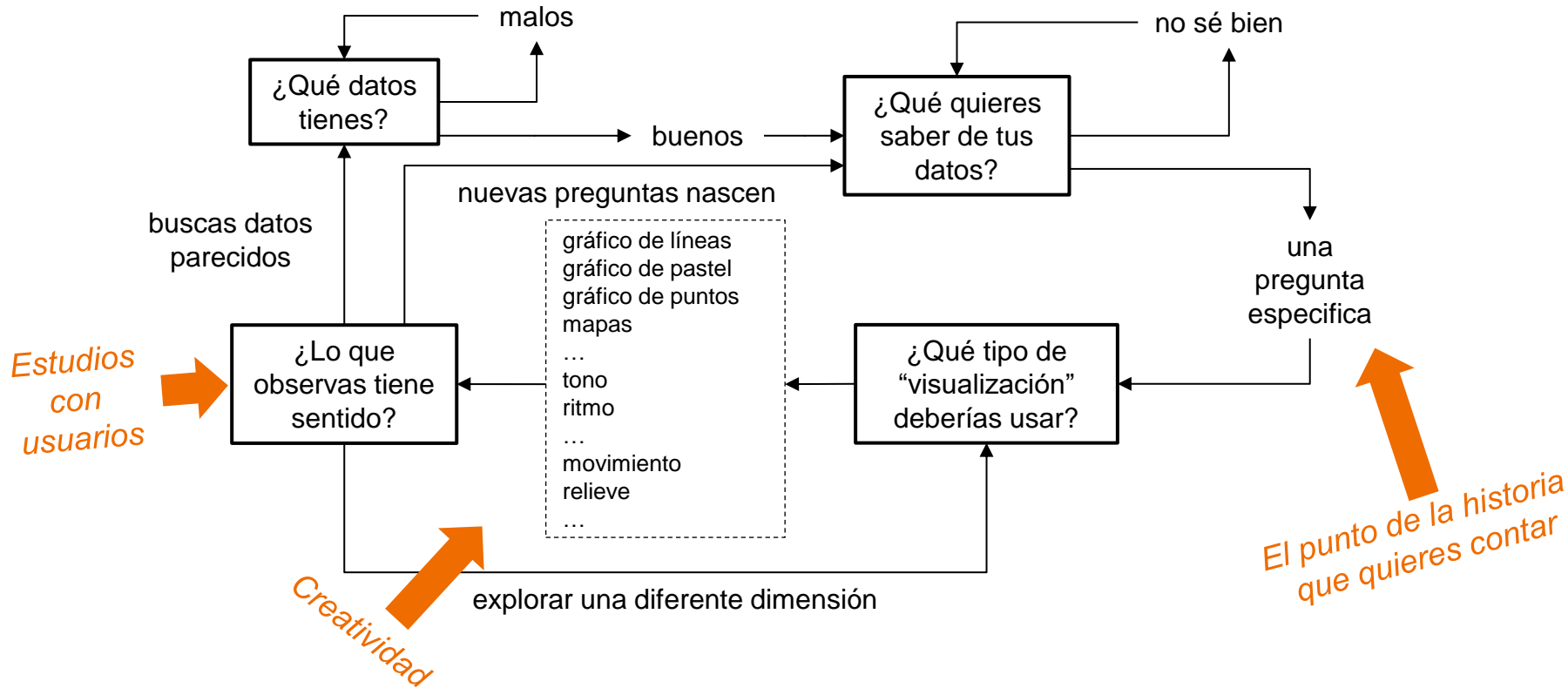
# Las preguntas adecuadas



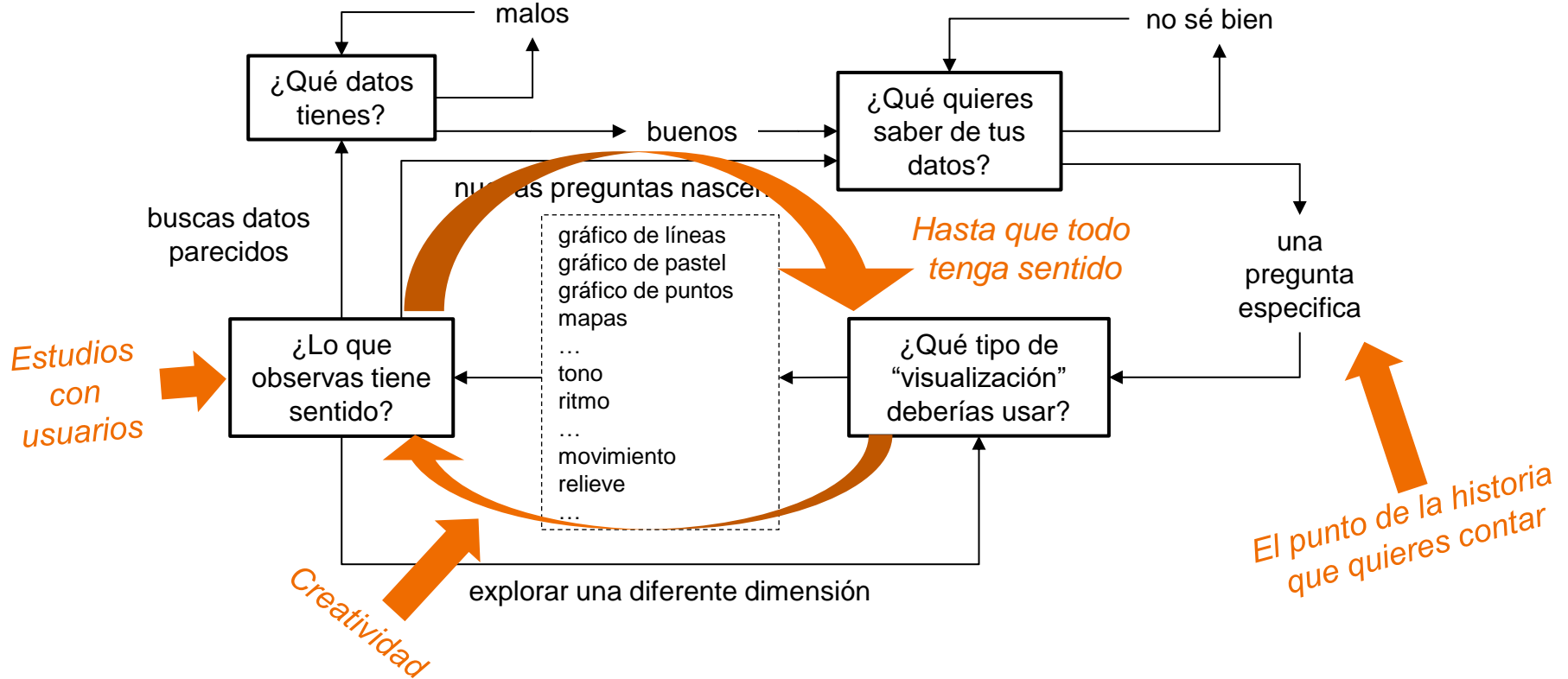
*Creatividad*

*El punto de la historia  
que quieres contar*

# Las preguntas adecuadas



# Las preguntas adecuadas



¿Qué datos existen?

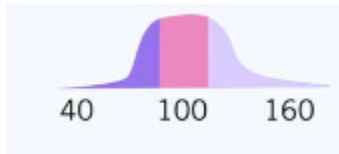
# Datos numéricos

Escala de Intervalo: *sin 0 absoluto*

**Temperatura °C**

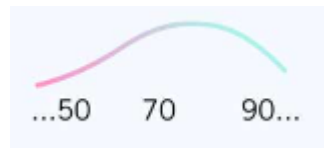


**IQ score**



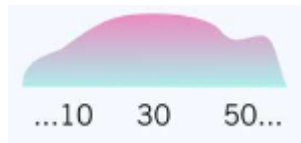
Escala de Razón: *con 0 absoluto*

**Peso en KG**



(ejemplo de dato continuo)

**Alumnos en una clase**



(ejemplo de dato discreto)

# Datos categóricos

Se usa la frecuencia para su visualización

Escala Ordinal

**Nivel de educación**



**Experiencia laboral**



Escala Nominal

**Smartphone vendidos**



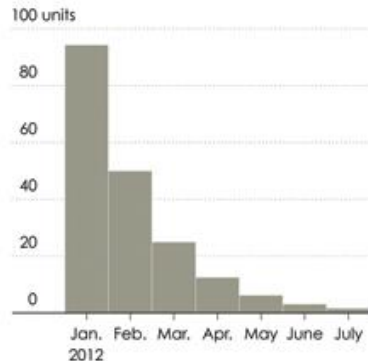
**Medio de transporte usados**



# Los ingredientes adecuados

## Title of this Graph

A description of the data or something worth highlighting to set the stage.



Source: Somewhere reputable

## Title of this Graph

A description of the data or something worth highlighting to set the stage.



## Title of this Graph

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## Visual Cues

Visualization involves encoding data with shapes, colors, and sizes. Which cues you choose depends on your data and your goals.

## Coordinate System

You map data differently with a scatterplot than you do with a pie chart. It's x- and y-coordinates in one and angles with the other; it's cartesian versus polar.

## Title of this Graph

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## Scale

Increments that make sense can increase readability, as well as shift focus.

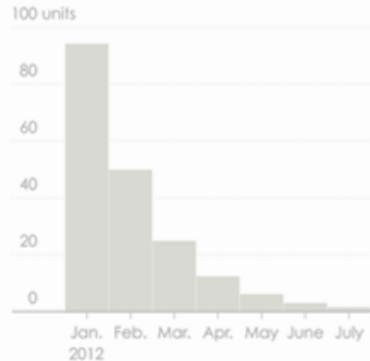
## Context

If your audience is unfamiliar with the data, it's your job to clarify what values represent and explain how people should read your visualization.

# Los ingredientes adecuados

## Title of this Graph

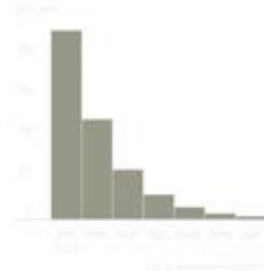
A description of the data or something worth highlighting to set the stage.



Source: Somewhere reputable

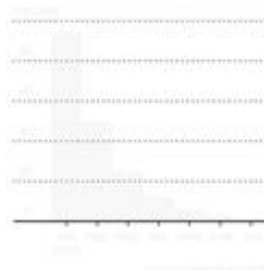
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Como mapear números visualmente

## Coordinate System

You map data differently with a scatterplot than you do with a pie chart. It's x- and y-coordinates in one and angles with the other; it's cartesian versus polar.

Donde, en el espacio

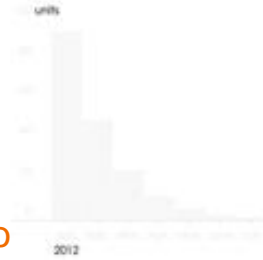
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Referencias para interpretar correctamente

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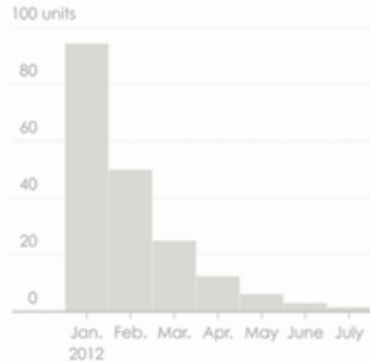
De que estoy hablando



# Los ingredientes adecuados

## Title of this Graph

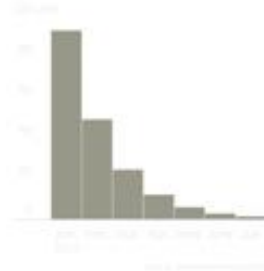
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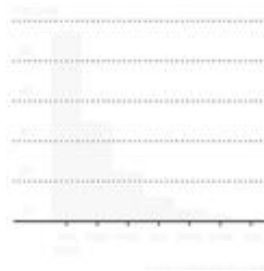
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Como mapear números visualmente

## Coordinate System

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Donde, en el espacio

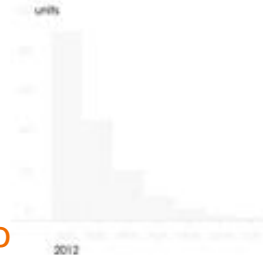
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Referencias para interpretar correctamente

## Context

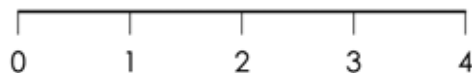
If your audience is unfamiliar with the data, it's your job to clarify what values represent and explain how people should read your visualization.

De que estoy hablando

# Escalas

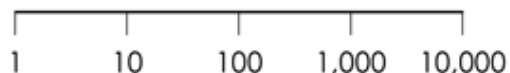
## Linear

Values are evenly spaced



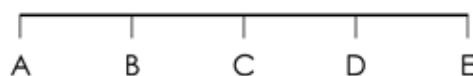
## Logarithmic

Focus on percent change



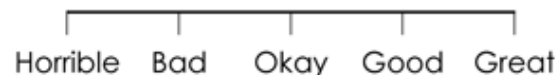
## Categorical

Discrete placement in bins



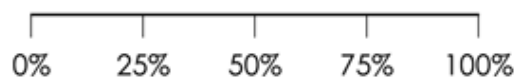
## Ordinal

Categories where order matters



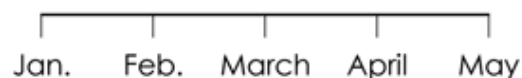
## Percent

Representing parts of a whole



## Time

Units of months, days, or hours

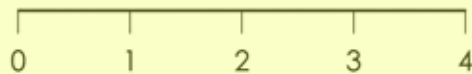


# Escalas

Datos numéricos

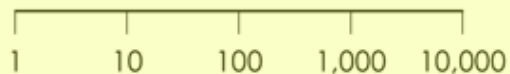
## Linear

Values are evenly spaced



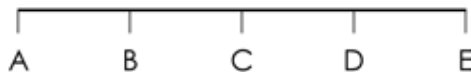
## Logarithmic

Focus on percent change



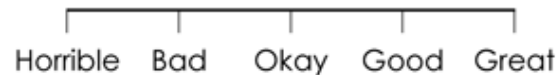
## Categorical

Discrete placement in bins



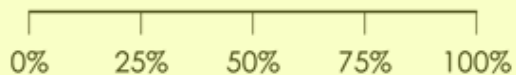
## Ordinal

Categories where order matters



## Percent

Representing parts of a whole



## Time

Units of months, days, or hours

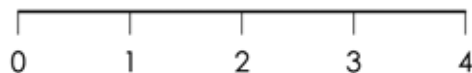


# Escalas

Datos categóricos

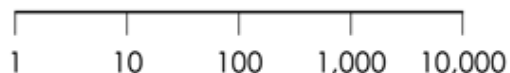
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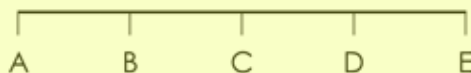
## Logarithmic

Focus on percent change



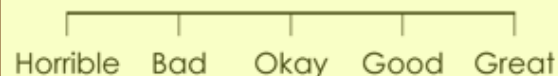
## Categorical

Discrete placement in bins



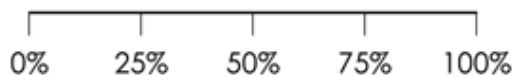
## Ordinal

Categories where order matters



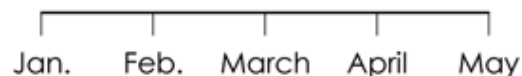
## Percent

Representing parts of a whole



## Time

Units of months, days, or hours

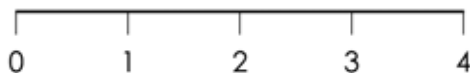


# Escalas

Ambos  
dependiendo del  
contexto

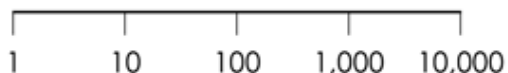
## Linear

Values are evenly spaced



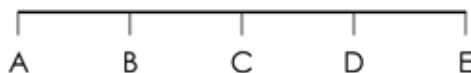
## Logarithmic

Focus on percent change



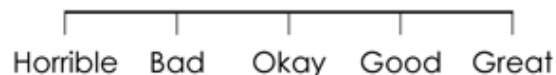
## Categorical

Discrete placement in bins



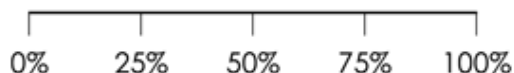
## Ordinal

Categories where order matters



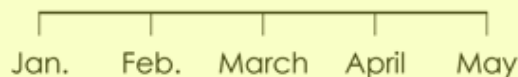
## Percent

Representing parts of a whole



## Time

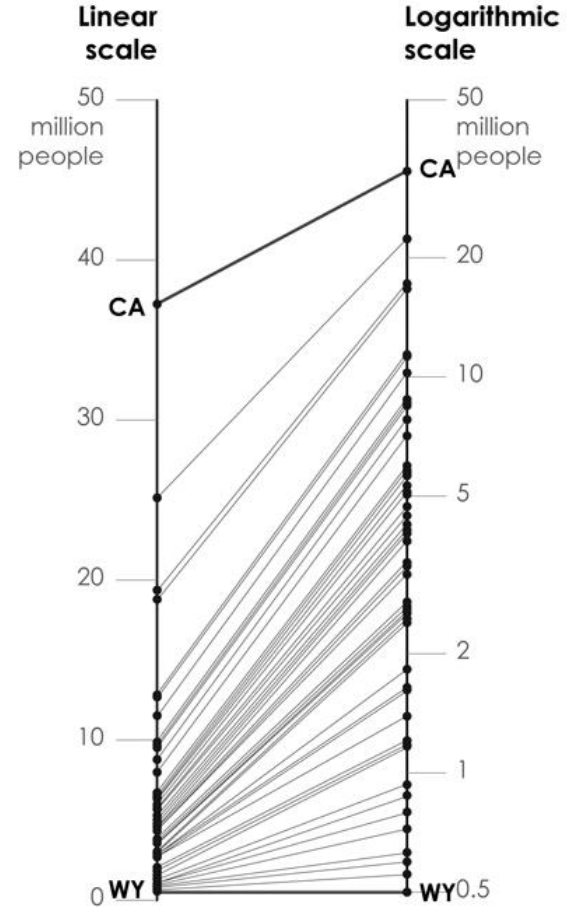
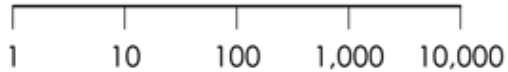
Units of months, days, or hours



# Escalas logarítmicas

## Logarithmic

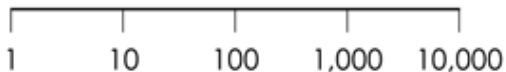
Focus on percent change



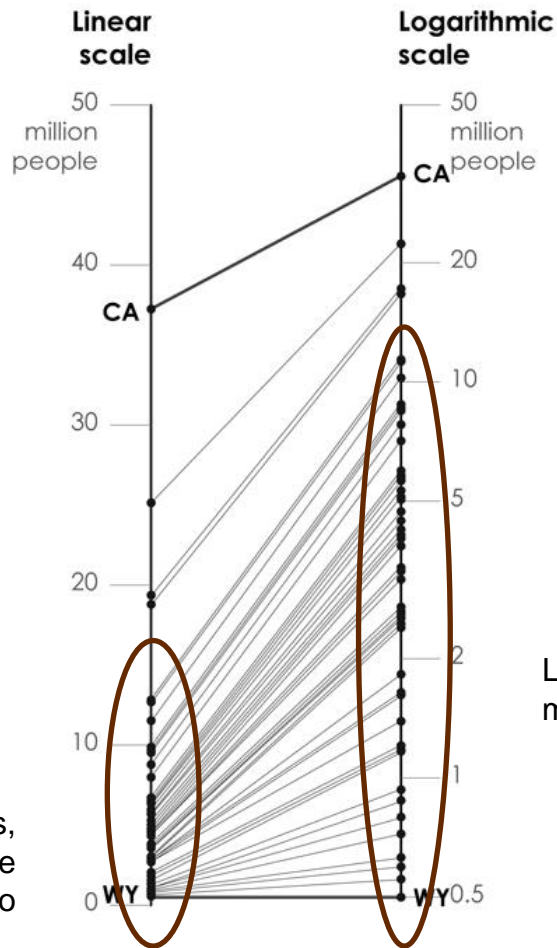
# Escalas logarítmicas

## Logarithmic

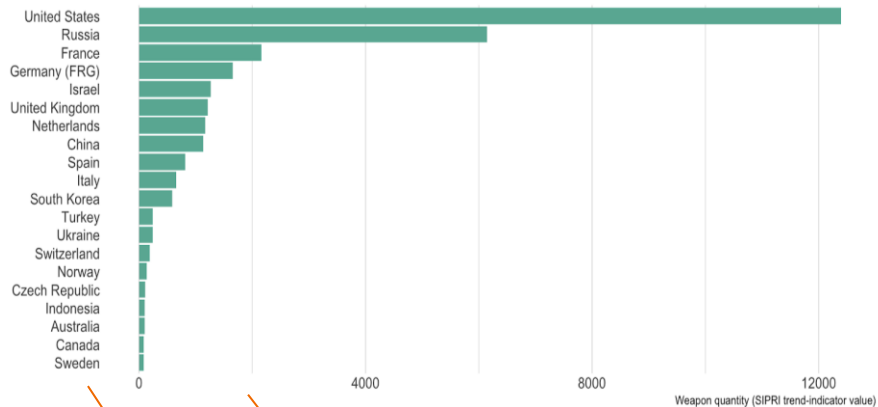
Focus on percent change



Hay muchos valores pequeños,  
muy concentrados y no se  
entiende mucho

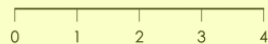


# Ejemplo de escalas



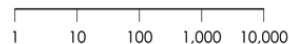
## Linear

Values are evenly spaced



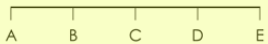
## Logarithmic

Focus on percent change



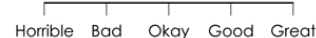
## Categorical

Discrete placement in bins



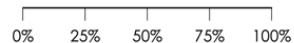
## Ordinal

Categories where order matters



## Percent

Representing parts of a whole



## Time

Units of months, days, or hours

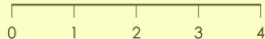




# Ejemplo de escalas

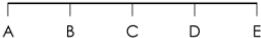
## Linear

Values are evenly spaced



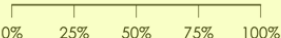
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Discrete placement in bins



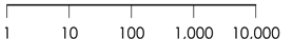
## Percent

Representing parts of a whole



## Logarithmic

Focus on percent change



## Ordinal

Categories where order matters

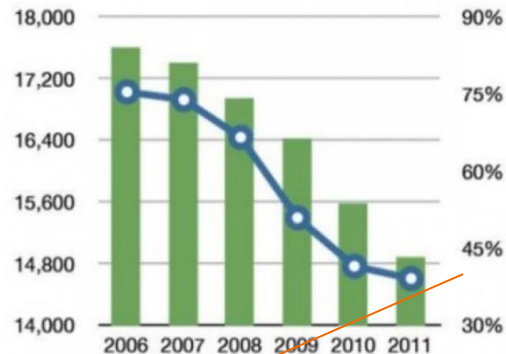


## Time

Units of months, days, or hours



Internet Explorer vs Murder Rate

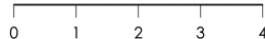


● Murders in US ■ Internet Explorer Market Share

# Ejemplo de escalas

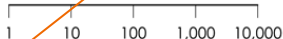
## Linear

Values are evenly spaced



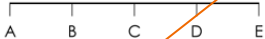
## Logarithmic

Focus on percent change



## Categorical

Discrete placement in bins



## Ordinal

Categories where order matters



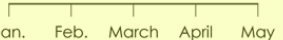
## Percent

Representing parts of a whole \*



## Time

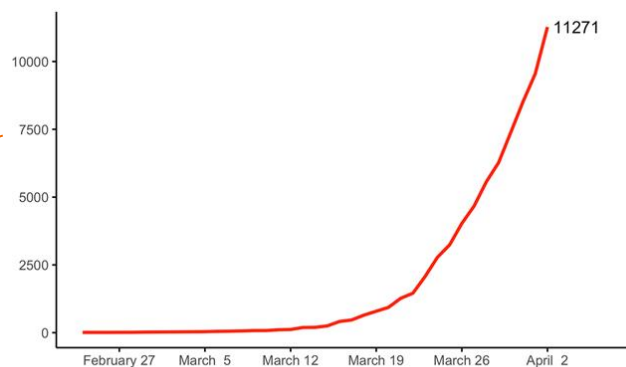
Units of months, days, or hours



\*En este caso, no se representa una parte del todo, sino un cambio porcentual.

# Ejemplo de escalas

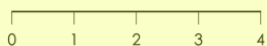
Total number of COVID-19 cases in Canada



Source: Johns Hopkins University (CSSE)

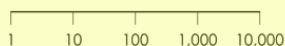
## Linear

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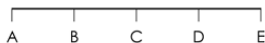
## Logarithmic

Focus on percent change



## Categorical

Discrete placement in bins



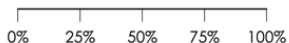
## Ordinal

Categories where order matters



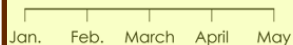
## Percent

Representing parts of a whole

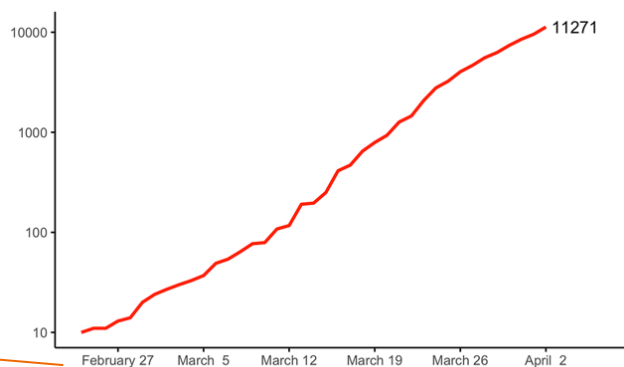


## Time

Units of months, days, or hours



Total number of COVID-19 cases in Canada

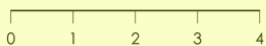


Source: Johns Hopkins University (CSSE)

# Ejemplo de escalas

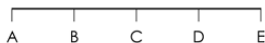
## Linear

Values are evenly spaced



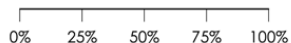
## Categorical

Discrete placement in bins



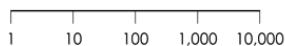
## Percent

Representing parts of a whole



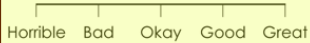
## Logarithmic

Focus on percent change



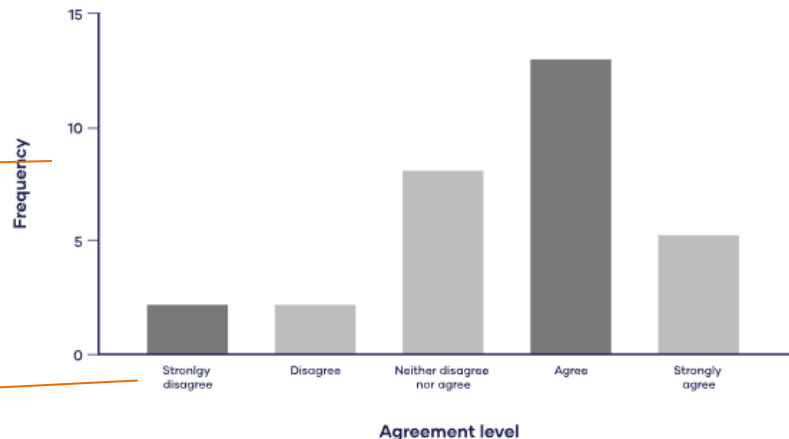
## Ordinal

Categories where order matters



## Time

Units of months, days, or hours



# Los ingredientes adecuados

## Title of this Graph

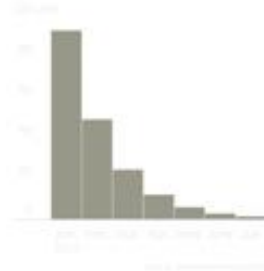
A description of the data or something worth highlighting to set the stage.



Source: Somewhere reputable

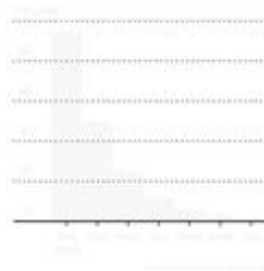
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## Visual Cues

Visualization involves encoding data with shapes, colors, and sizes. Which cues you choose depends on your data and your goals.

Como mapear números visualmente

## Coordinate System

You map data differently with a scatterplot than you do with a pie chart. It's x- and y-coordinates in one and angles with the other; it's cartesian versus polar.

Donde, en el espacio

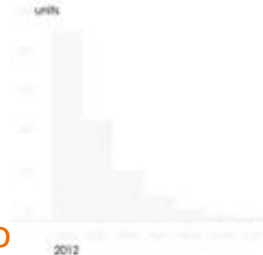
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## Scale

Increments that make sense can increase readability, as well as shift focus.

Referencias para interpretar correctamente

## Context

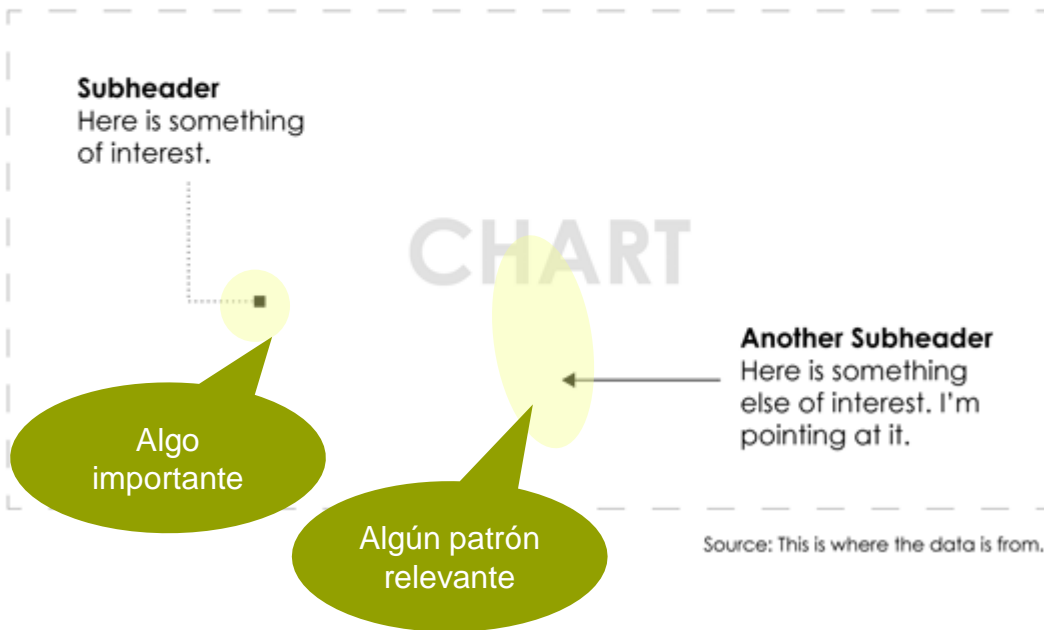
If your audience is unfamiliar with the data, it's your job to clarify what values represent and explain how people should read your visualization.

De que estoy hablando

# Contexto

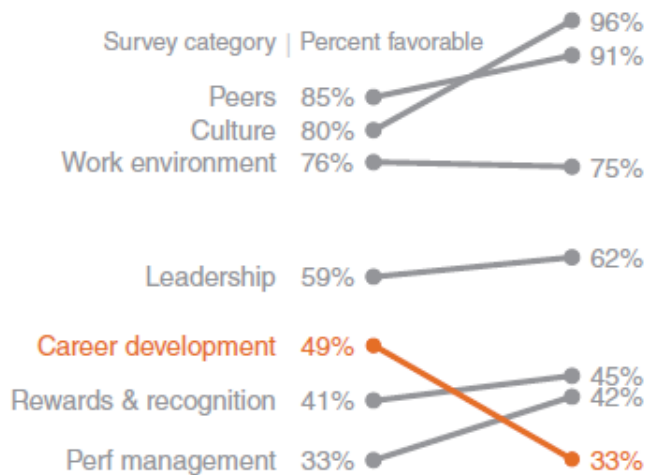
## Header title that describes findings

Lead-in text is your chance to provide more details on what the data is about, where it's from, and what the audience should see or look at.



# Contexto

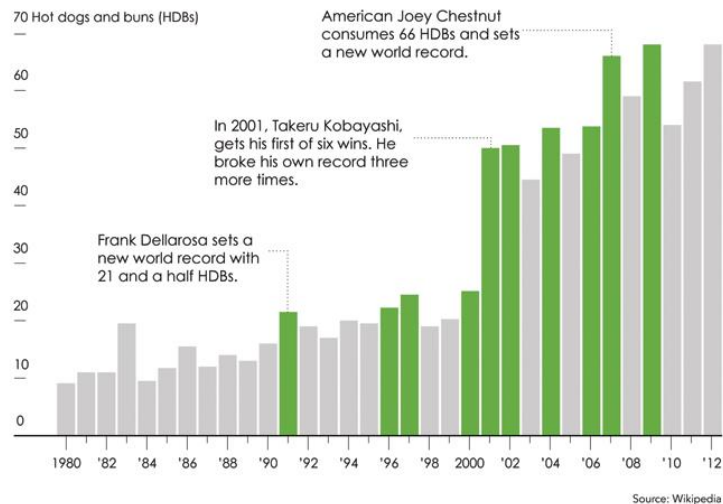
## Employee feedback over time



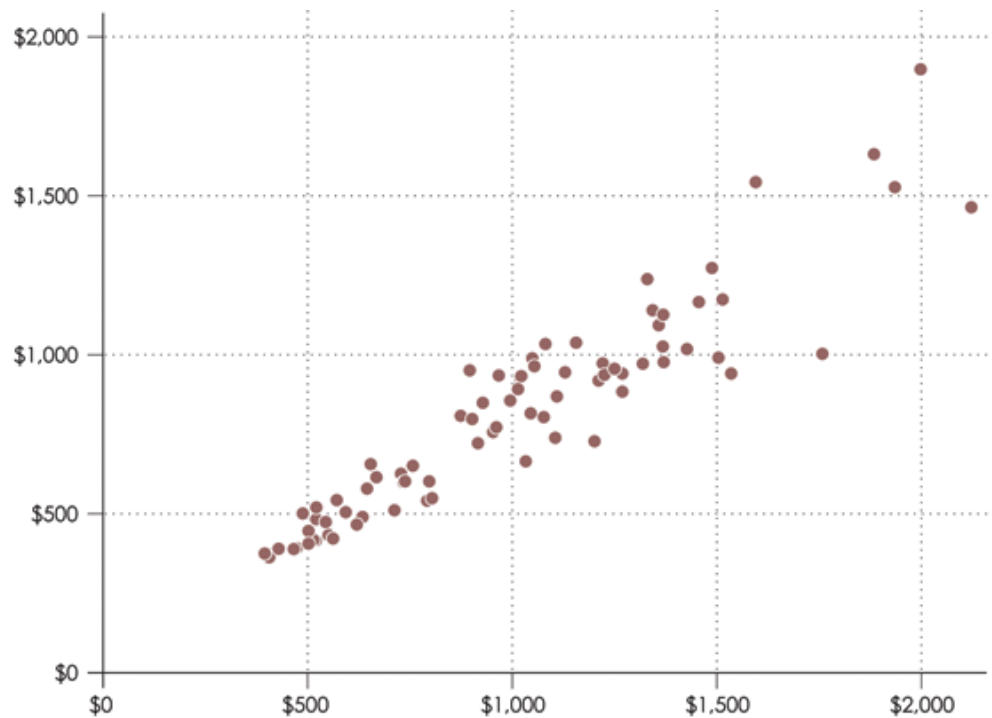
Mostrar los datos  
Evidenciar algo

## Integrar texto y gráficos

### Breaking hot dog eating records



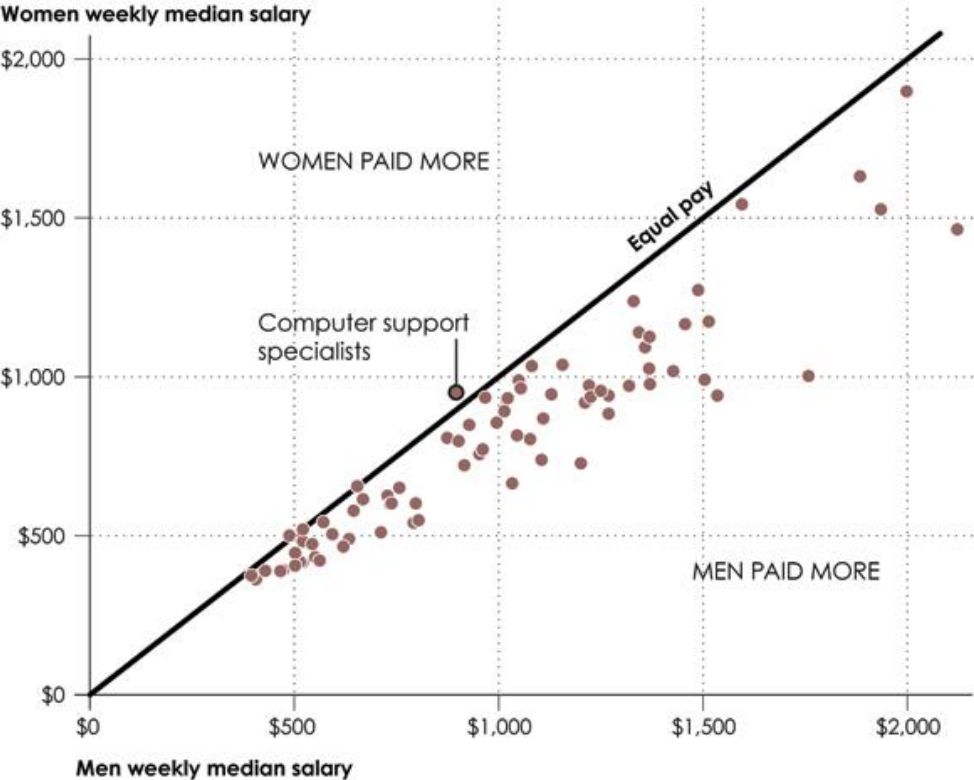
# Contexto





# Contexto

Gender pay gap in 2011

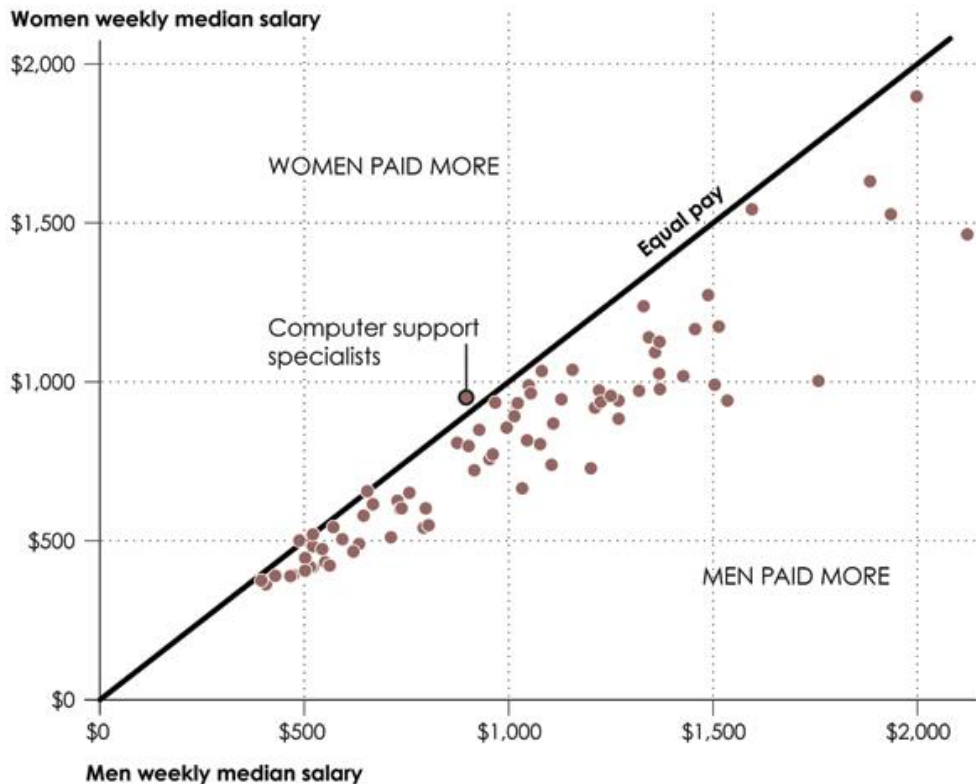


Source: Bureau of Labor Statistics

# Contexto

Un gráfico sin  
contexto **¡no  
tiene sentido!**

Gender pay gap in 2011



Source: Bureau of Labor Statistics

# Los ingredientes adecuados

## Title of this Graph

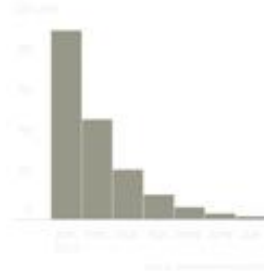
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Source: Somewhere reputable

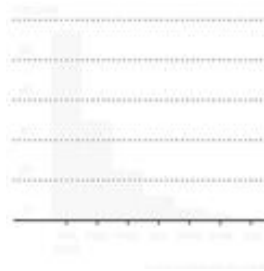
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Como mapear números visualmente

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Donde, en el espacio

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Referencias para interpretar correctamente

## Context

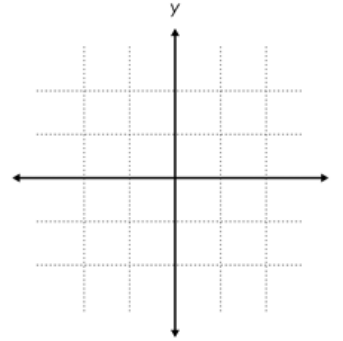
If your audience is unfamiliar with the data, it's your job to clarify what values represent and explain how people should read your visualization.

De que estoy hablando

# Sistema de coordenadas

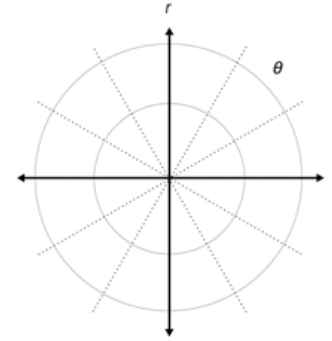
## Cartesian

If you've ever made a graph, the x- and y-coordinate system will look familiar to you.



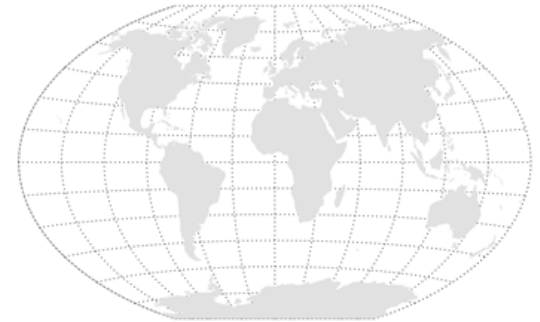
## Polar

Pie charts use this system. Coordinates are placed based on radius  $r$  and angle  $\theta$ .



## Geographic

Latitude and longitude are used to identify locations in the world. Because the planet is round, there are multiple projections to display geographic data in two dimensions. This one is the Winkel tripel.



# Sistema de coordenadas

## Equiarectangular

Typically used for thematic mapping, but doesn't preserve area or angle



## Albers

Scale and shape not preserved; angle distortion is minimal



## Mercator

Preserves angles and shapes in small areas, making it good for directions



## Lambert conformal conic

Better for showing smaller areas and often used for aeronautical maps.



## Sinusoidal

Preserves area; useful for areas near the prime meridian



## Polyconic

Was often used to show US in the mid-1900s; little distortions in small areas near meridian



## Winkel Tripel

Minimized area, angle, and distance distortion; good choice for world map



## Robinson

A compromise between preserving areas and angles; good to show world map



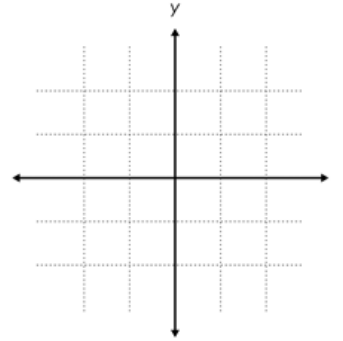
## Orthographic

Representing a 3-D object in 2-D, need to rotate to area of interest



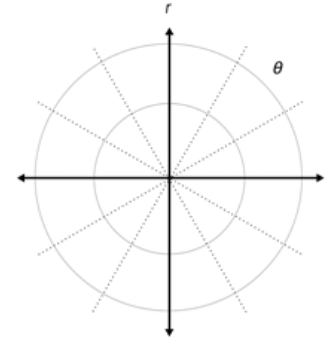
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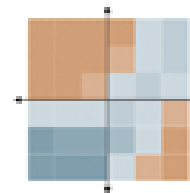
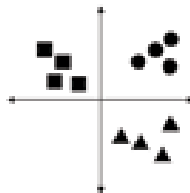
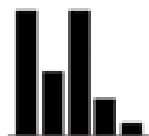
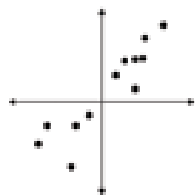








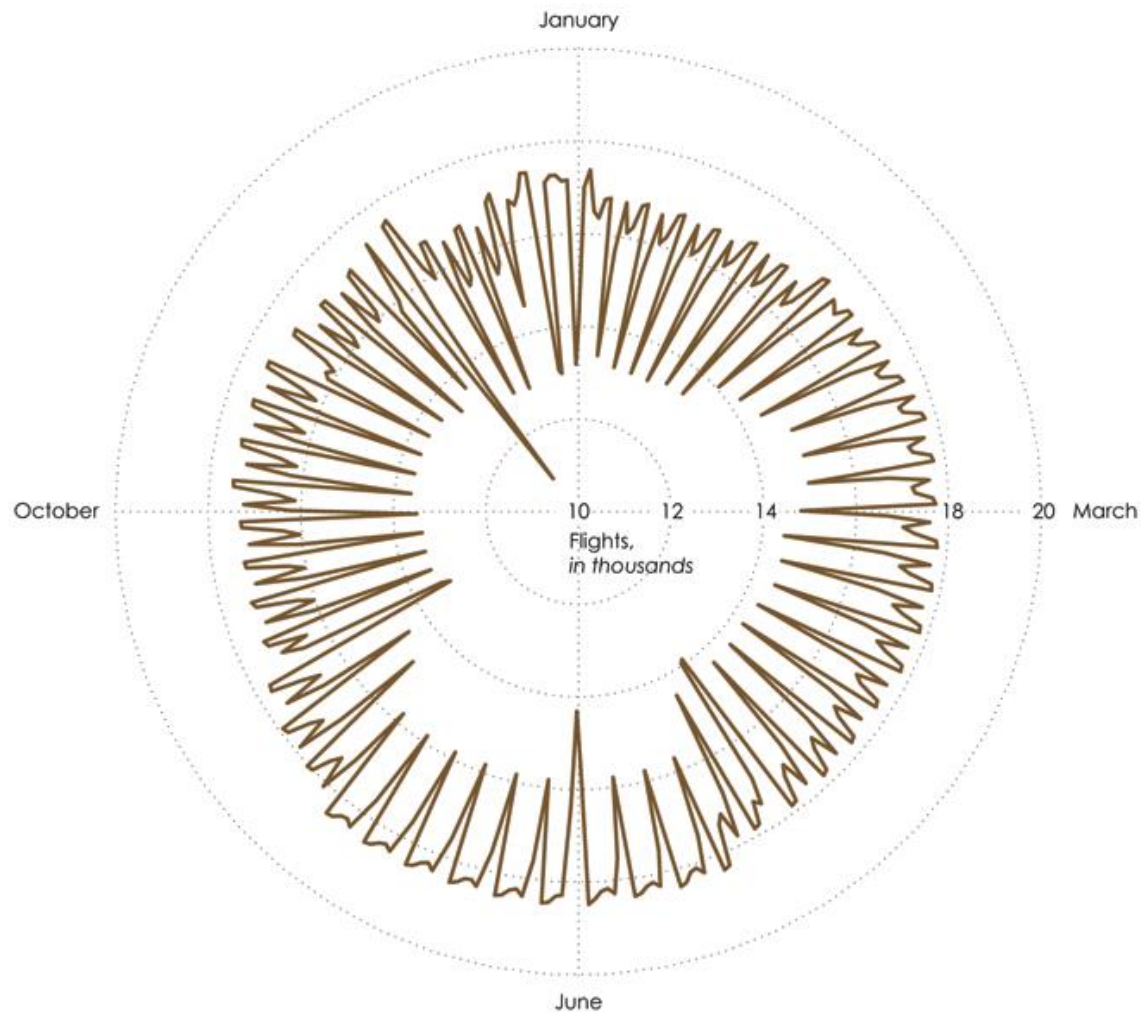
# Coordenadas cartesianas



# Coordenadas polares



# Coordenadas polares



# Coordenadas geográficas



# Los ingredientes adecuados

## Title of this Graph

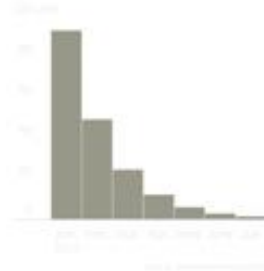
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Source: Somewhere reputable

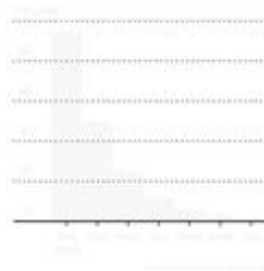
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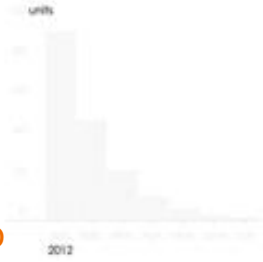
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Referencias para interpretar correctamente

## Context

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De que estoy hablando

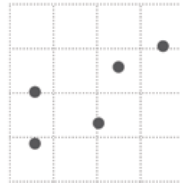
# Señales visuales

## Visual cues

When you visualize data, you encode values to shapes, sizes, and colors.

### Position

Where in space the data is



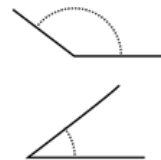
### Length

How long the shapes are



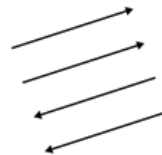
### Angle

Rotation between vectors



### Direction

Slope of a vector in space



### Shapes

Symbols as categories



### Area

How much 2-D space



### Volume

How much 3-D space



### Color saturation

Intensity of a color hue

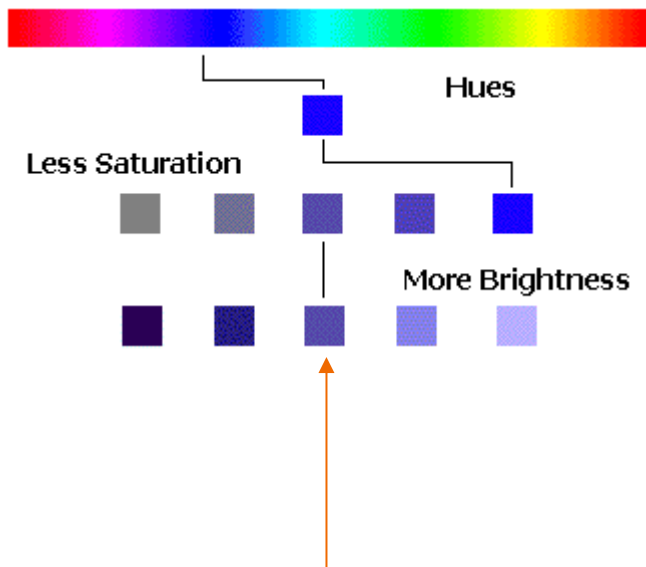


### Color hue

Usually referred to as color



# Señales visuales

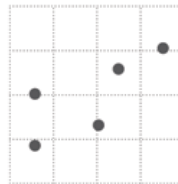


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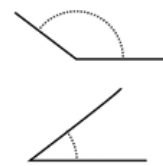
### Length

How long the shapes are



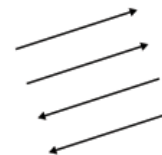
### Angle

Rotation between vectors



### Direction

Slope of a vector in space



### Shapes

Symbols as categories



### Area

How much 2-D space



### Volume

How much 3-D space



### Color saturation or brightness



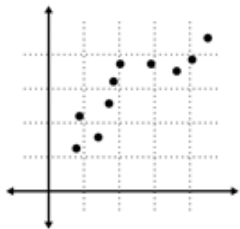
### Color hue

Usually referred to as color

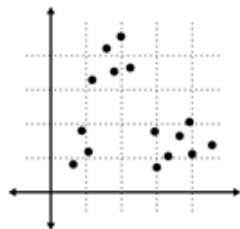


# Señales visuales

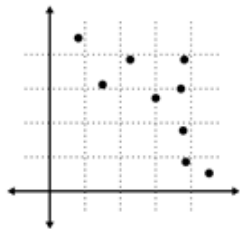
Upward trend



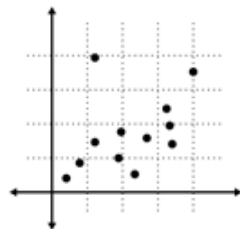
Clustering



Downward trend



Outlier

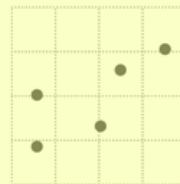


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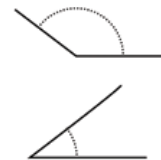
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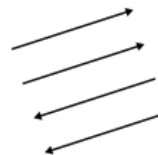
### Angle

Rotation between vectors



### Direction

Slope of a vector in space



### Shapes

Symbols as categories



### Area

How much 2-D space



### Volume

How much 3-D space



### Color saturation

Intensity of a color hue



### Color hue

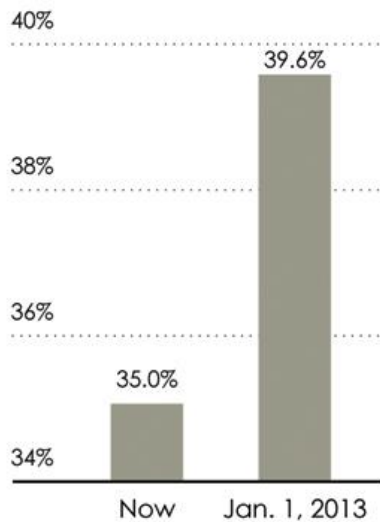
Usually referred to as color





# Señales visuales

Axis starting at 34 percent

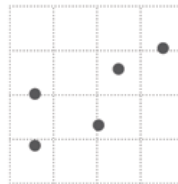


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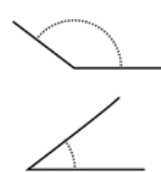
### Length

How long the shapes are



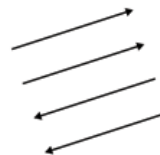
### Angle

Rotation between vectors



### Direction

Slope of a vector in space



### Shapes

Symbols as categories



### Area

How much 2-D space



### Volume

How much 3-D space



### Color saturation

Intensity of a color hue



### Color hue

Usually referred to as color



# Señales visuales

## Greatest to least, endpoint

Focus on most recent numbers

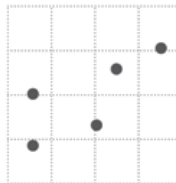


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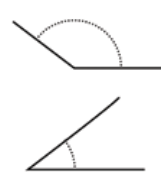
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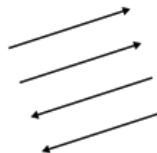
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Intensity of a color hue

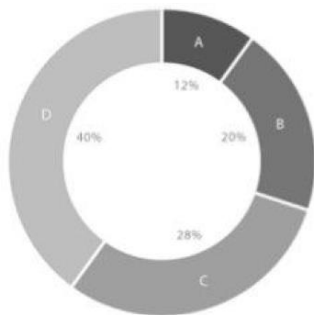


### Color hue

Usually referred to as color



# Señales visuales



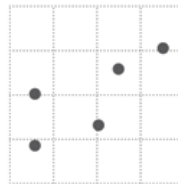
Donut charts!

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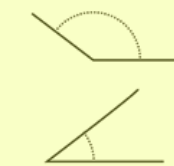
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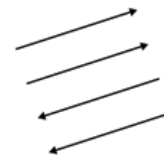
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Rotation between vectors



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Slope of a vector in space



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How much 2-D space



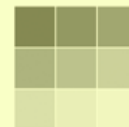
### Volume

How much 3-D space



### Color saturation

Intensity of a color hue



### Color hue

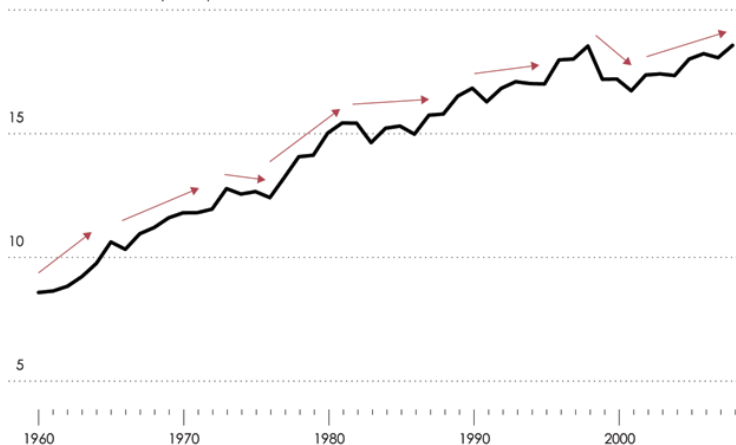
Usually referred to as color



# Elementos visuales

## Direction in a time series

20 metric tons of CO2 per capita in Australia



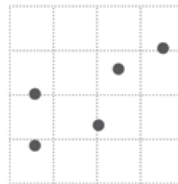
Source: The World Bank

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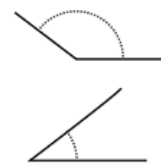
### Length

How long the shapes are



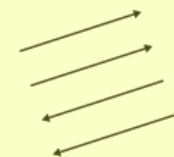
### Angle

Rotation between vectors



### Direction

Slope of a vector in space



### Shapes

Symbols as categories



### Area

How much 2-D space



### Volume

How much 3-D space



### Color saturation

Intensity of a color hue

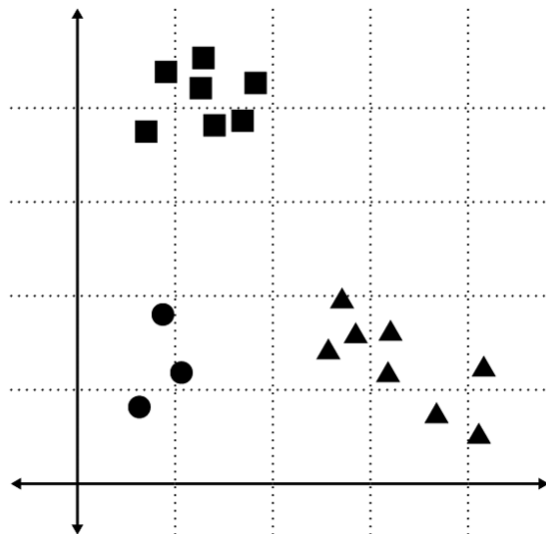


### Color hue

Usually referred to as color



# Señales visuales

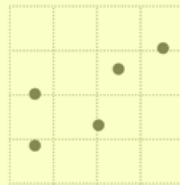


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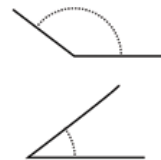
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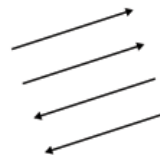
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Rotation between vectors



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Slope of a vector in space



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Symbols as categories



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How much 2-D space



### Volume

How much 3-D space



### Color saturation

Intensity of a color hue

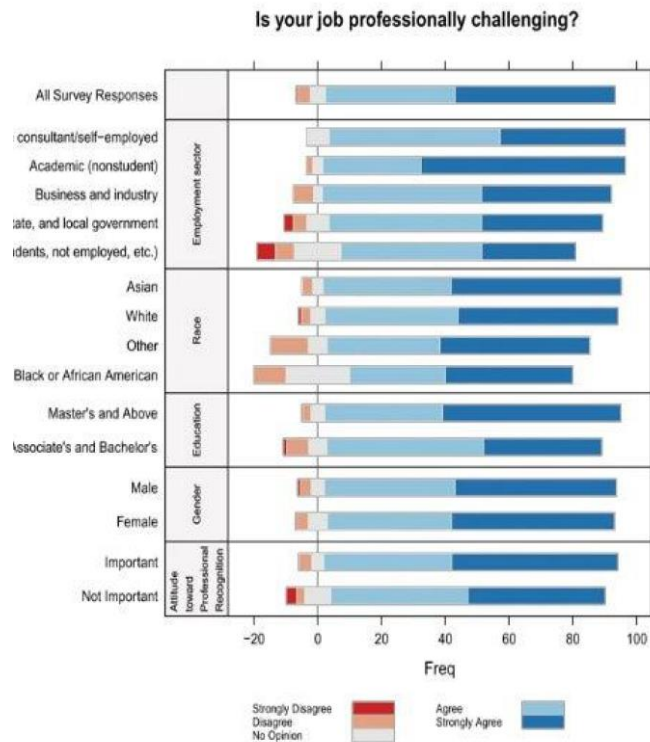


### Color hue

Usually referred to as color



# Señales visuales

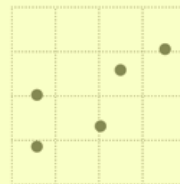


## Visual cues

When you visualize data, you encode values to shapes, sizes, and colors.

### Position

Where in space the data is



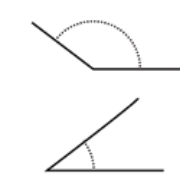
### Length

How long the shapes are



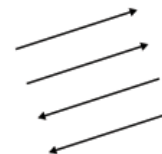
### Angle

Rotation between vectors



### Direction

Slope of a vector in space



### Shapes

Symbols as categories



### Area

How much 2-D space



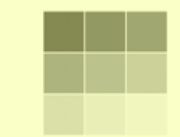
### Volume

How much 3-D space



### Color saturation

Intensity of a color hue



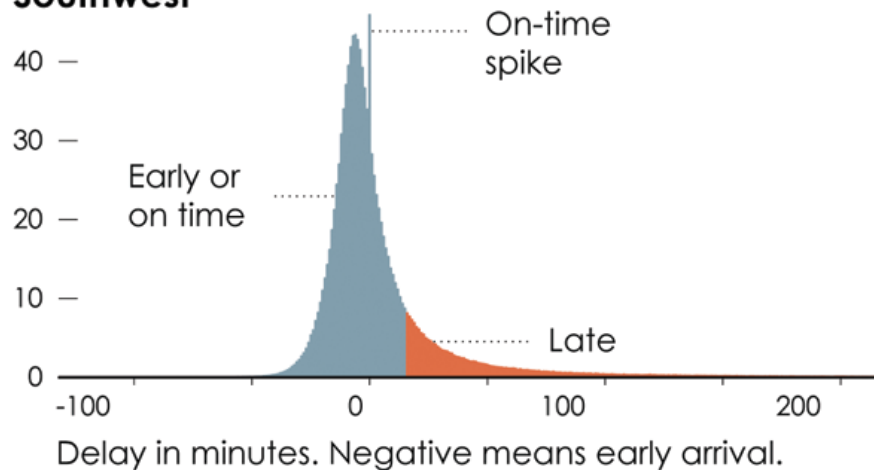
### Color hue

Usually referred to as color



# Señales visuales

## Southwest

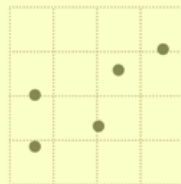


## Visual cues

When you visualize data, you encode values to shapes, sizes, and colors.

### Position

Where in space the data is



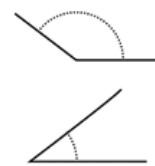
### Length

How long the shapes are



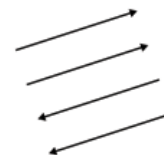
### Angle

Rotation between vectors



### Direction

Slope of a vector in space



### Shapes

Symbols as categories



### Area

How much 2-D space



### Volume

How much 3-D space



### Color saturation

Intensity of a color hue

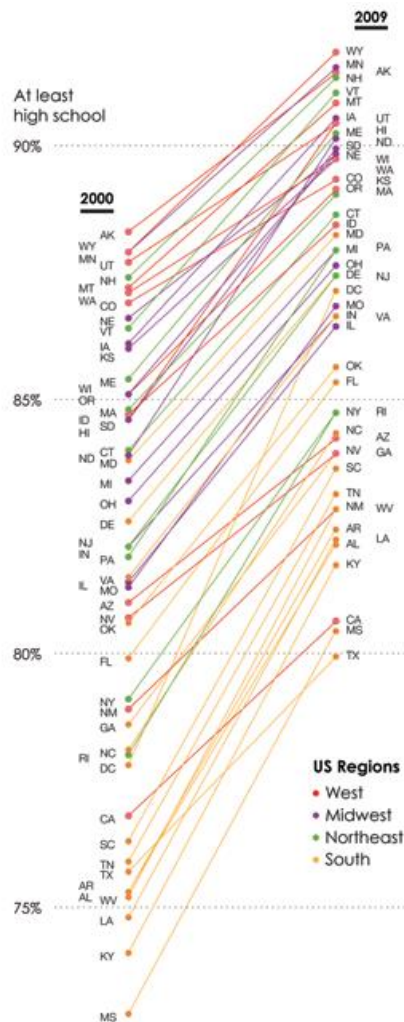


### Color hue

Usually referred to as color



# Señales visuales

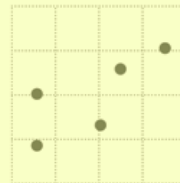


## Visual cues

When you visualize data, you encode values to shapes, sizes, and colors.

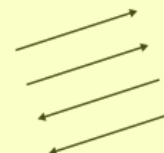
### Position

Where in space the data is



### Direction

Slope of a vector in space



### Volume

How much 3-D space



### Length

How long the shapes are



### Shapes

Symbols as categories



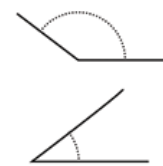
### Color saturation

Intensity of a color hue



### Angle

Rotation between vectors



### Area

How much 2-D space



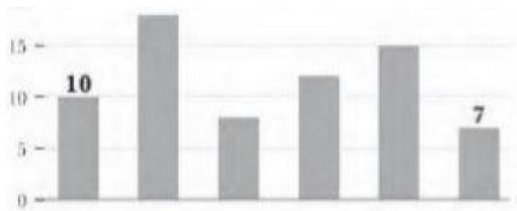
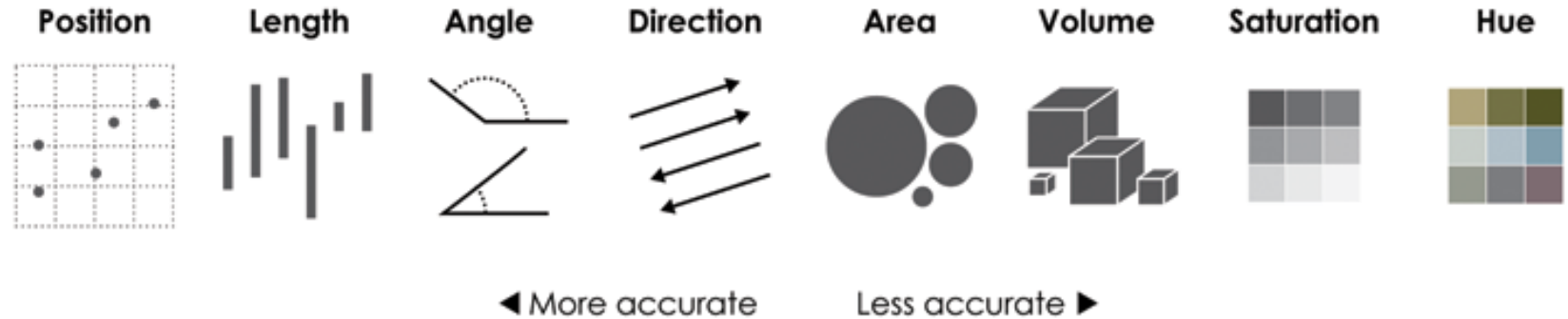
### Color hue

Usually referred to as color



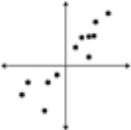





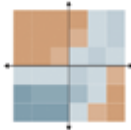
















# Señales visuales

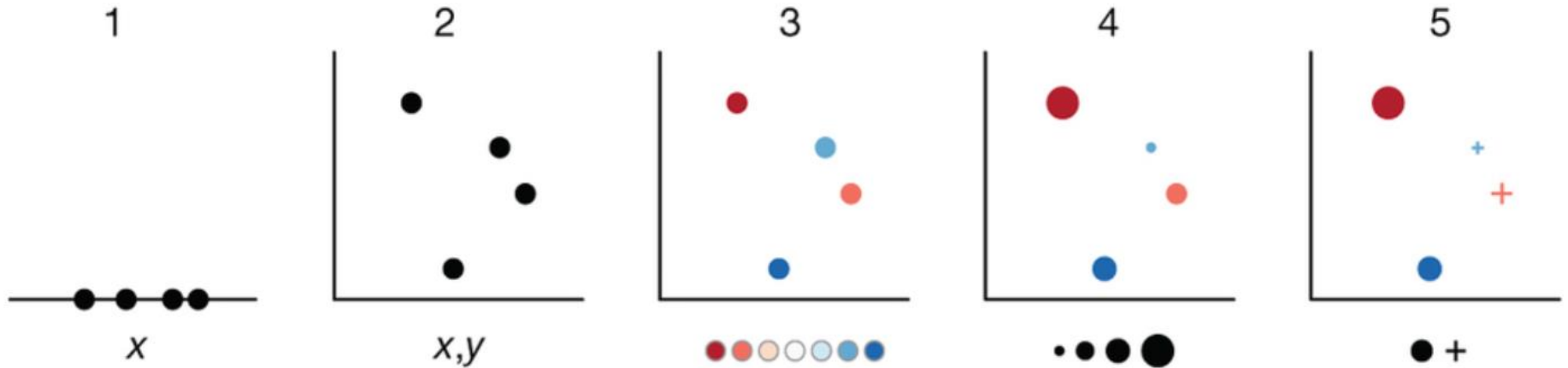


# Combinación de ingredientes

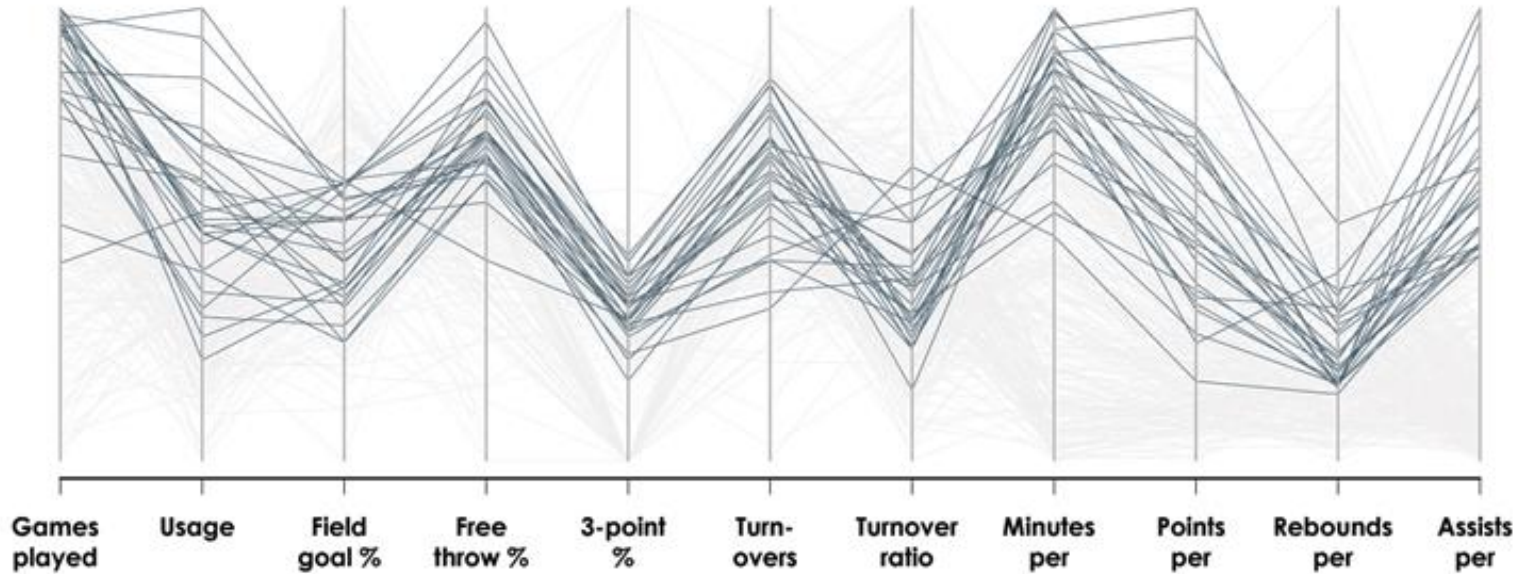
## Visual cues

	Position	Length	Angle	Direction	Shapes	Area or Volume	Color
Coordinate systems							
Cartesian							
Polar							
Geographic							

# Multidimensionalidad



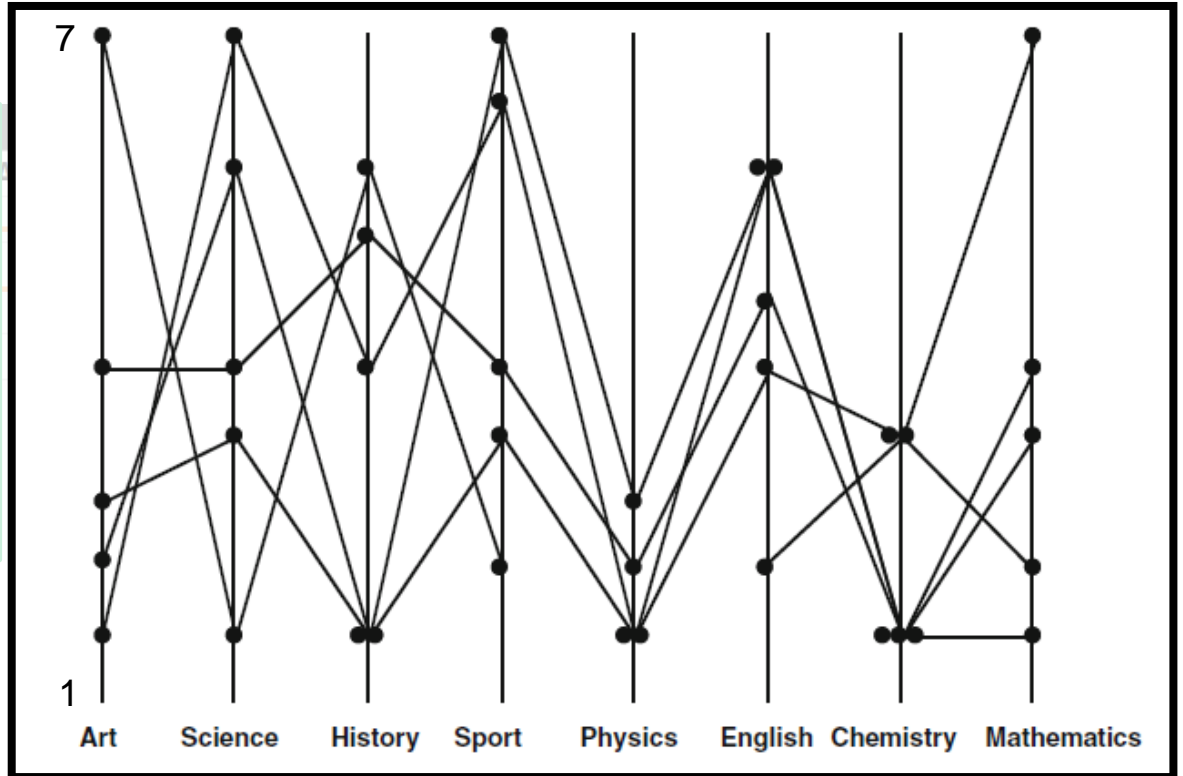
# Multidimensionalidad



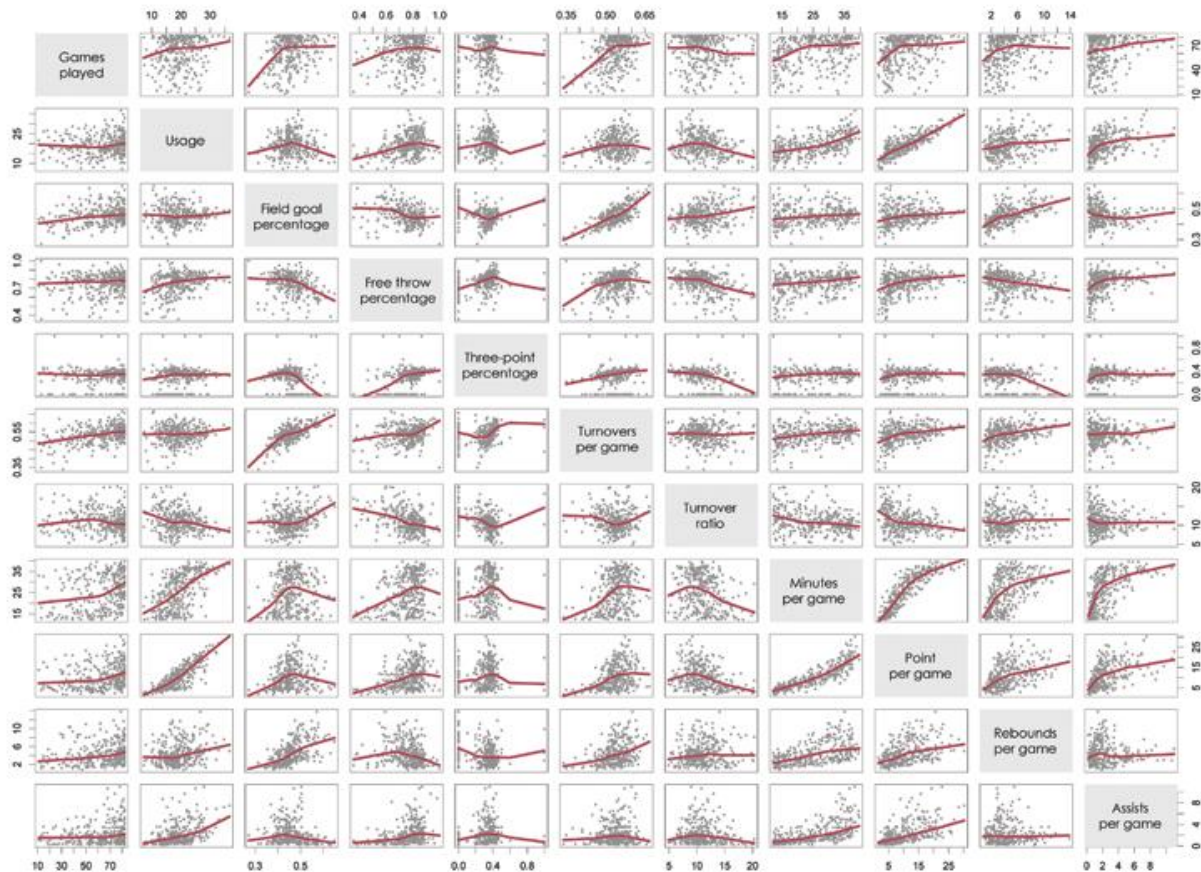
# Multidimensionalidad

	A	B	C
1	Estudiante	Chimica	Fisica
2	Juan	5.7	4.6
3	Pedro	5.4	5.8
4	Vicente	5.5	5.4
5	Alicia	6.9	4.5
6	Silvia	2.2	5.3

Atributo

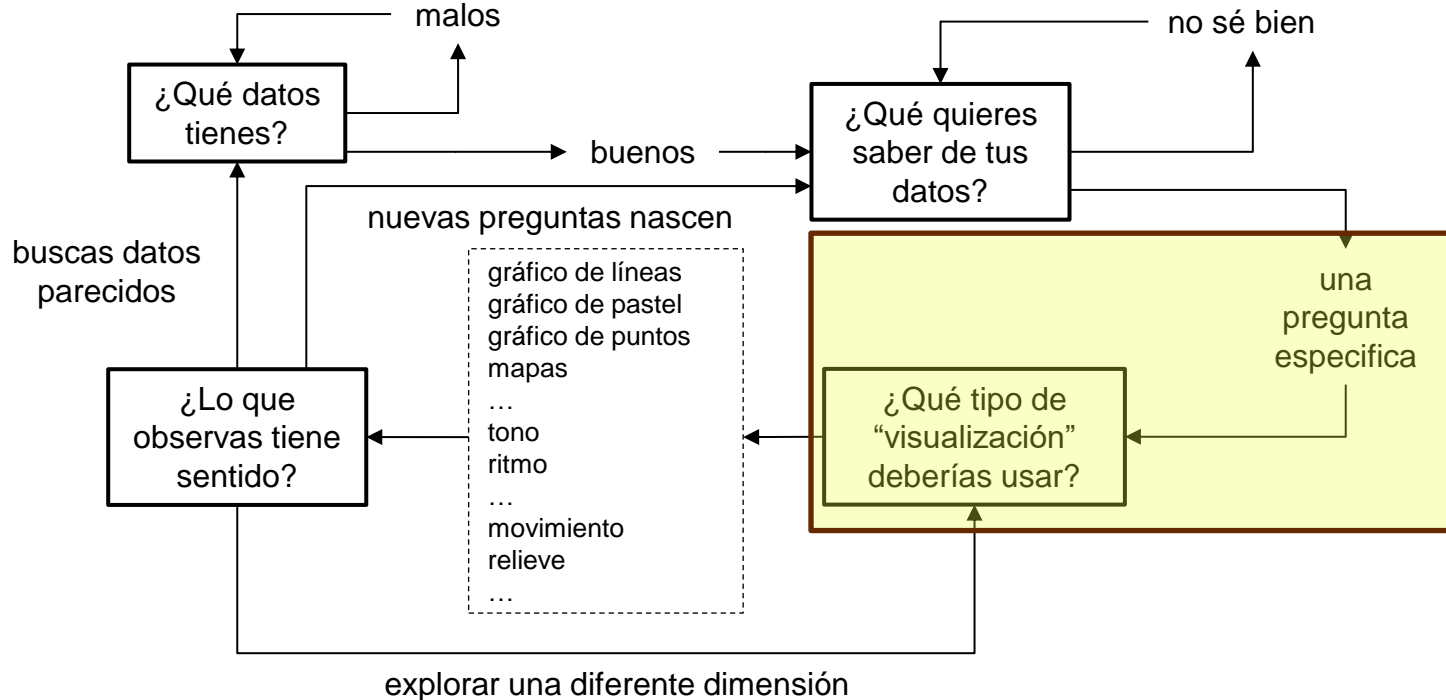


# Multidimensionalidad





# Preguntas e ingredientes





Preguntas  
posibles

Conceptos  
estadísticos

Posibles  
visualizaciones

¿Cuál \_\_\_\_\_ es el  
mejor y el peor?

Máximos y  
mínimos



¿Cómo ha  
cambiado \_\_\_\_\_ a  
lo largo del tiempo?

Patrones  
temporales



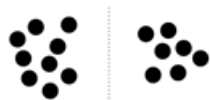
¿Qué \_\_\_\_\_ se  
destaca del resto?

Valores  
atípicos



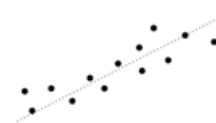
¿Qué hace que  
\_\_\_\_\_ sea diferente  
de \_\_\_\_\_?

Agrupamiento



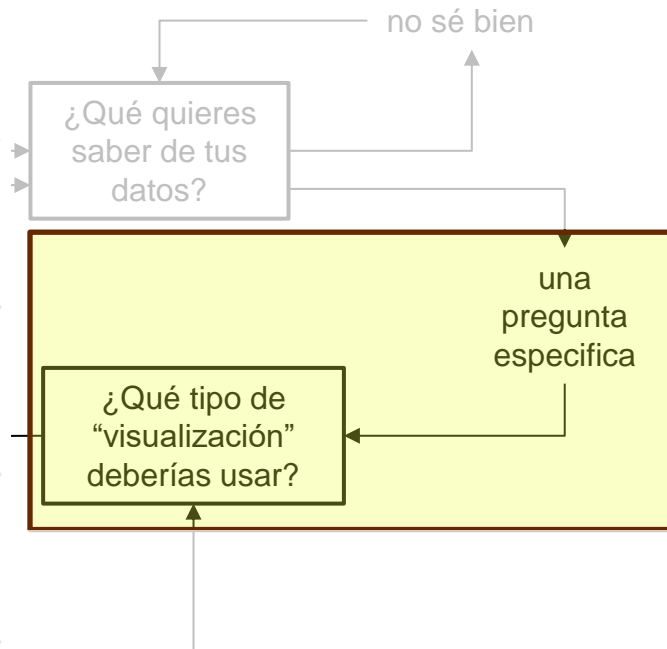
¿Cómo están  
relacionados \_\_\_\_\_  
y \_\_\_\_\_ entre sí?

Correlación



¿Cuál es la  
descomposición de  
\_\_\_\_\_?

Distribuciones



**¡Experimentar, probar, y  
evaluar alternativas es clave!**

# IIC2026

# Visualización de Información

Alessio Bellino  
(2024 - 2 / Clase 07)