
Information Visualization

time allowed: 2h

instructions:

Please answer all the questions. If there is any ambiguity in the questions, explain your hypotheses.

Question 1 (10pts)

A group of 10 friends ($f_1 \dots f_{10}$) try to choose a restaurant among a list of 5 possibilities (A, B, ...E) for the dinner. To do so, each of them express a preference by ordering the five restaurants with a unique rank (1st, 2nd, ...5th).

A way to combine those preferences is to assign points to ranks and to sum those points to get a global ordering. They are different ways to assign points to ranks:

- the Borda count: 4 points for 1st, 3 for 2nd, 2 for 3rd, 1 for 4th and 0 for 5th
- the Nauru method: 1 point for 1st, 1/2 for 2nd, 1/3 for 3rd, 1/4 for 4th and 1/5 for 5th
- a geometric progression: 1 point for 1st, 1/2 for 2nd, 1/4 for 3rd, 1/8 for 4th and 1/16 for 5th

- a) How would you represent this information so that the raw preferences can be perceived, and that the global ordering for the various points distributions can be compared ?
- b) Justify your design.

Question 2 (10pts)

For the three visualisations below (see next pages):

- c) Give the visual mapping for this chart (i.e. list the attributes of the data shown by the graph, and give for each of them its type and the graphical variable used for its encoding), e.g. using Card *et al.* taxonomy.
- d) Explain why this encoding is good/bad according to Bertin's criterions and according to your own judgment.

image 1: Electric Cars Are Better for the Planet – and Often Your Budget, Too

<<https://www.nytimes.com/interactive/2021/01/15/climate/electric-car-cost.html>>

image 2: Excess mortality using raw death counts

<<https://ourworldindata.org/excess-mortality-covid#excess-mortality-using-raw-death-counts>>

image 3: Sad songs say so much, **consider only the "mood of music streamed/ monthly average" graph.**

<<http://economist.com/graphic-detail>>

Image 1

Average carbon dioxide emissions per mile

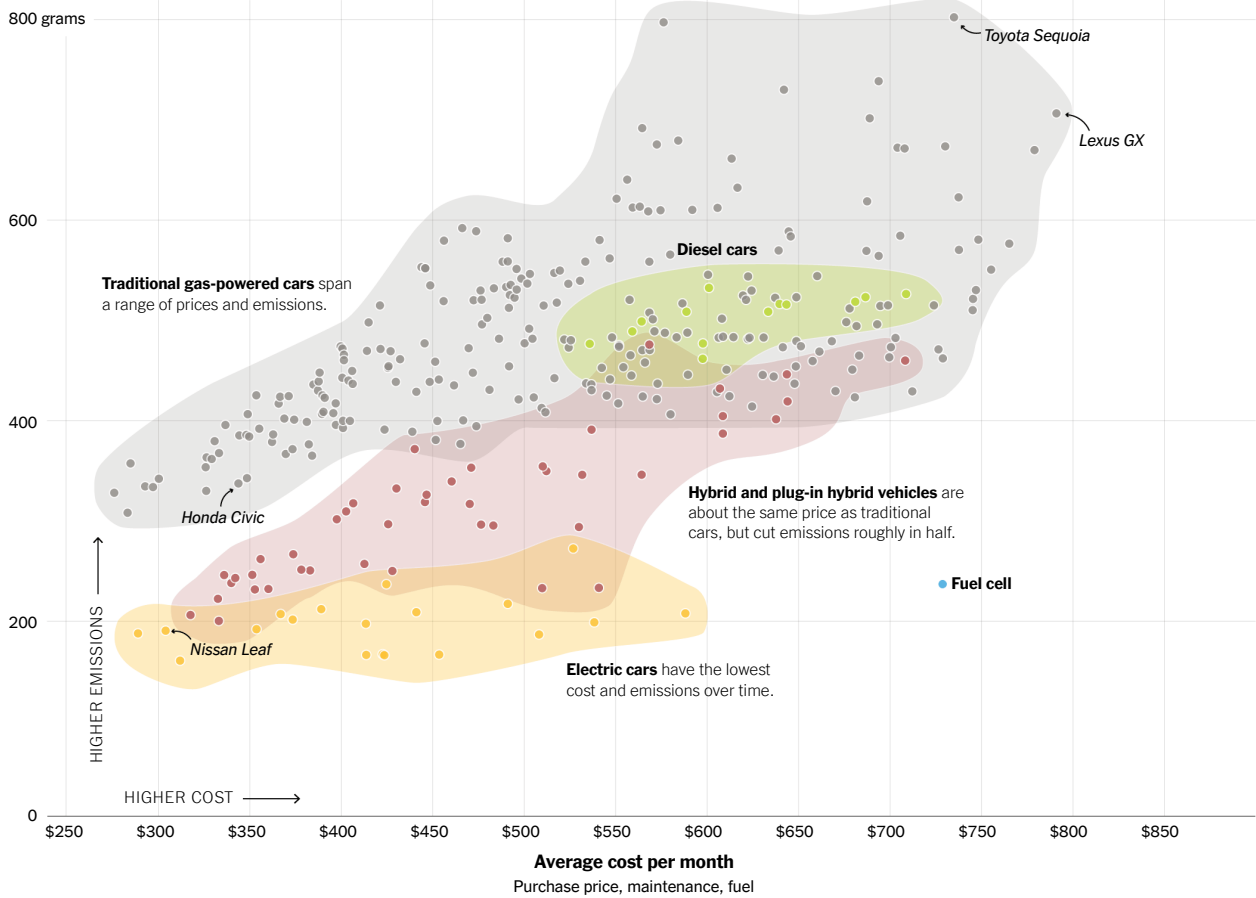


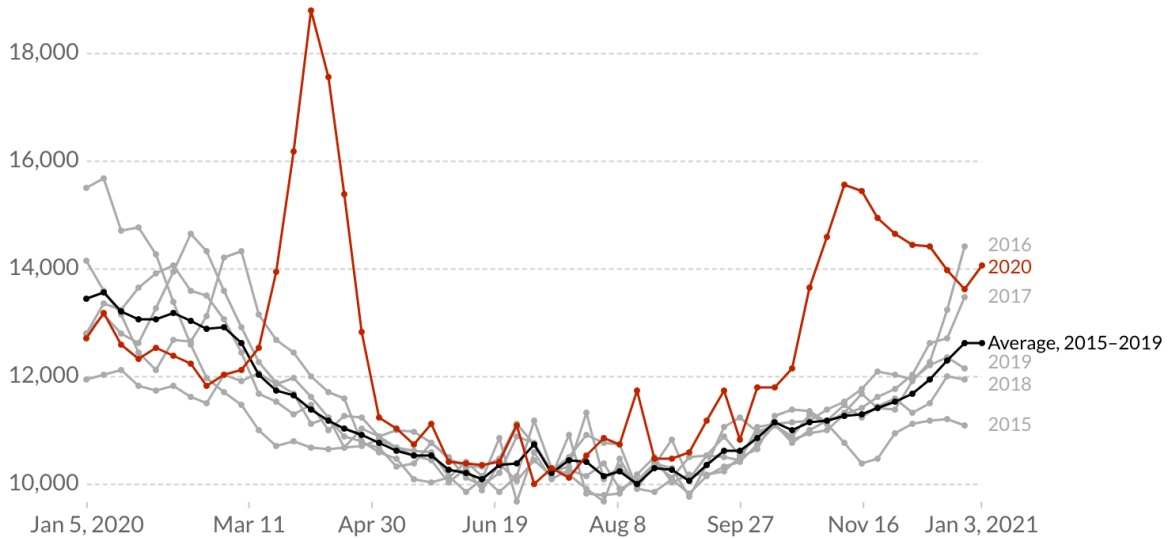
Image 2

Excess mortality during COVID-19: Raw number of deaths from all causes compared to previous years, France



Shown is how the raw number of weekly deaths in 2020–2021 differs from the number of deaths in the same week over the years 2015–2019. We do not show data from the most recent weeks because it is incomplete due to delays in death reporting.

[Change country](#)



Source: Human Mortality Database (2021)

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▶ Jan 5, 2020 ○ Jan 3, 2021

CHART

TABLE

SOURCES

DOWNLOAD



Image 3

Graphic detail Music and moods

The Economist February 8th 2020 81

Sad songs say so much

Data from Spotify suggest that February is the gloomiest month

RESIDENTS OF THE northern hemisphere might think that their moods are worst in January. Christmas is over, the nights are long and summer is a distant prospect. Newspapers often claim that “Blue Monday”, in the third week of January, is the most depressing day. To create a quantitative measure of seasonal misery, *The Economist* has analysed music consumption.

Our calculations use data from Spotify, which offers 50m tracks to 270m users in over 70 countries, mostly in Europe and the Americas. The firm has an algorithm that classifies a song’s “valence”, or how happy it sounds, on a scale from 0 to 100. The algorithm is trained on ratings of positivity by musical experts, and gives Aretha Franklin’s soaring “Respect” a score of 97; Radiohead’s gloomy “Creep” gets just 10. Since 2017 Spotify has also published daily tables of the 200 most-streamed songs, both worldwide and in each country. We gathered data for 30 countries around the globe, including 46,000 unique tracks with 330bn streams, to identify the annual nadir of musical mood. Drum roll, please.

The global top 200 songs are gloomiest in February, when their valence is 4% lower than the annual average. In July, the perkier month, the mood is 3% higher. The most joyful spike comes at Christmas.

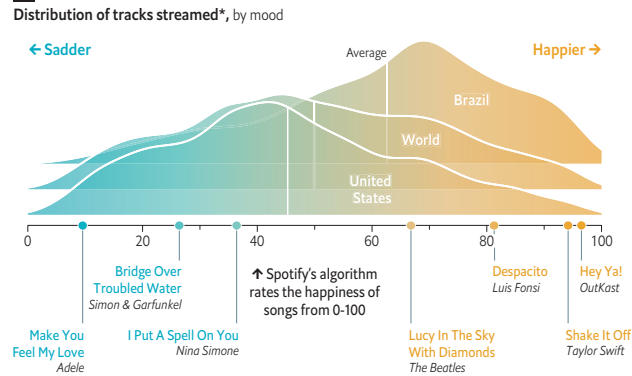
Strikingly, this February slump occurs in some countries near the equator, such as Singapore, and far south of it, such as Australia—even though their musical tastes differ. A few Latin American countries lack such a dip, perhaps because the algorithm sees Latin music as mostly happy.

The icy north shows the biggest seasonal swings. Finland’s mood in July is 11% happier than usual. Overall, on days when a country gets one more hour of sunlight than its annual average, the valence of its streams increases by 0.6%. In contrast, wet days bring particularly downcast tunes.

So why might some countries with long days and clear skies in February get the blues? The cause is not a deluge of mopey singles, since we found no evidence that songs released then were particularly sad. The most played tune of all—Ed Sheeran’s “Shape Of You”, with a valence score of 93 and a remarkable 2.4bn streams—came out in January 2017.

Perhaps the global dip is explained simply by the calendar. For most people, the first weeks of a promising new year have disappeared with little sign of improvement. Anyone for some Joy Division? ■

→ Some countries listen to happier music than others



→ But most see a dip in happiness early in the year



Sources: Spotify, *The Economist* *200 most-streamed songs on each day, January 1st 2017-January 29th 2020