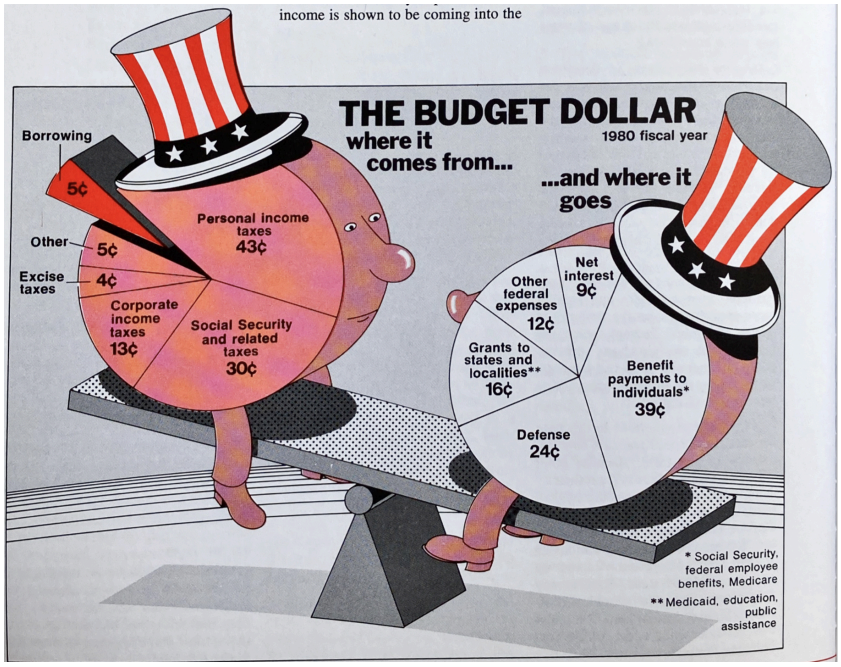
DH150 Visualization
Demo03: Information Visualization

Agenda:

1. How to analyze the chart/graph/diagram
2. How to analyze the data
3. How to create basic graphs (pie, bar, line) and advanced graphs
4. How to analyze the visual attribute
5. How to get rid of clutters (simplify)
6. How to review the work and choose the two alternatives (for a different target)
7. How to publish the work and share/ get the url to submit

In this demo, I would like to show you how you can draw a graph/chart by analyzing the structure. For this demo, I want you to have the chart of choice from Nigel Holmes works. They should be one of pie charts, bar charts, line graphs, or tables.

I choose this:



Step01: How to analyze the chart

1) Read the chart and write a note, here are the examples
    - Ex. finding the title (The budget dollar) and subtitle (where it comes from and where it goes). The components are two: one is where the budget comes (=revenue) and the other is where it goes (=spending). The message is ‘spending is more than revenue - 5% is from borrowing. Target audience is not a scientific reader but the general public - because it looks like the two charts seem to be

intended to educate the general public to easily understand the federal gov's fiscal year data, in % (the ratio is metaphorically presented as cents for dollar) and playful visual metaphor with seesaw (spending is now down = heavier).
- There are two pie chart
- The pie chart wants to show the structure of budgets (by items); and also wants to show the relationship between the revenue and spending for comparison.

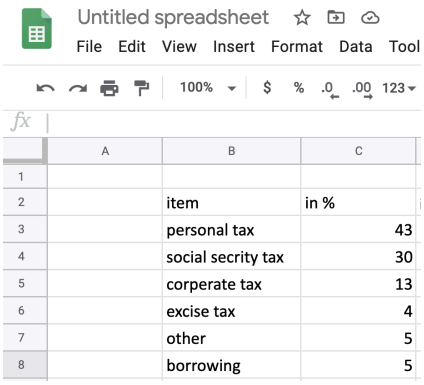
Step02: Read the data
I will list them out the data I can see in the chart, there are numbers and the text -- so I can make a pair, [ITEM]: NUMBER

Pie_Chart1: Where it comes from
Personal income taxes: 43 cents
Social security and related taxes: 30cents
Corporate income taxes: 13cents
Excise taxes: 4cents
Other: 5cents
Borrowing: 5cents

Pie_Chart2: Where it goes
Benefit payment to individuals: 39 cents
Defense: 24 cents
Grants to states and localities: 15 cents
Other federal expenses: 12cents
Net interests: 9cents

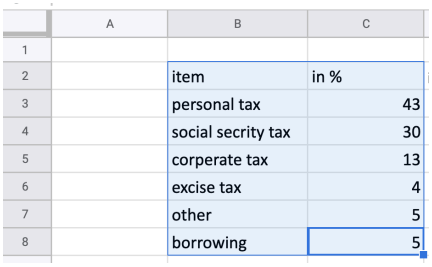
Then, I will organize the data in the spreadsheet to test graphs, using google sheet
- You may use other tools like MS excels, tableau, numbers, or illustrator
- If you want to use D3 or R, first make a data file -- then you will save the data as json, tsv, or csv format, then you need to load the data in the program in order to plot.
- The demonstration is for those who never experienced charting with any program - you do not need to follow these if you are experienced with creating a chart, just go with your own way.

a) Open the google sheet (https://docs.google.com/spreadsheets/)
b) There need two columns in table, ITEM and NUMBER

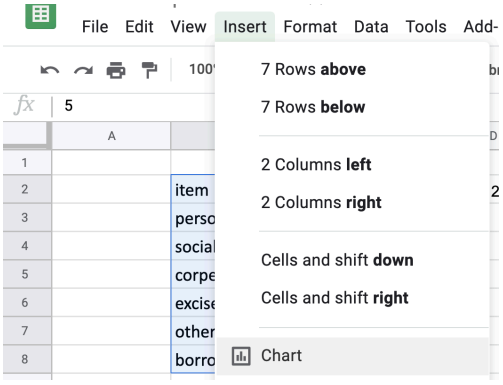


c) Then, explore the data with the charts - I will first test with the pie chart as the same type the original design has.

First, select the range of data (drag and drop)



Go up to “Insert” > select “Chart”



It will automatically create a default chart and open the chart editor window on the right side; a bar chart by default was created like this:

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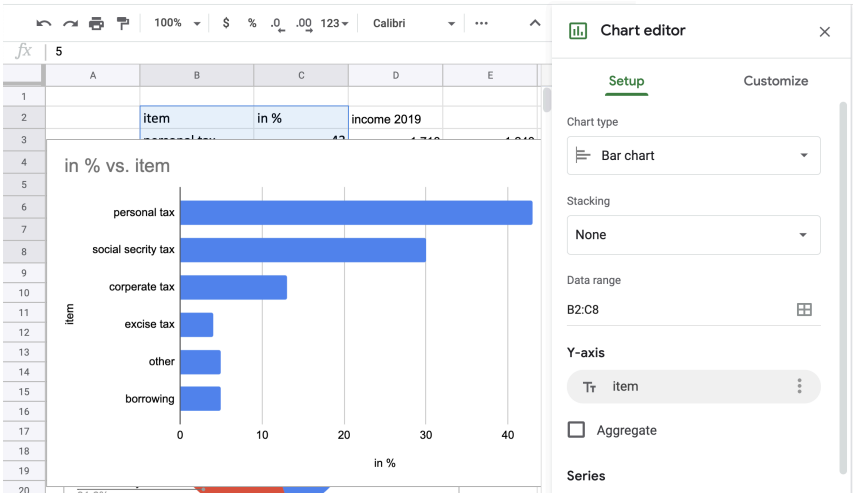
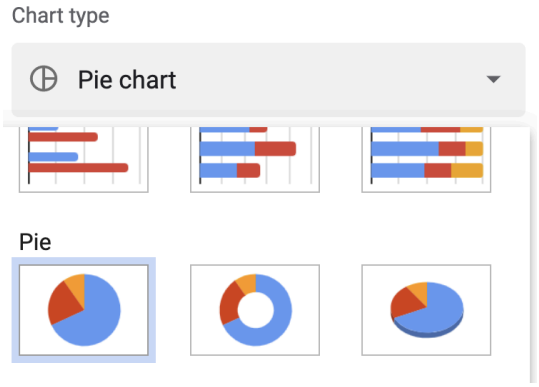
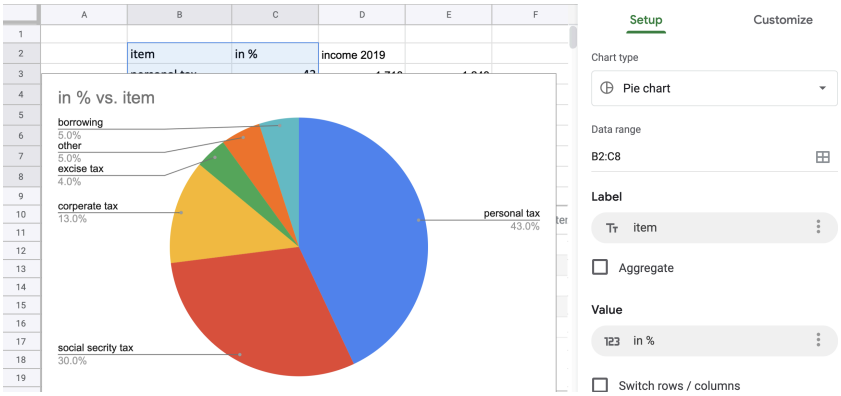


I will change “Bar chart” under chart type on Setup in Chart editor into “Pie chart”



And there comes a pie chart with the given data:



And compare the outcome with the original chart -- what are different?

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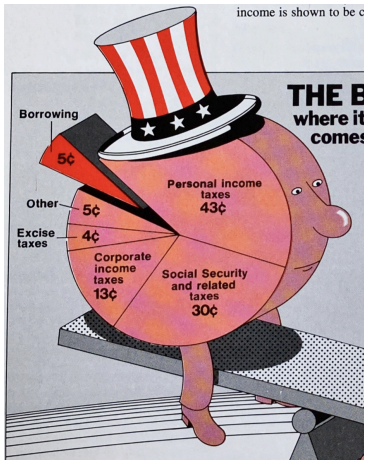
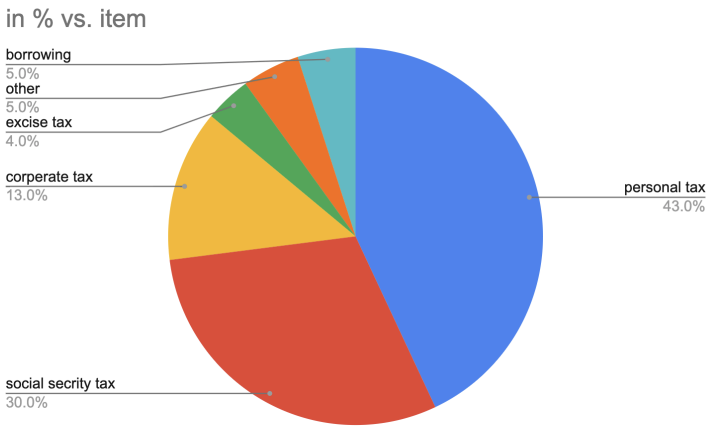
Initial visual attribute analysis (part of Step04):





- Then analyze the visual elements/attributes:

  I can see the arrangement of the arc (the piece of the pie) is different. The new one starts from 12 o'clock, while the old one has around 10 o'clock.
  >> so the "personal tax", for example, arc looks different, especially the size (the old one looks wider vs. the new one looks narrower)

  I can see the color (hue) is applied differently - the old one has the same solid color of pink (with noise of yellow) for all pie pieces except the red for burrowing; the new one has different primary colors (blue, red, yellow, …) for each pie piece.
  >> The same color in the old version can make the pie chart look like a side view of the face; but it makes it hard to distinguish the detail parts.
  >> The different colors in the new version can make it easy to recognize each item, but they are highly saturated and easily make the reader's eyes get tired.

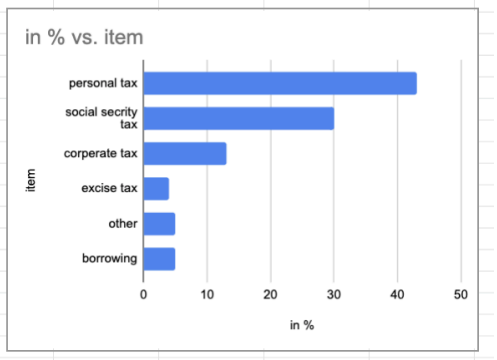
  The borrowing item in the old version is exaggerated by 3D effect and red color with black shadow - it looks bigger than "Other" item that should be in the same size. In the new version, the borrowing has green-blue color compared to the bright-orange Other. For some reasons, the bright-orange looks more important than the green-blue (which looks a bit dimed).

  The title of the chart is not properly located (distanced from the chart) in the old version - and "where it comes from..." is vague what it means (and it needs to be understood with "fiscal year 1980"). In the new version, it is good to start with the title on the left top on top of the legend - but the automatically generated title by combining column labels "in % vs item" doesn't make sense. The clear title is needed like "income items in %" or similar.

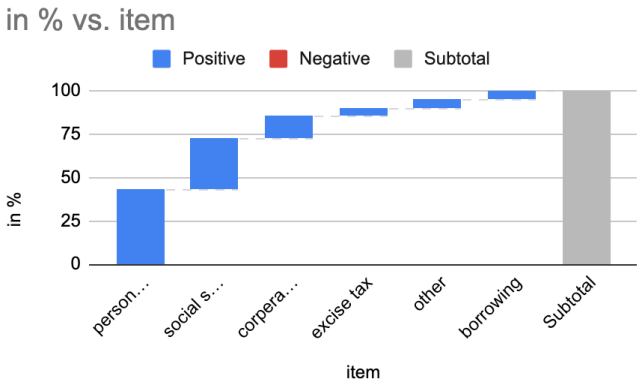
The legends are shown inside of the pie in the old version - but some little pieces are explained with the legend outside along with the connected line. The new one has all legends outside with the connected lines, and it looks visually consistent but feels a bit too distanced - maybe better to make the overall graph narrower so as to make the distance closer between the legend and the pie piece.

Step03: how to create the basic graphs/chart and some others.

Let's try the different types of charts --- select the data table, then go to insert > chart > select bar-chart.



And tried waterfall:



(idea: maybe borrowing can be marked differently, like negative)

And stacked bar chart:

By default, it shows every spread out -

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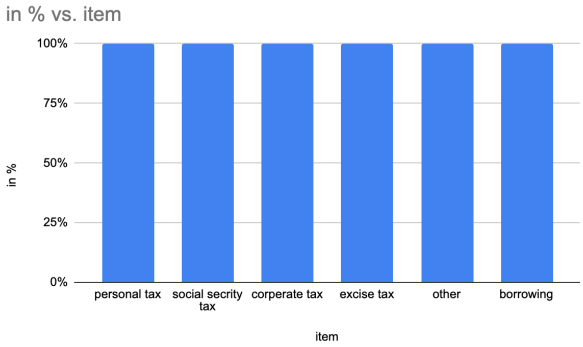
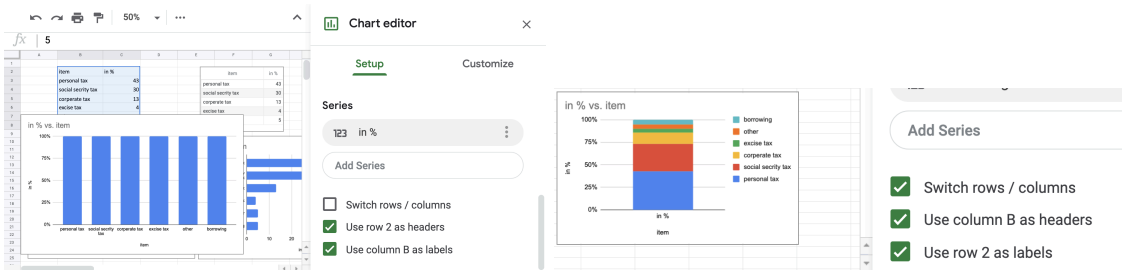
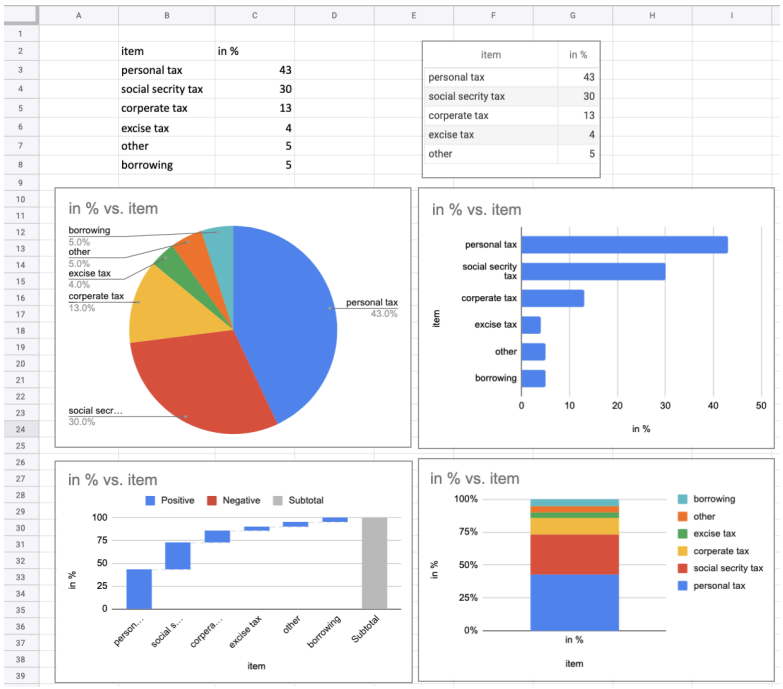


But “switch rows/columns” option, it will turn to a stacked column:



I have four alternative types of visualization so far:



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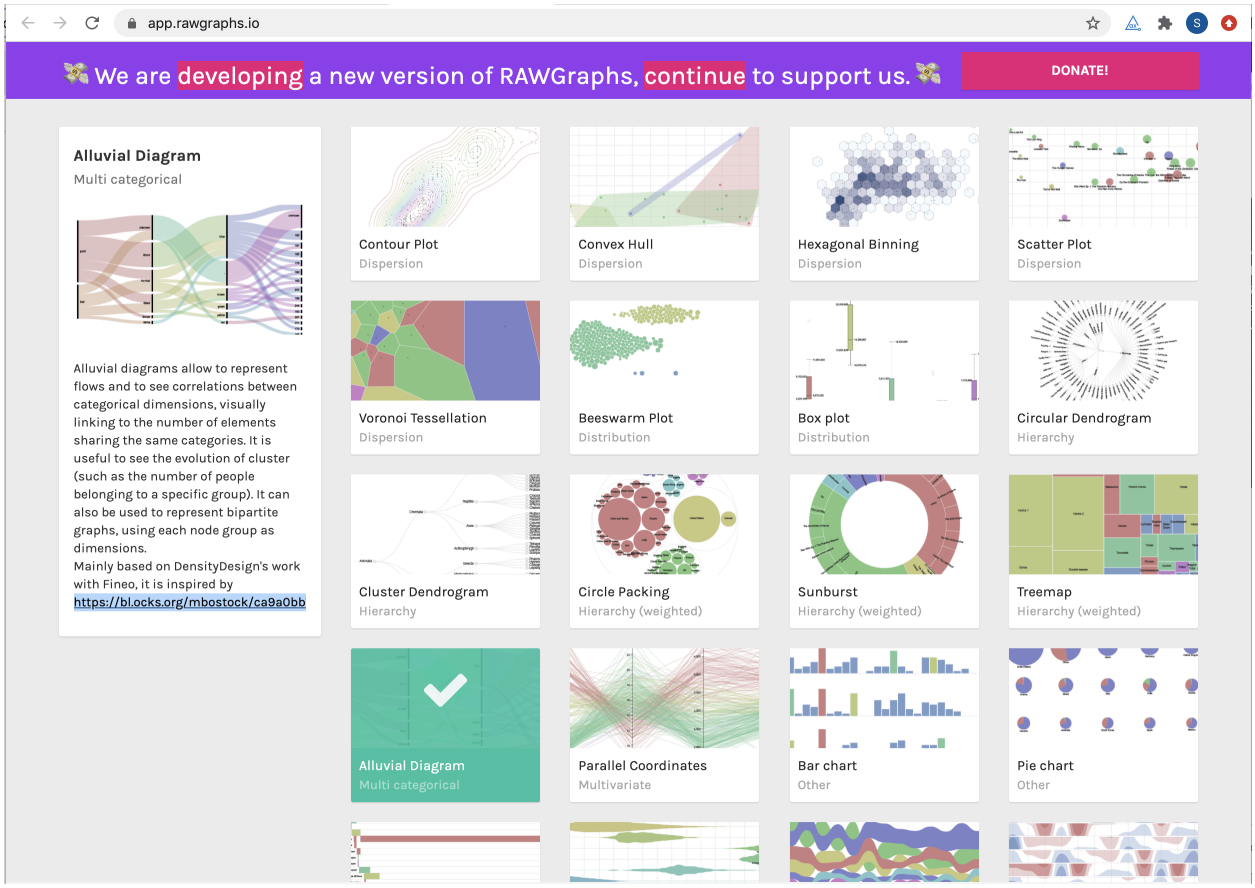
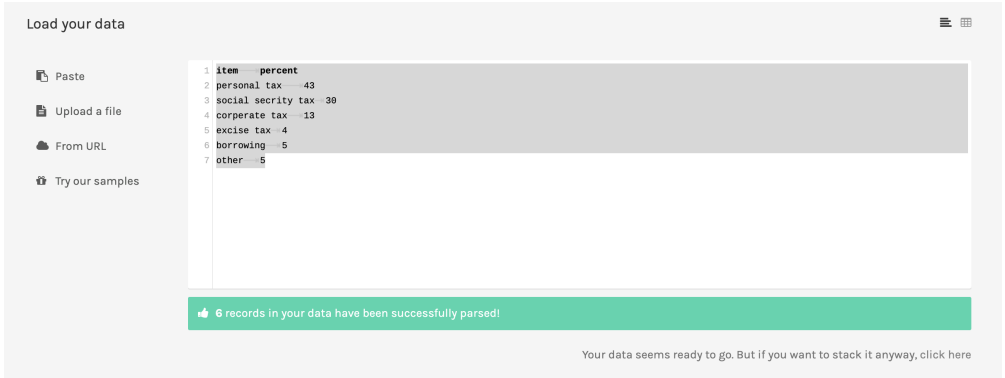
[advanced/ optional exploration]

Depending on your data, you can explore more complex type of visualization - https://rawgraphs.io/ can help you to create some D3 graphs:



For example, I wanted to try tree map, so I pasted the copied data table:



And chose treemap

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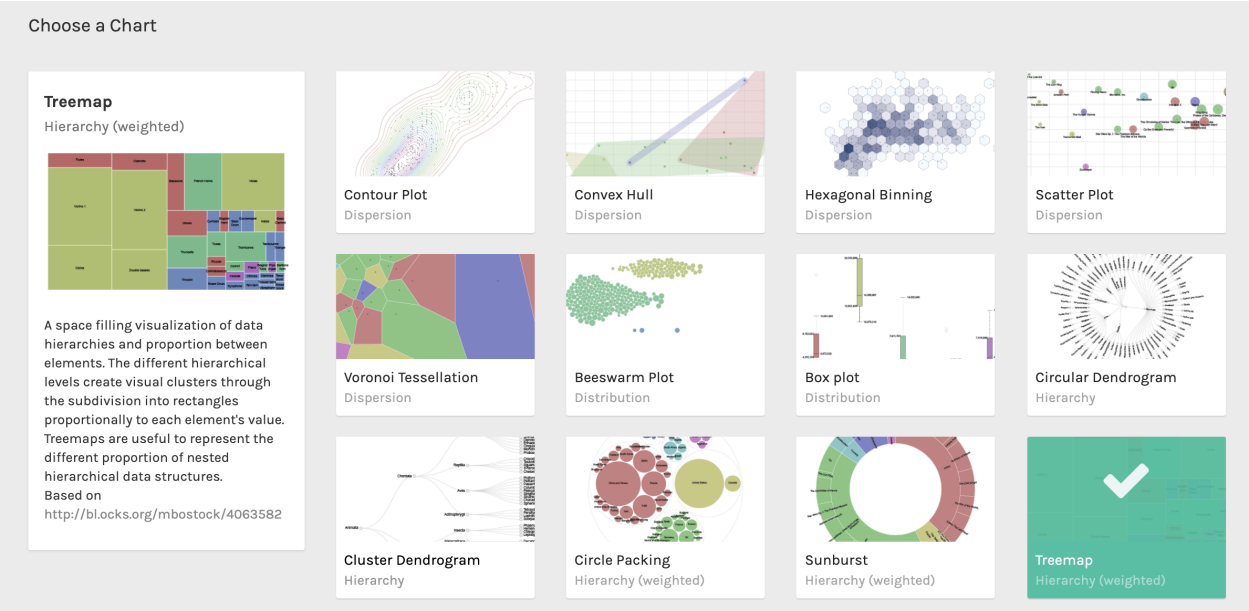
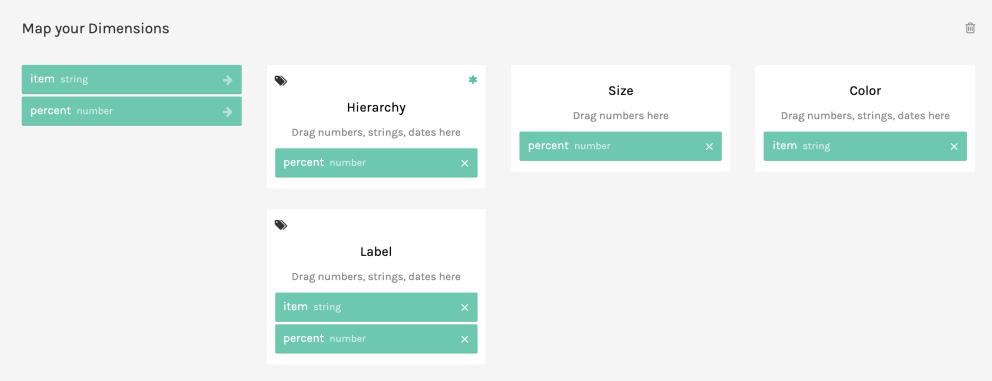


Then, setup the details how I would like to show:

First, I want to show the hierarchy of the income budget structure;
And show the different size for the different data;
I would like to show different size for the different item
And then, add details in label by item and percent(number).

If your dataset is complicated (with substructures), some advanced visualization is helpful -- you need to test several possibilities on “mapping” to find out the ideal alternatives.



It shows me the draft graph by default visual attributes (= only color)

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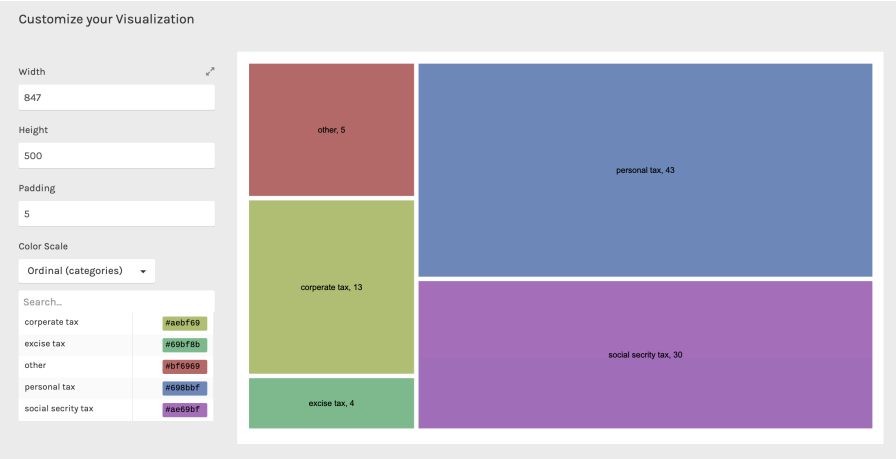
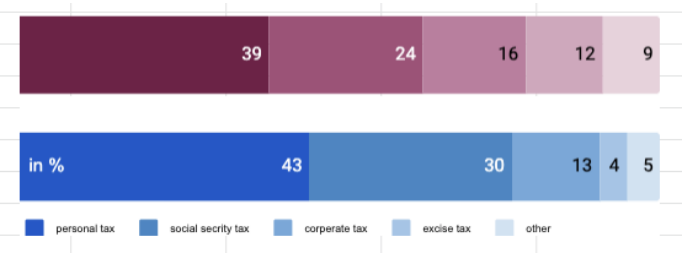


Then, I can either download the image(png or svg) and json file of the data, or copy the embed code to insert in html.

Come back to the charts -- the original graphics has two pie charts to show the in and out of the government budgets details. I think stacked (bar/column) charts would be better than the pie chart to show the proportional data; but I think using the same type of chart for input and outcome would be confusing for the readers.

> Because the readers might want to compare the same category for the change -- for example “borrowing” in 1980 vs. “borrowing” in 2020; but the outcome has different categories (or items -- it doesn’t have borrowing, for example) - so it is better to prevent such temptation of comparison by providing a different type of chart. (for example like the below)



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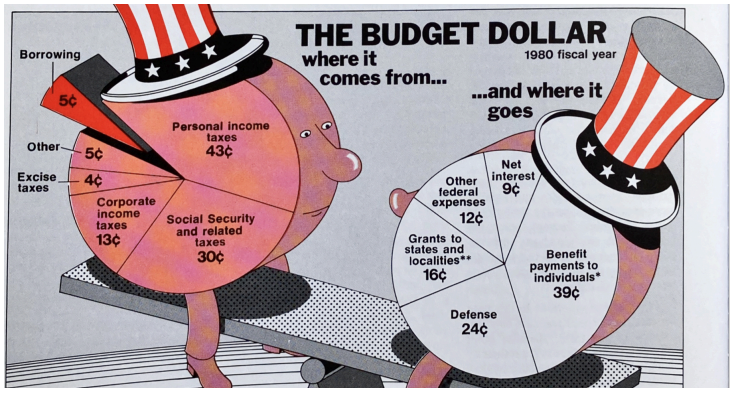
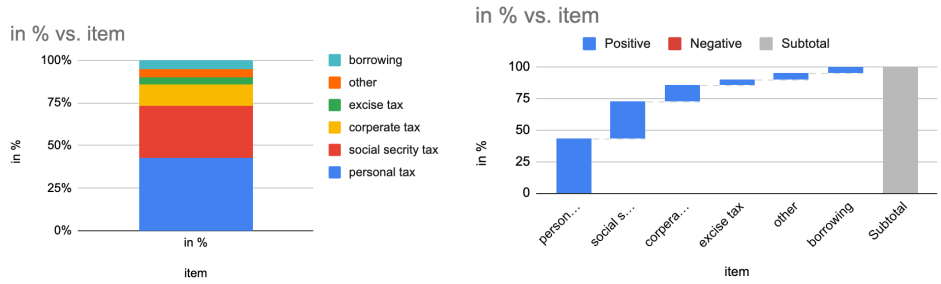
The similar structure, but break down/spread out by categories, can be presented with the waterfall chart -- so I think using those two would be good to show the accumulated income and explosion(?) of the spending.

Two charts I chose to present the original data:
[orignal]



[my idea]



Step04: Analyze visual attributes
I want to change the visual attributes to make the information easier to understand (clearer message) -- the message would be to show the structure of the budget (income and spending).

The visual attribute in use is the size (expectaly speaking the height of the rectangle) and colors. I think Size is the important information mapped with the numbers (percentage of the budget); and color is only used to distinguish the items. First, I would make the color, hue changes, less dramatic.

1) Double click and open Cart Editor > click to open Customize tab

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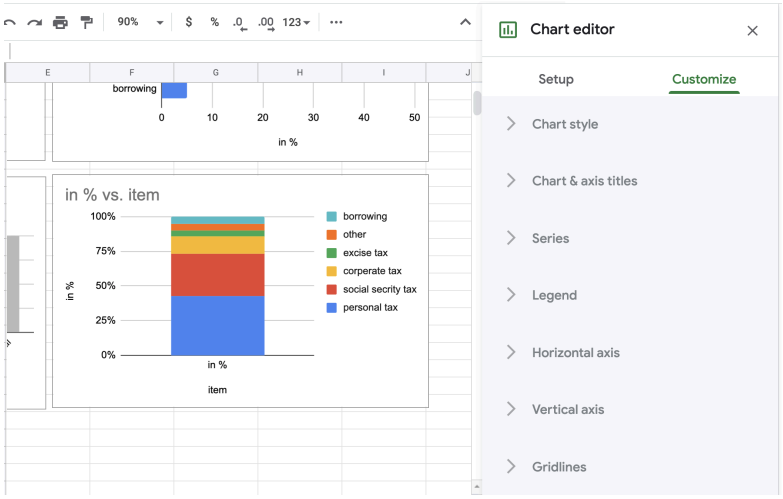
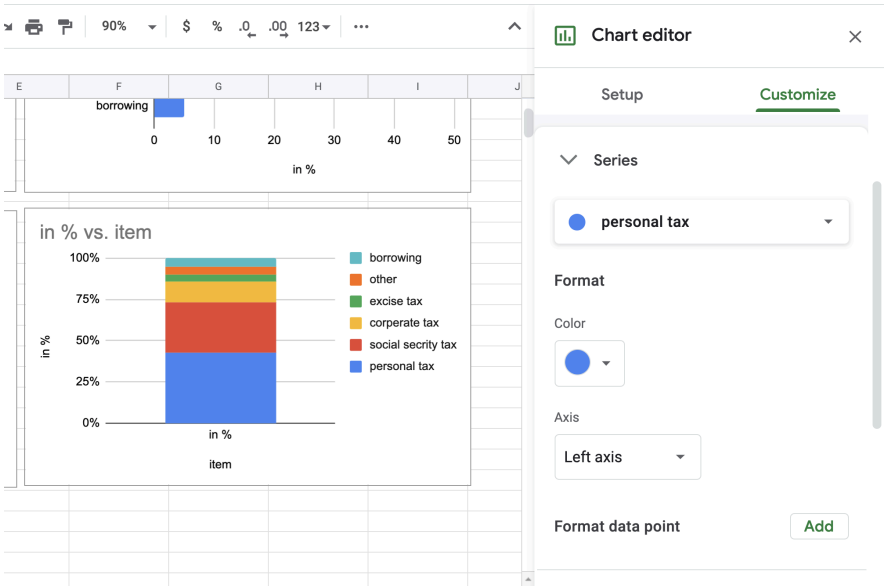


2) This is about the categories (items) or some type of groups, so “series” seems to be relevant -- click to open “series”



It shows the first item “persona tax” and its visual attribute (= color). So, I will change all the colors as one hue but different lightness/saturation (= monochromatic color). I think the income can be marked either black (representing profit) or similar. I will go with a blue color family for now.

I will pick the biggest one as the darkest color -- than getting brighter for the lighter budget items. In the color swatch, I can see the pre-set blue mono-chromatic variations -- will use them. I prefer less saturated blues that would be less disturbing.

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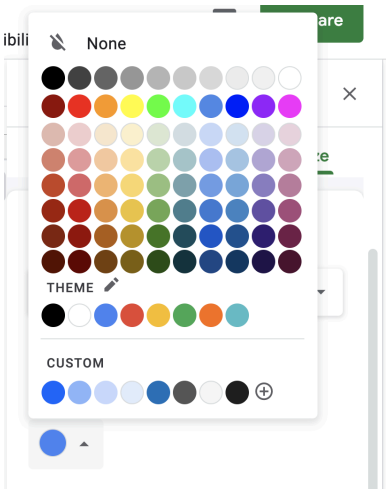
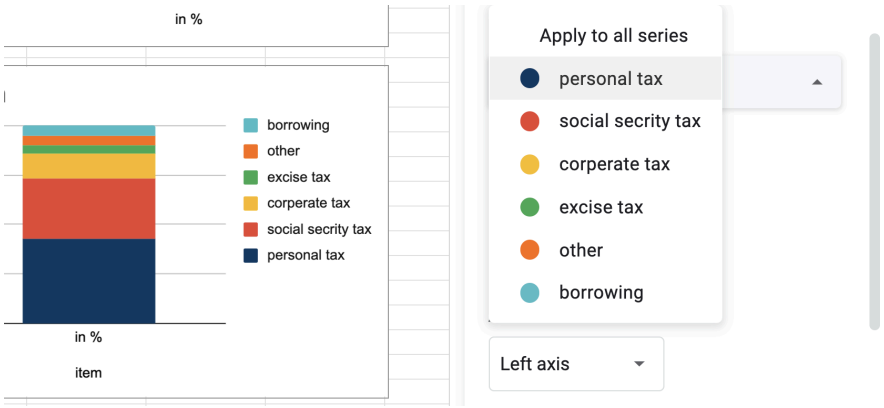
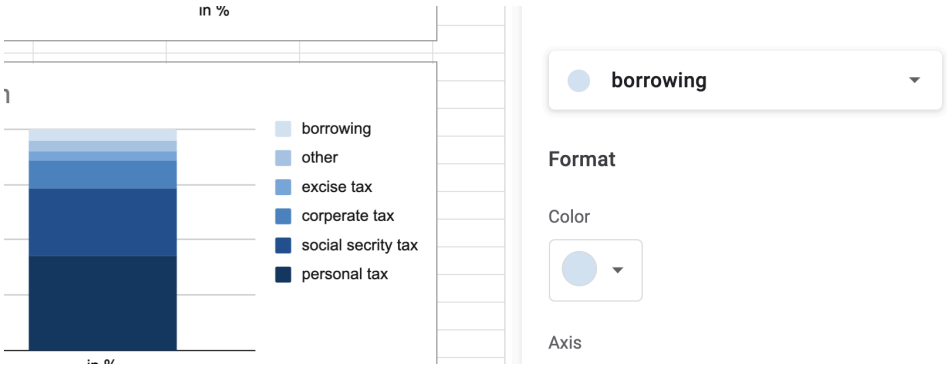


So, visit the series selector one by one, change the color in blue-grays.



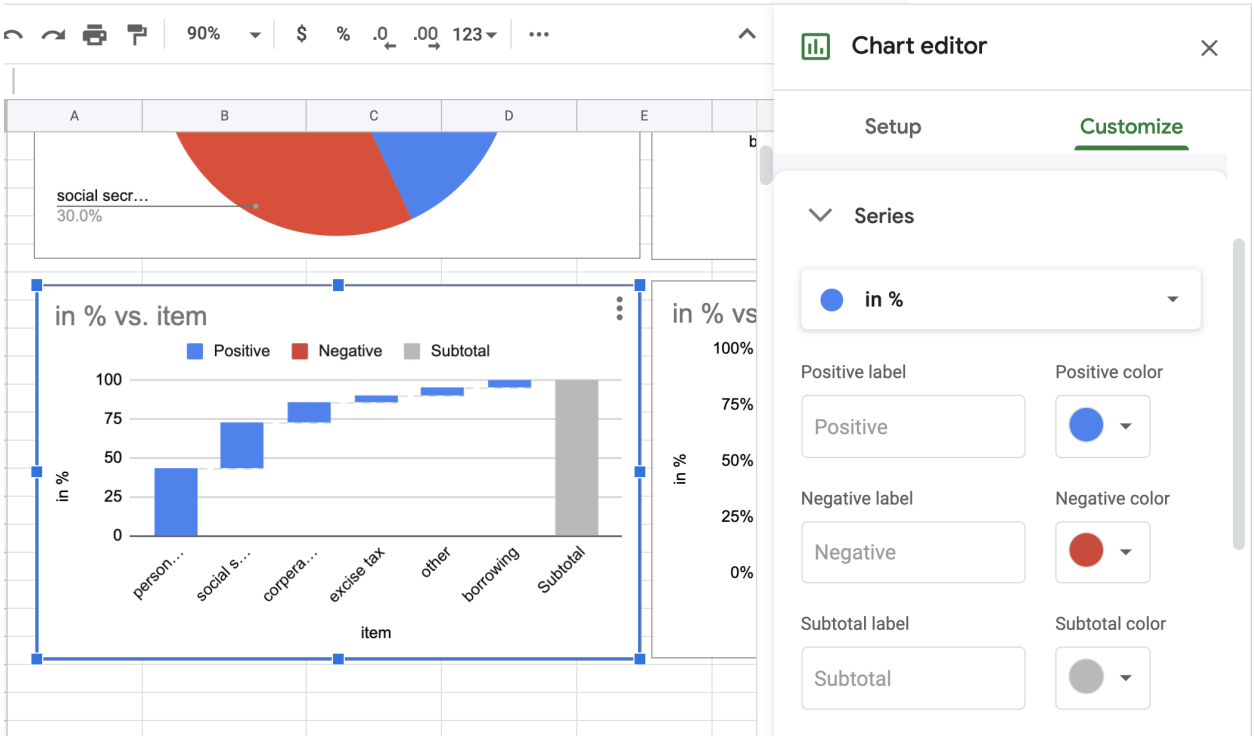
Into



I feel that this color scheme is enough to show the difference in items.

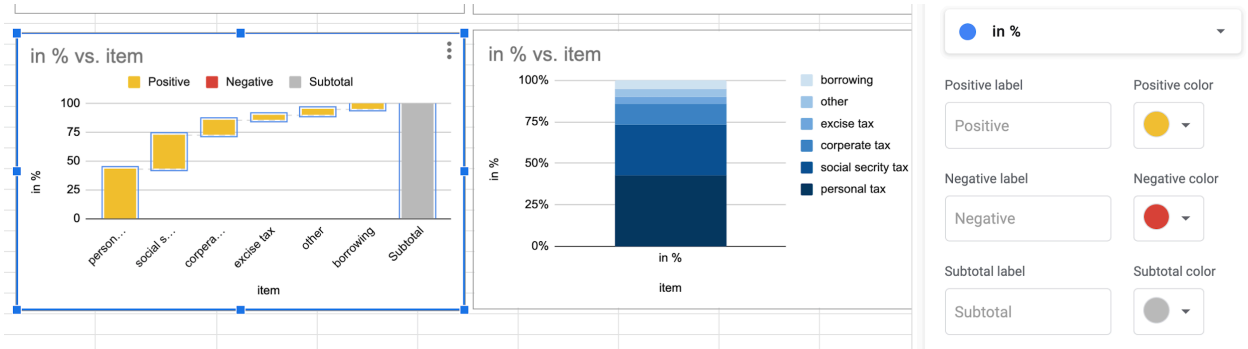
Then, I will work on the waterfall in colors -- same logic, but different hue -- I feel that different yellow (meaning opposite) or red (meaning spending) would be good.

From this:



I realize that this google sheet only offers one color for all the items because it doesn't need to provide any other distinction other than the position (which is the strongest visual attribute -- people won't miss the information).

I will try the complementary color yellow (to blue):



And test with (light) red:

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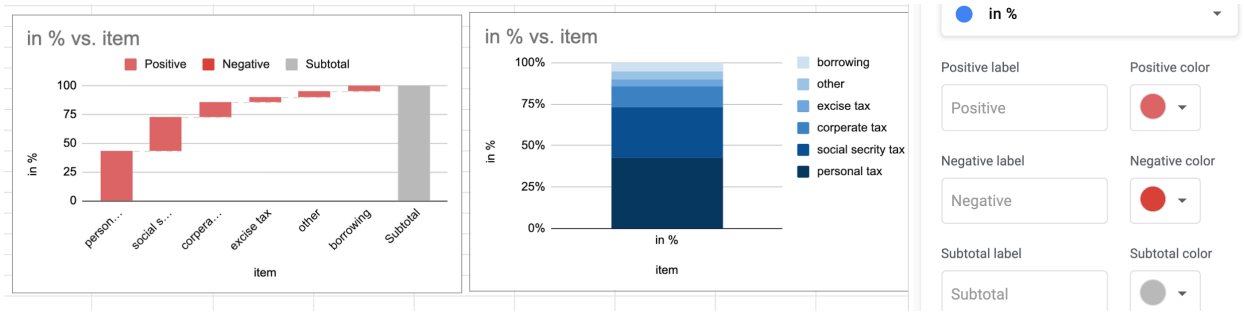
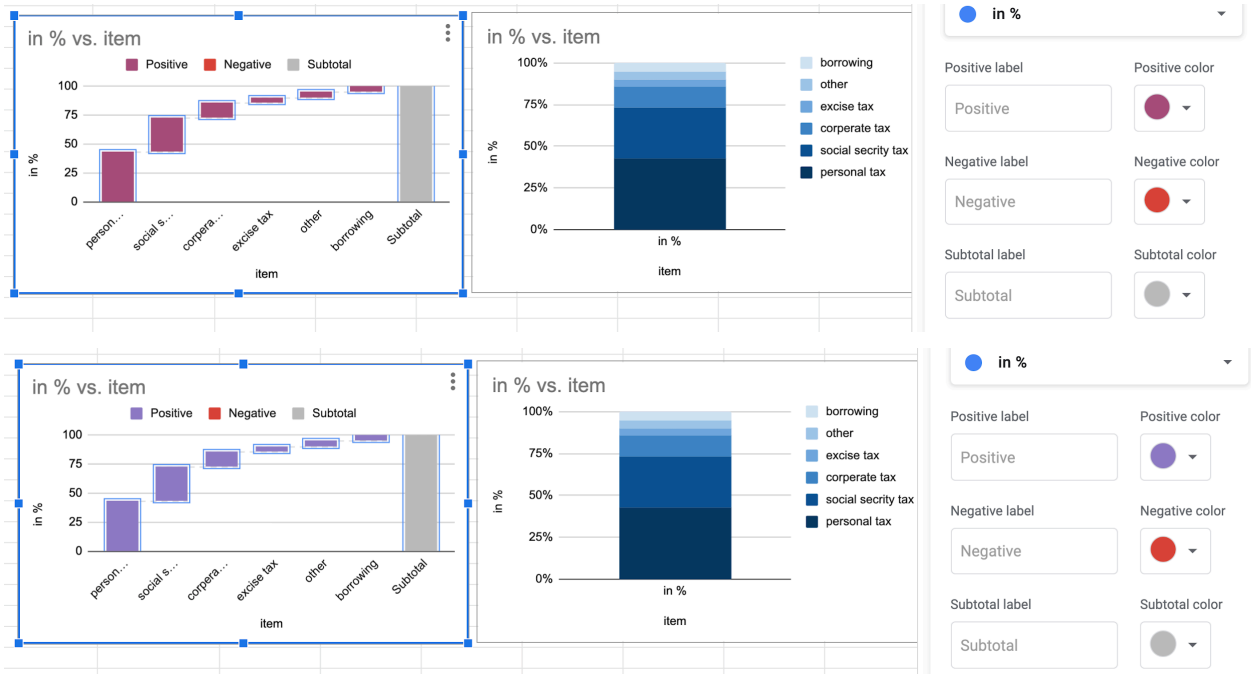


But I feel that red-ish blue (=violet or purple) would look less dramatic:



Light magenta is chosen for the final color to represent the spending.

Step05: How to get rid of the clutters
I would like to make the graphs look simple and clear for the message -- so I will rearrange the items by applying Gestalt theory to make the similar/related information look as a group .

First, the story goes, what comes and what goes out -- so by considering the reading direction (in western style) - “what comes” = the income would be better to be on the left and “what goes out” = the spending would be on the right side.

I will switch the graphs (income-stacked column on the left vs. outlay-waterfall on the right).

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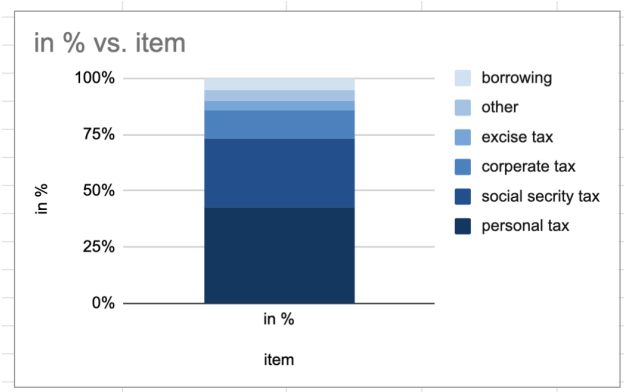
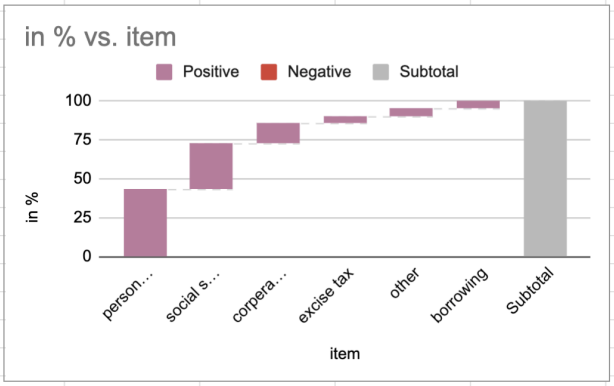
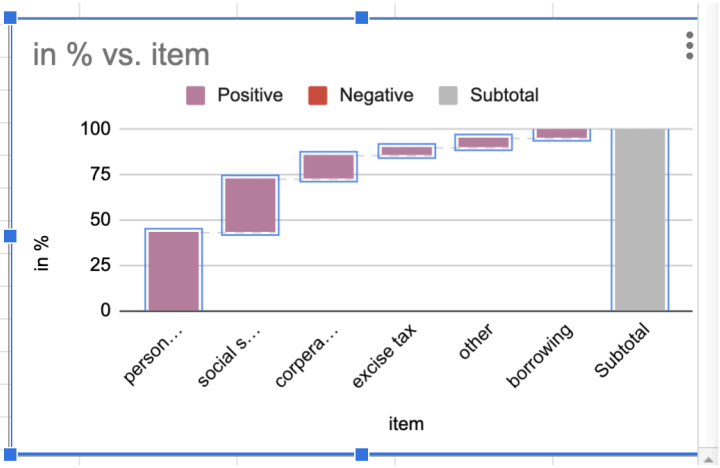
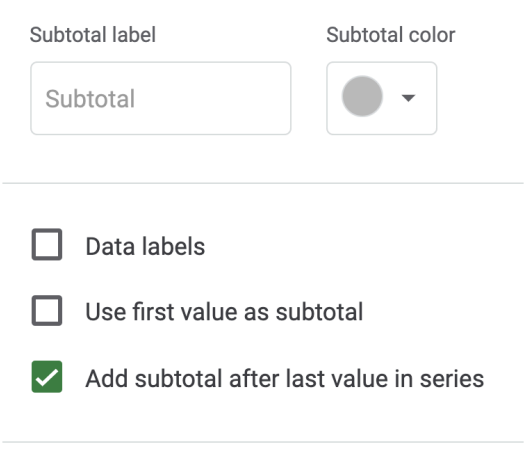
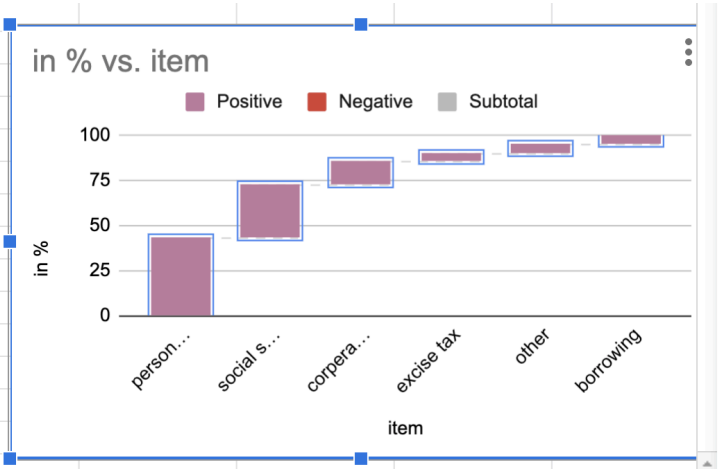


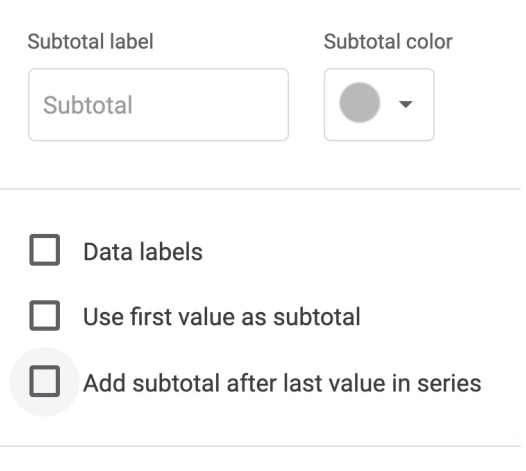


The subtotal in the waterfall looks redundant (as a whole) - so I will get rid of it. Uncheck “add subtotal after last value inseries”









Then, examine the graph if it shows the data you need to show -- unfortunately, It does not show the actual numbers (percentage) -- so better to show that numbers.

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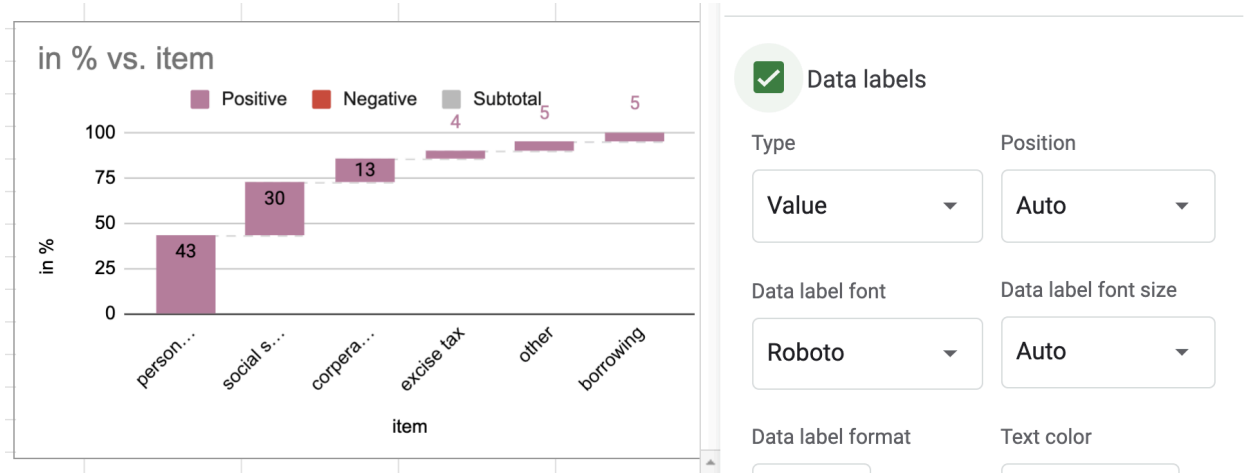
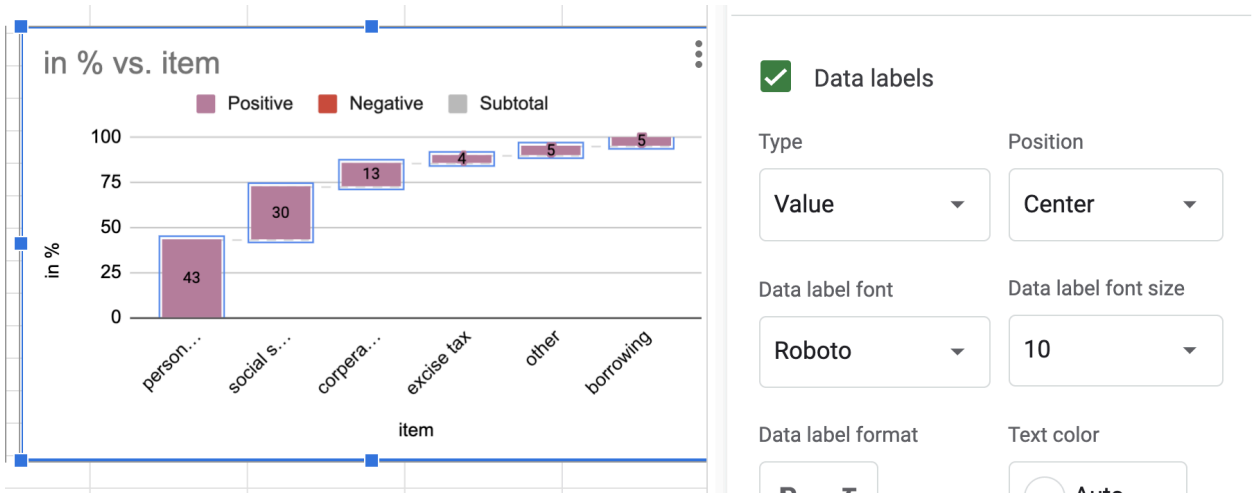
Check the data labels



Set the position of the labels inside or center.



The label font size is too large (or the graph is too small) -- so I will make the graph big enough to show the labels inside properly.

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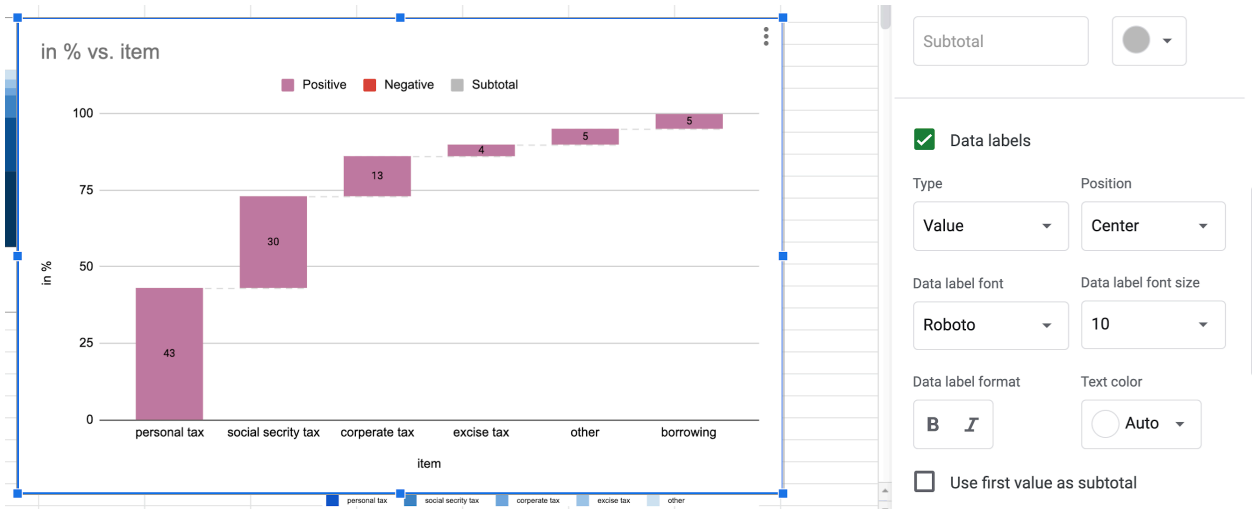
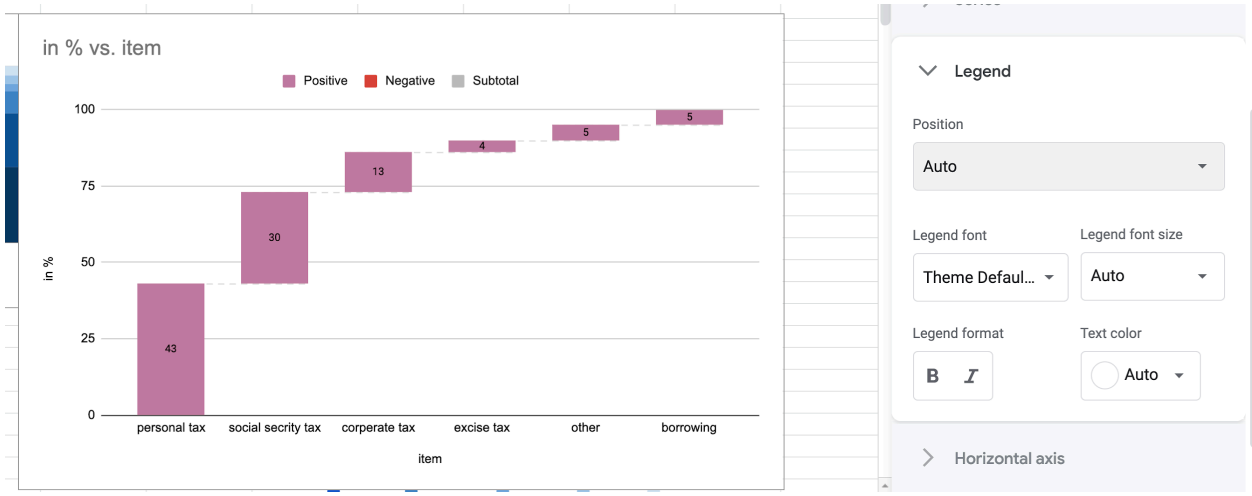


Then, I think the legend “positive, negative, subtotal” is not meaningful -- so will remove it.



Click legend position > none

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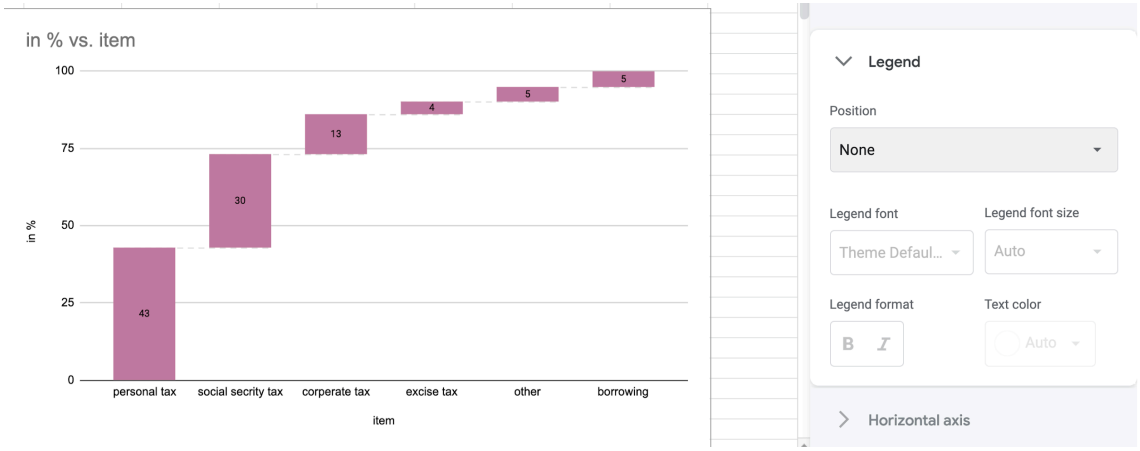
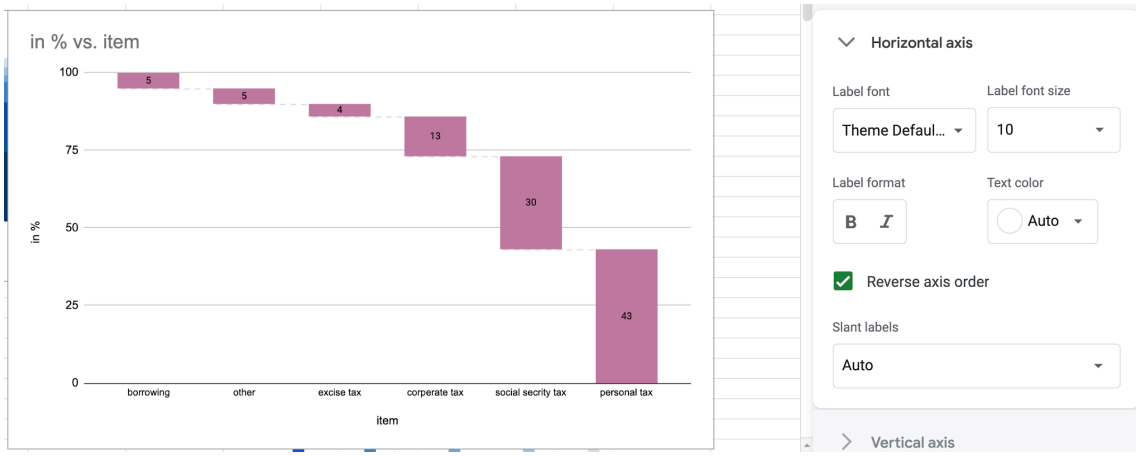


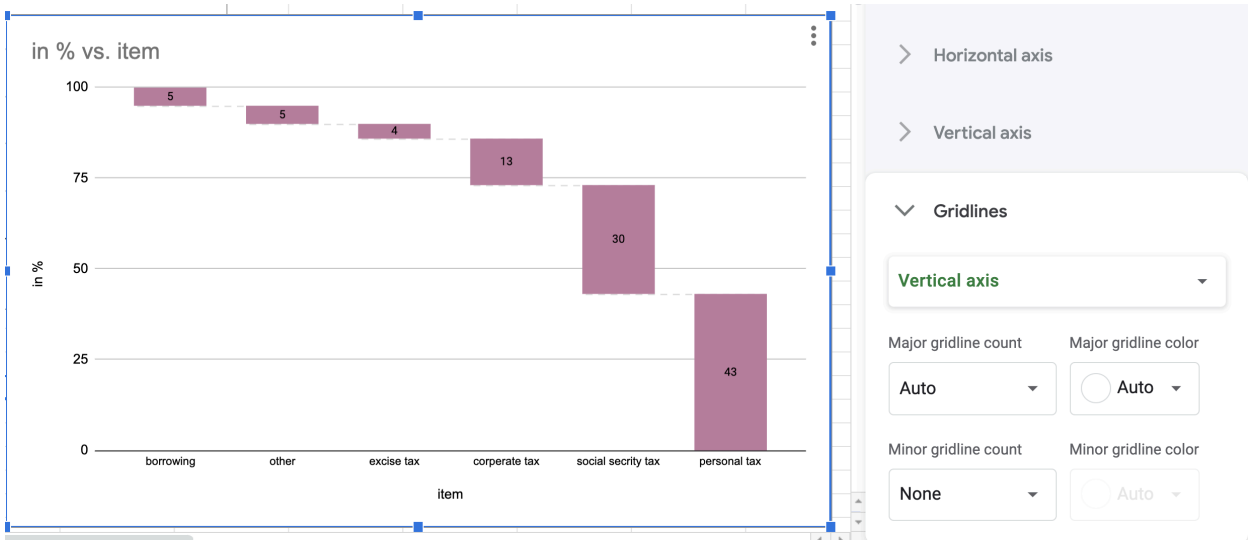
I want to make it look more falling down, so I will reverse the order of presentation, top to bottom. Goto horizontal axis, and check reverse



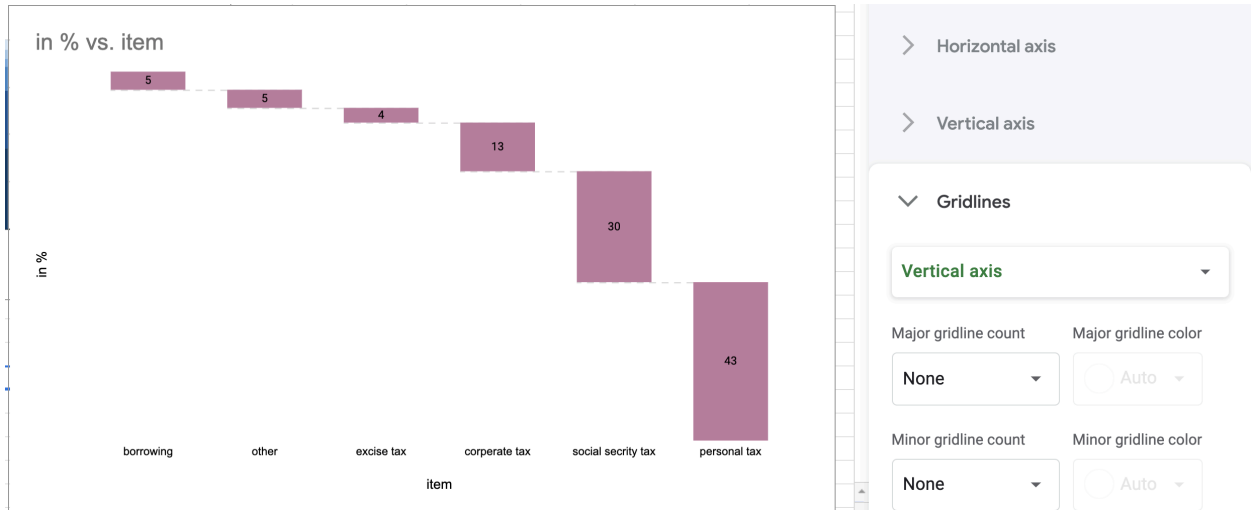
(I wish I could reorder/sort the items from the largest to smallest but I couldn't find the way -- let me know if you know that solution in this google sheet).

I don't think the grid lines are helpful to understand the data, so will remove it.

DH150 Visualization
Demo03: Information Visualization



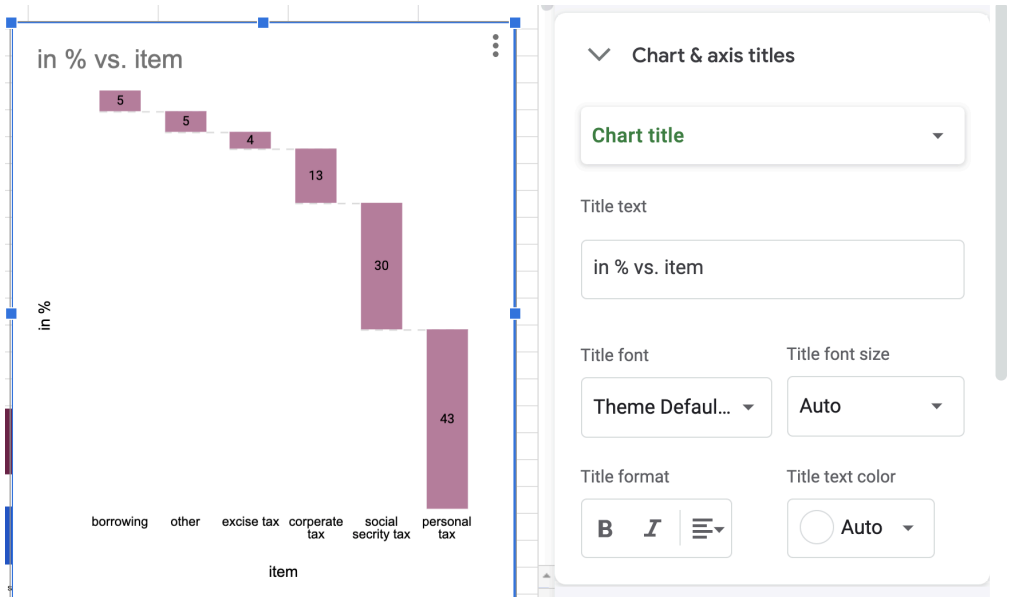
Change “major grid line count” Auto > none



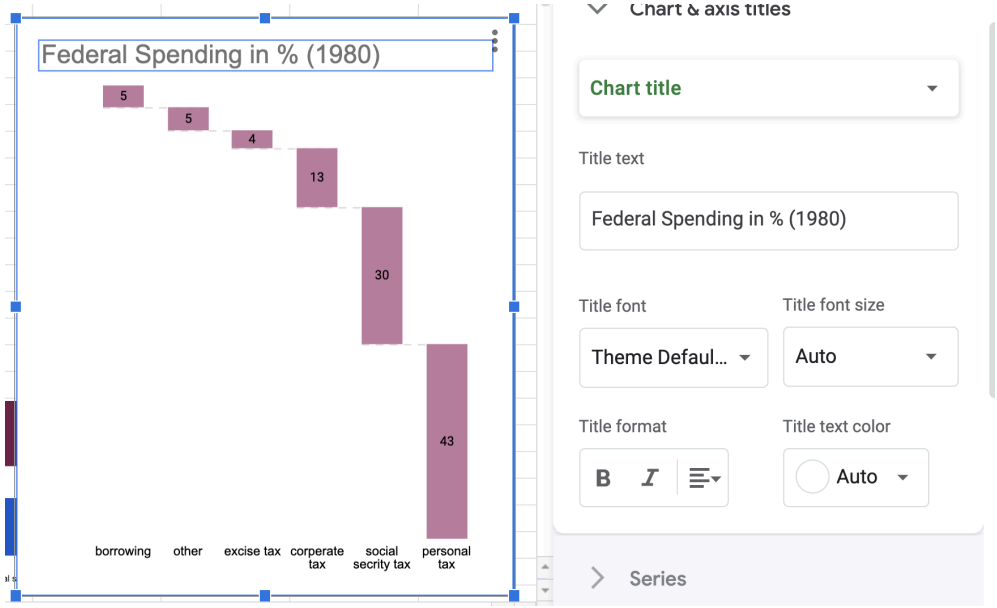
These are too distanced from each other - so let’s make the whole graph a bit narrower.

I will change the title more relevant one:

DH150 Visualization
Demo03: Information Visualization

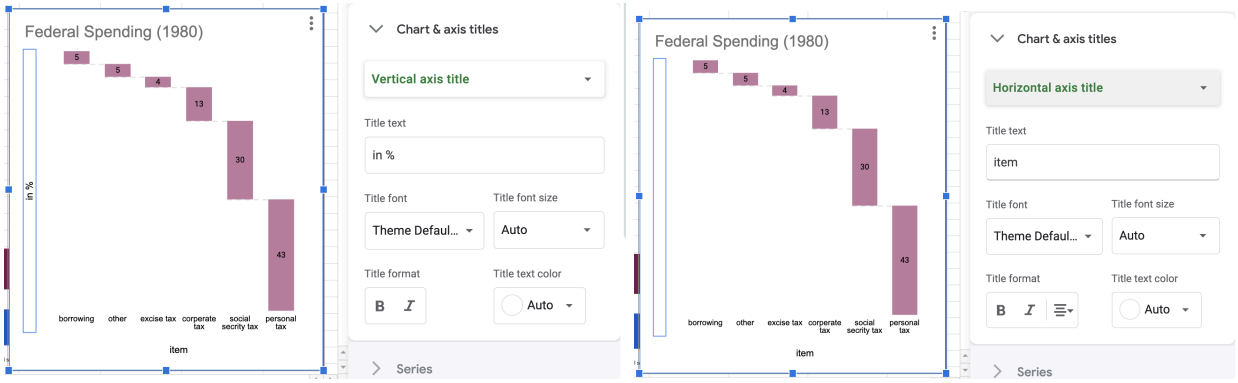


Change Title text to “Federal Spending in % (1980)”



Get rid of vertical axis title and horizontal axis title, which are not very informative -- either select and keyboard_delete, or if it doesn’t work delete the text and put SPACE (blank).

DH150 Visualization
Demo03: Information Visualization

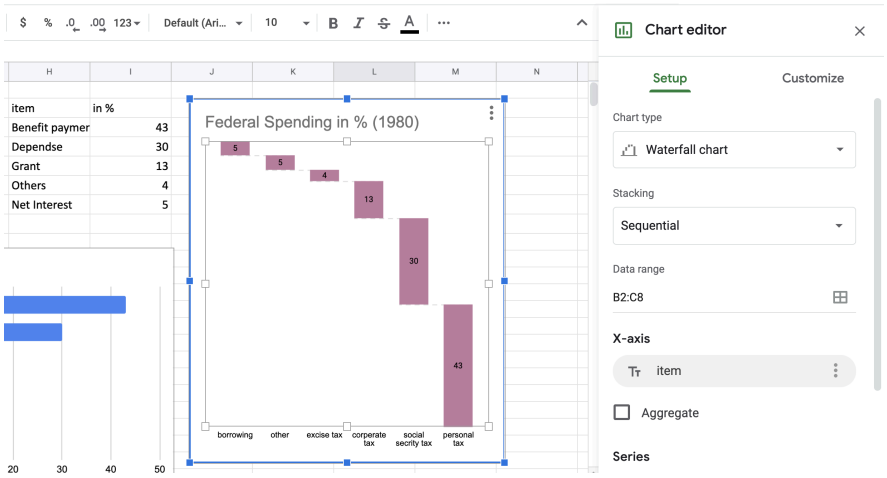


And I finally noticed that the data is not about the spending data - but the income data -- so I will replace that dataset.

First, write the data table from the original chart

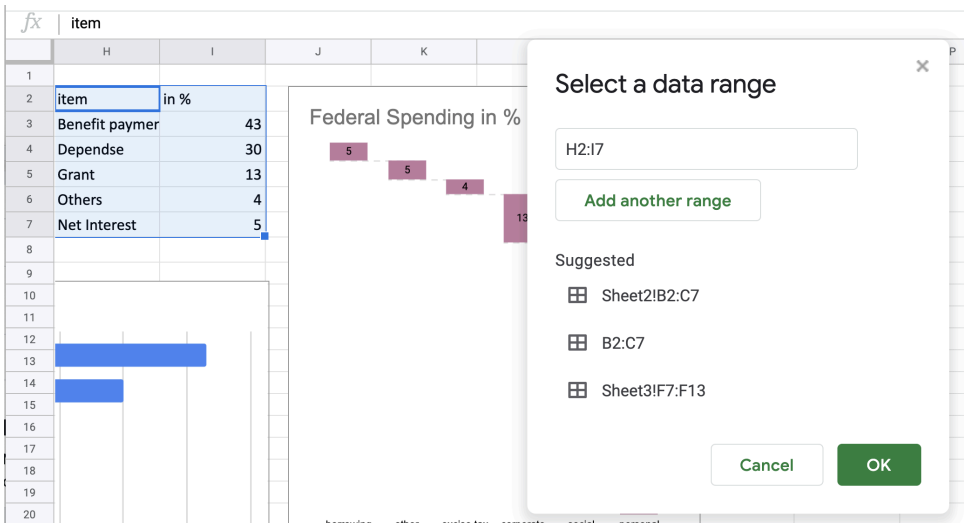
	H	I
1		
2	item	in %
3	Benefit paymer	43
4	Dependse	30
5	Grant	13
6	Others	4
7	Net Interest	5

Then, double click the chart to open chart editor

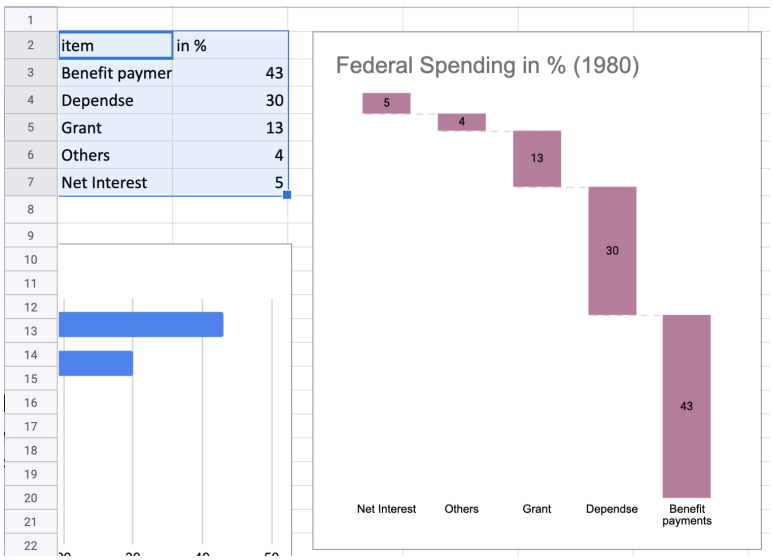


DH150 Visualization
Demo03: Information Visualization

Change Data Range to the new dataset: the data table can be found in row 2-7 and column H-I; combining, H2:I7 is the range of the dataset.



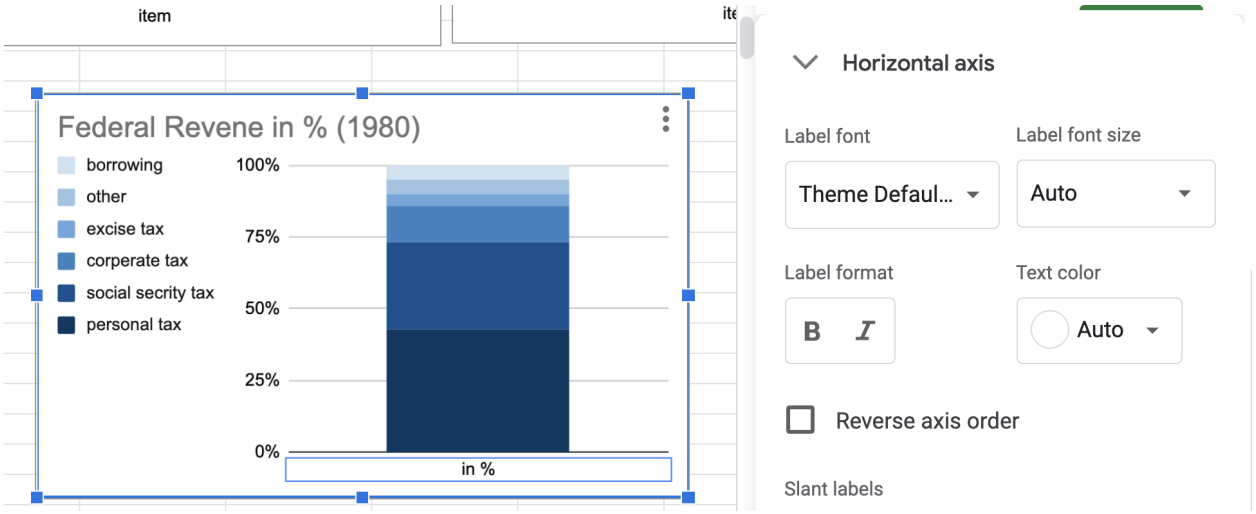
Click okay -- Then, the chart is revised.

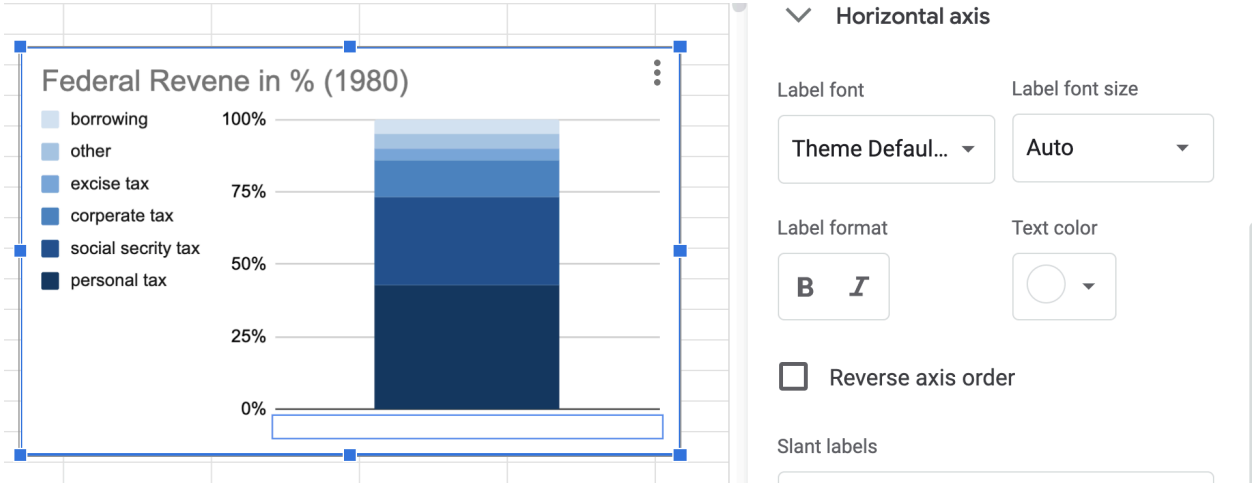


I simplify the first stacked column chart in the same way into this:

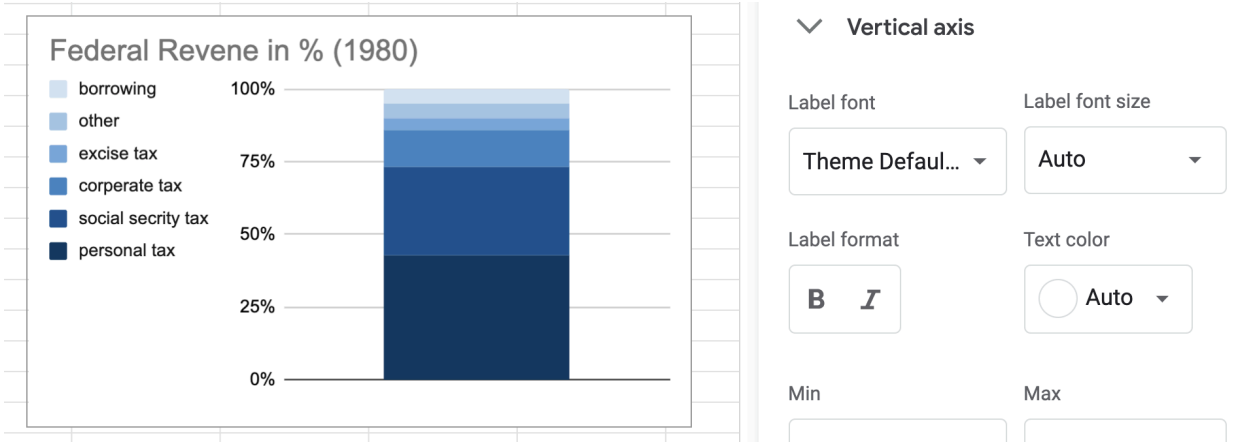
For this horizontal in % label, I cannot delete this text so I will make it invisible (by setting the font color as white)

DH150 Visualization
Demo03: Information Visualization

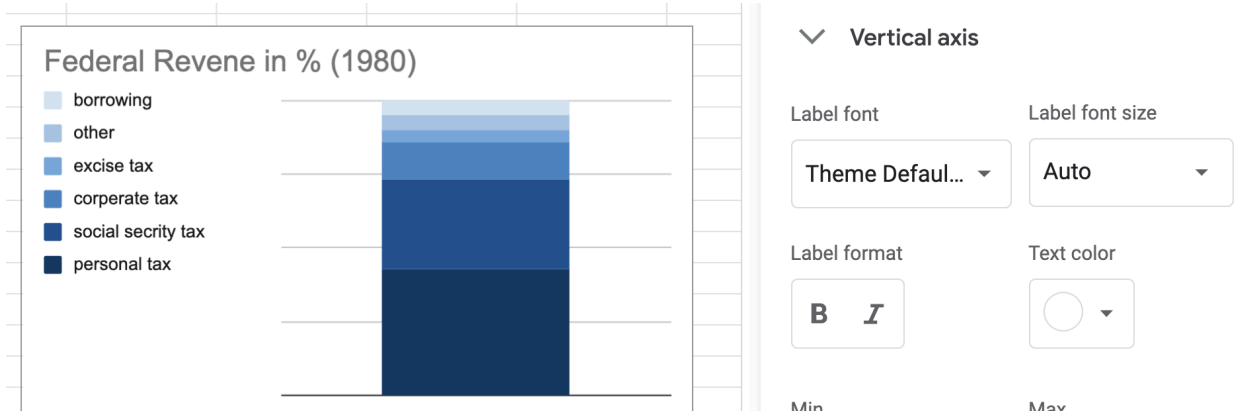




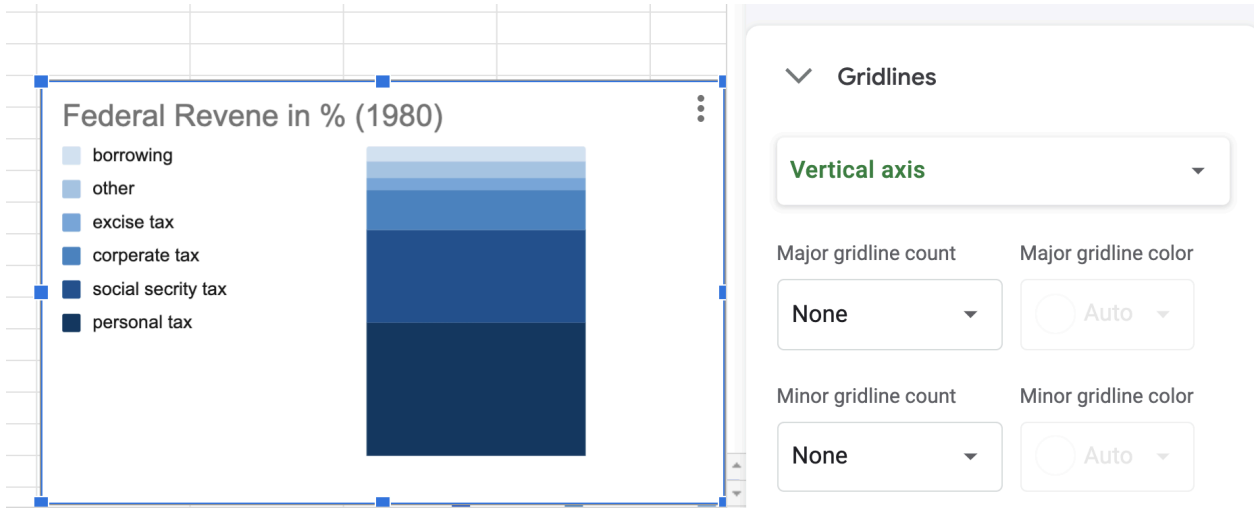
Again, for vertical axis 100%, 75%, 50%, 25%, 0% -- I can't delete them so I will make them as white, invisible.



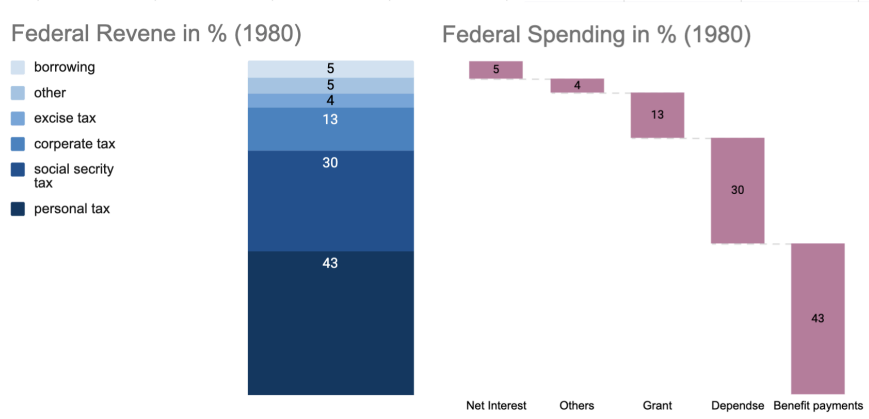
DH150 Visualization
Demo03: Information Visualization



And will delete the grid lines, which are meaningless.



I added the numbers (data labels); and the final two charts would look like the following:



DH150 Visualization
Demo03: Information Visualization

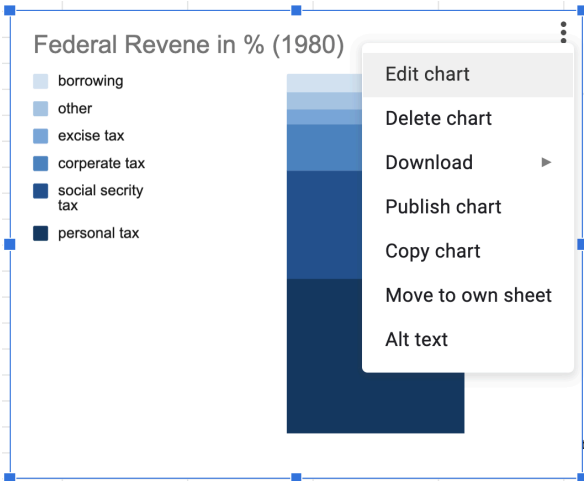
Step06: How to review the work and choose the two alternatives (for a different target)

Please check [here] how I examined the checklist and make the revision for the scientific journal

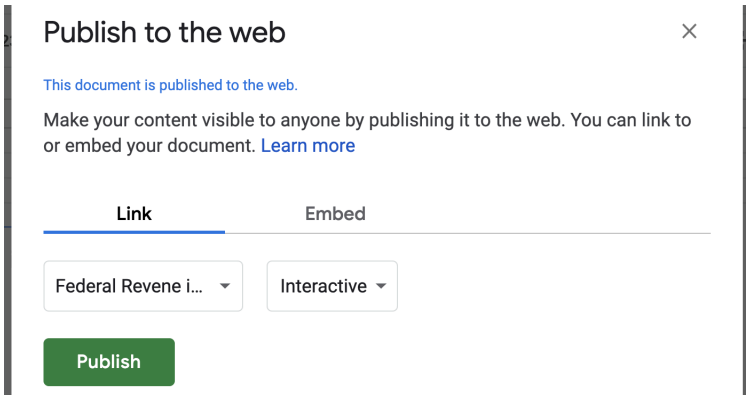
Step07: How to publish the work and share/ get the url to submit

There are two ways you can publish your graphs, 1) by image file; 2) embed.
-- when you use image files, it is very like what you did in assignment01, so I will skip that process. In the following, you can find how to embed the (interactive) graphs by using iframe.

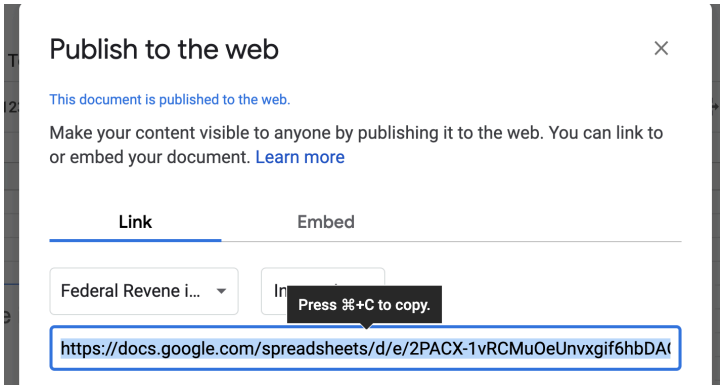
1) When you have a graph/chart to share in google sheet, select the chart (highlight); click on the right top (...) and open the menu > select “Publish chart”



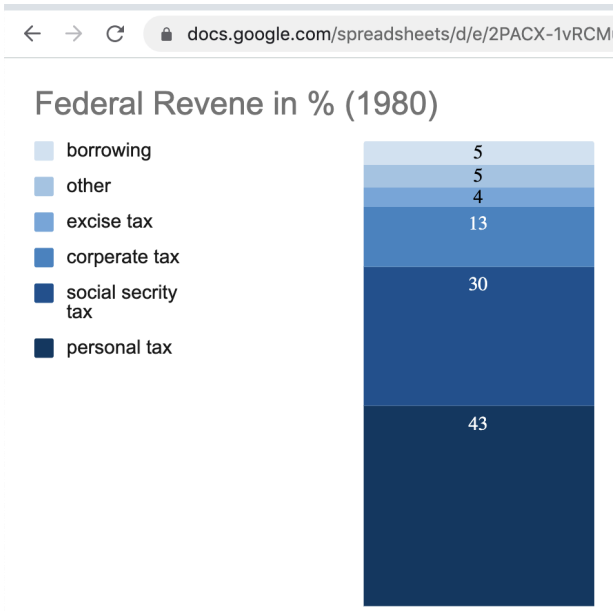
2) Click “publish” button to get the link (url) of the graph



Then you will be given a url; copy that url

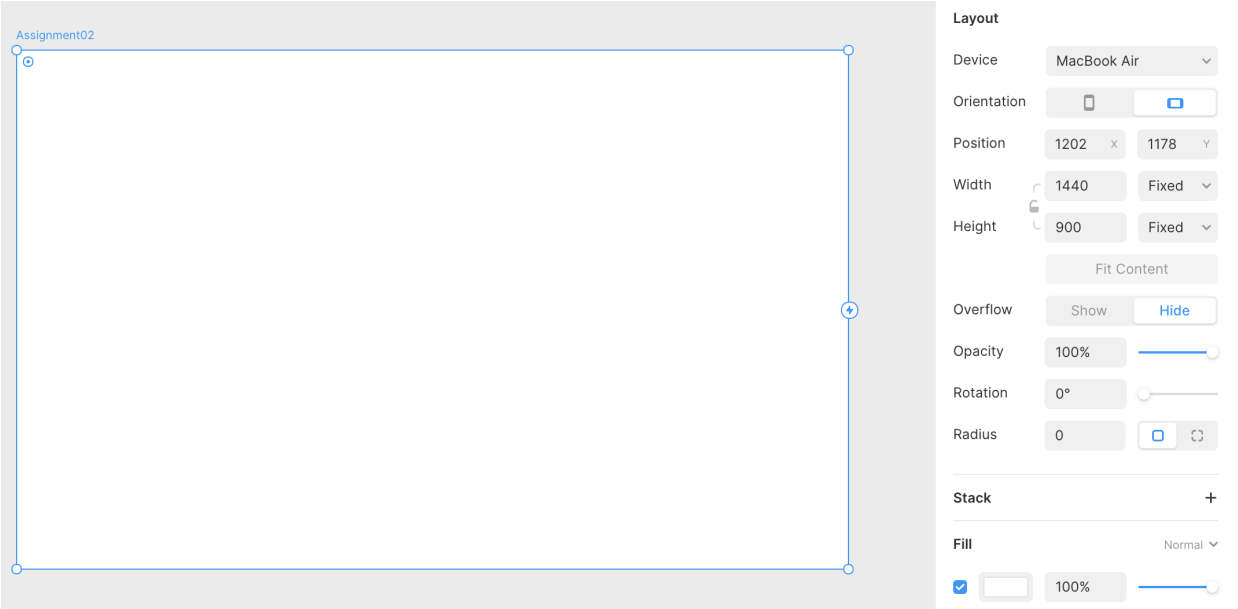


Test the copied url in a new tab; if it doesn't work double check if you selected the chart properly.



In Framer, open your project (that has your FirstScreen and Assignment01 frames) and create a blank frame (= assignment 02, 1440 x 900 Macbook Air); I changed the frame name from MacBook Air to Assignment02

DH150 Visualization
Demo03: Information Visualization

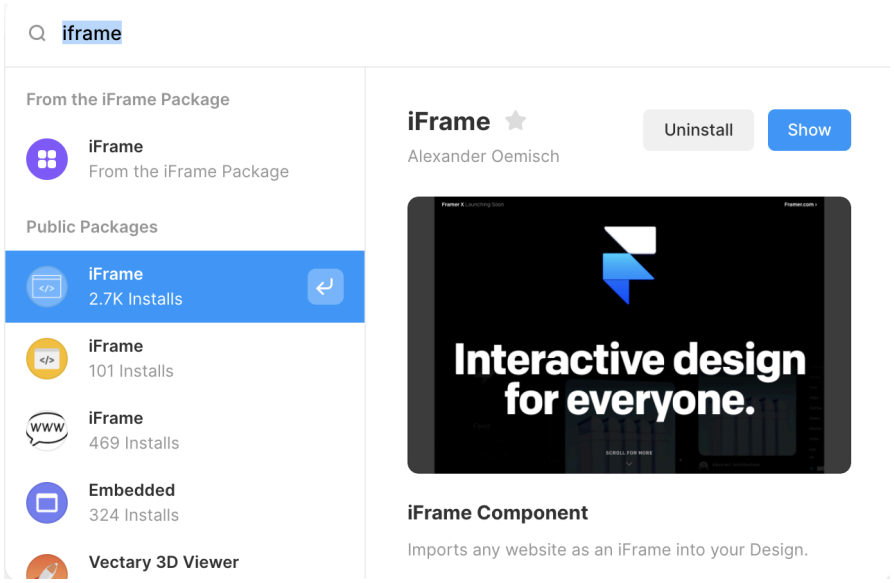


Let's use an iframe component to show the graph. Iframe is a html tab that makes it possible embed another html file inside of your work. With that you can embed map, video, and any other webpages as you want. (for more information: https://developer.mozilla.org/en-US/docs/Web/HTML/Element/iframe)

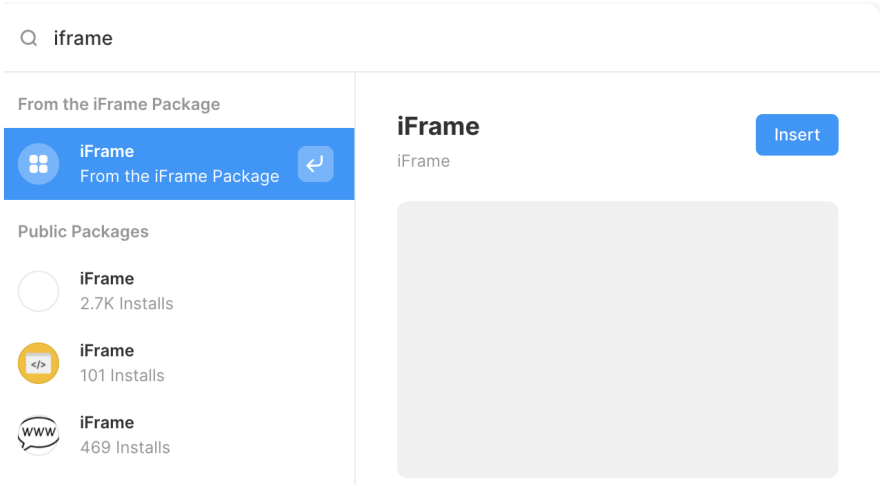
In Framer, click + insert on top

Then, type "iframe"; select the iframe (any) can install

DH150 Visualization
Demo03: Information Visualization

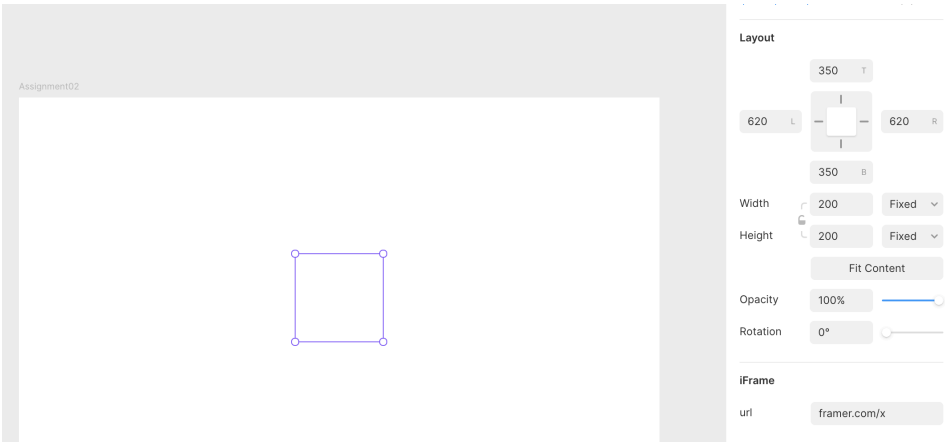


Then, click show

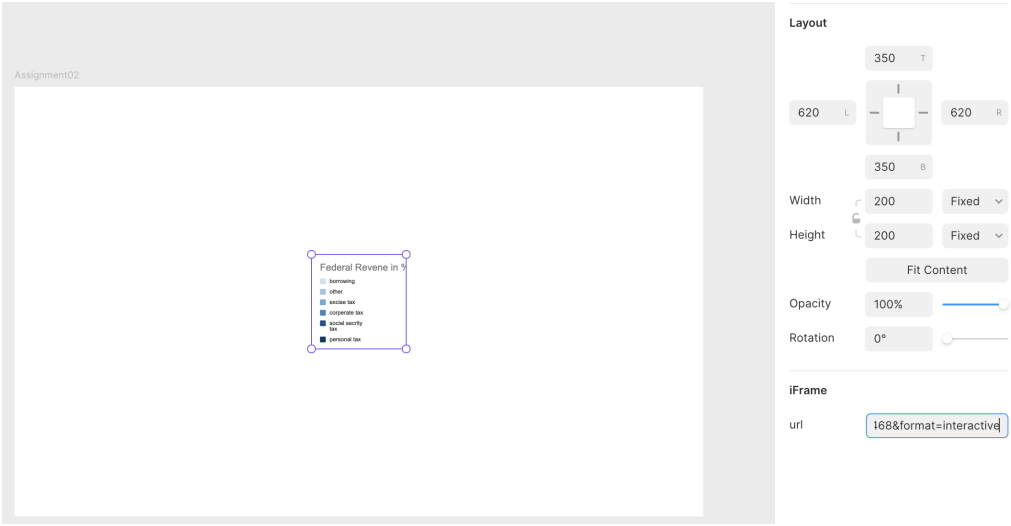


When you click “insert”, by default 200x200 tiny iframe will be created.

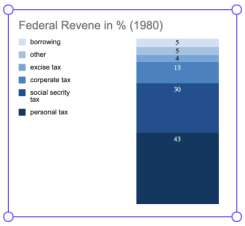
DH150 Visualization
Demo03: Information Visualization

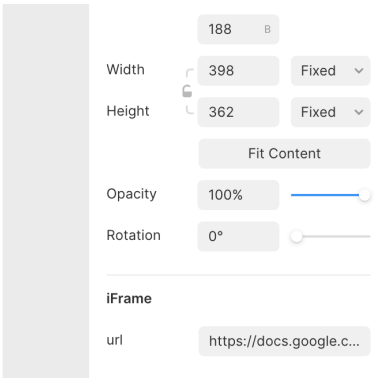


Then, test your graphic url -- put the url in iframe url (right bottom)



It seems that the iframe is smaller than the original chart size - so grab the bottom_right corner to make the size large enough to show the graph.





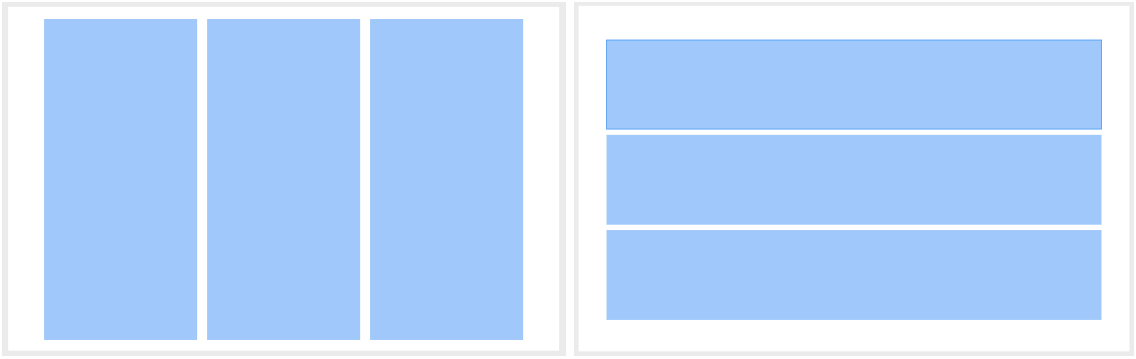
DH150 Visualization
Demo03: Information Visualization

Now, when you preview > open in the new tab, you can see the graph and if it were interactive (from google sheet), you can see the detailed information when you hover your mouse over the graph.

So, this is how you can embed the graphs with iframe. You can add multiple iframe and arrange accordingly to present your work.

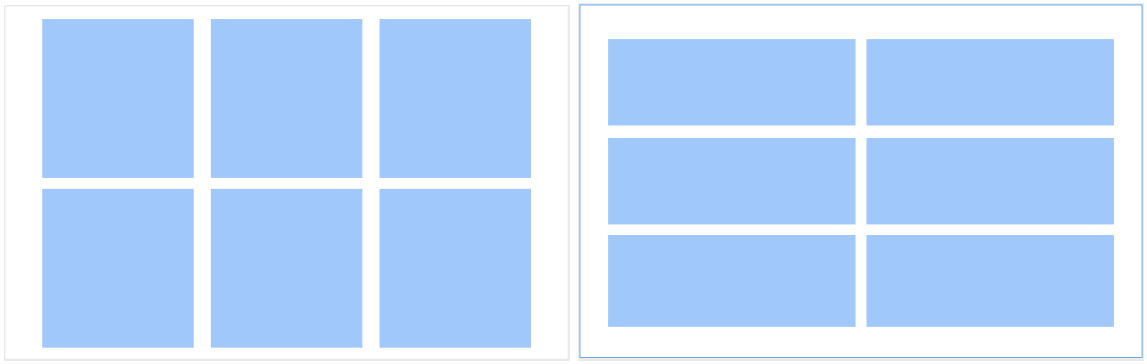
This is a part we will cover in detail when layout is on the topic - but I would love to share how I make a decision to present a work into a certain grid system, because it is related tn

1) First decide the block of information -- and how many blocks of information you want to show: in this work, I have three blocks of information, one for the original chart (by N. Holmes), the second my redrawn chart (for academic researcher), and the third one for another version of redrawn chart (for the general public). Each block has the image and the description.
2) Divide the space into three -- I usually test it with evenly divided spaces - three columns or three rows. And put space between the spaces (= gutter). You may want to evenly distribute the space from the edge (top-bottom, left-right padding).

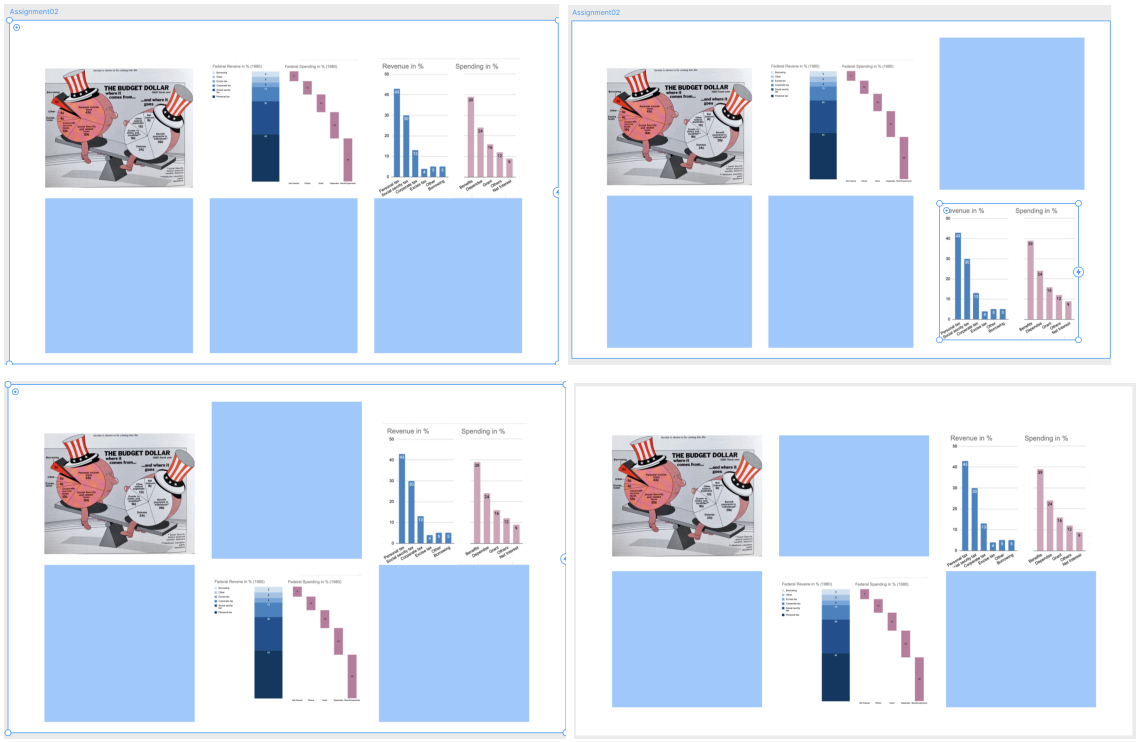


3) Because I have two kinds of information in each block -- 1) image/chart(s) and 2) the description, I will divide the block into two.

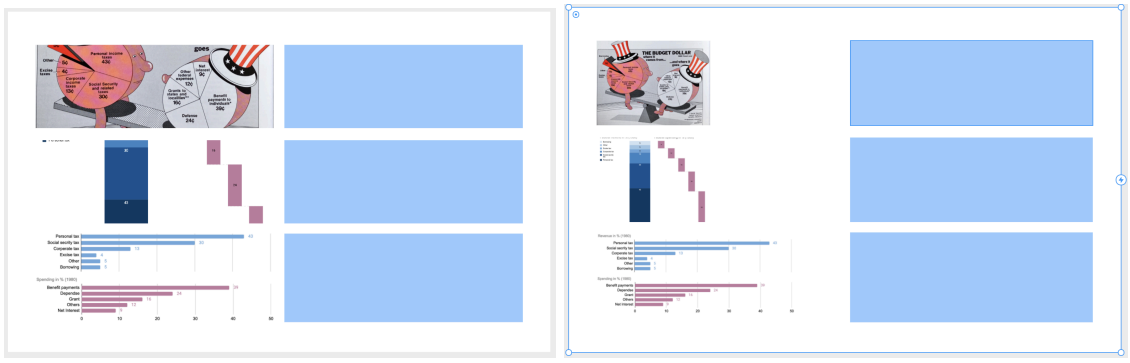
DH150 Visualization
Demo03: Information Visualization



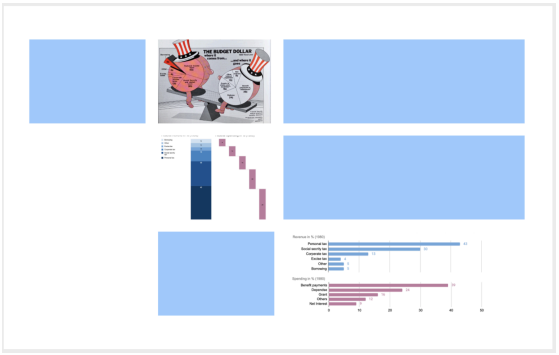
Then, test with your text and images. Move around until find a balanced layout -

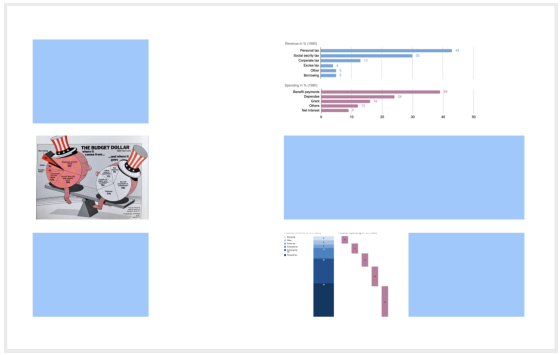


Or the horizontal ones:



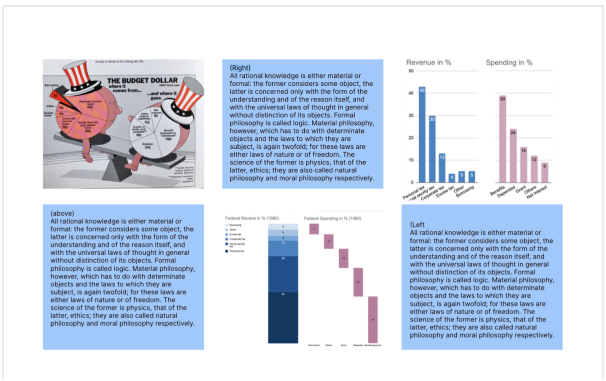
DH150 Visualization
Demo03: Information Visualization

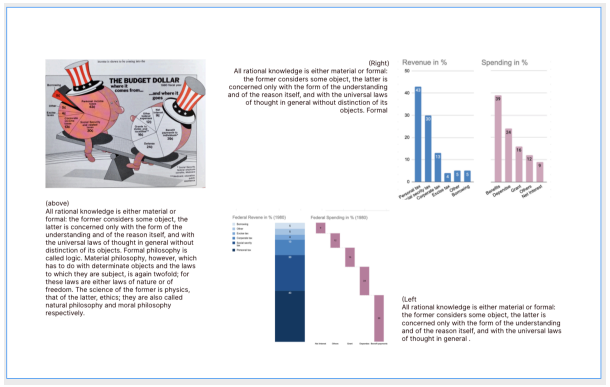




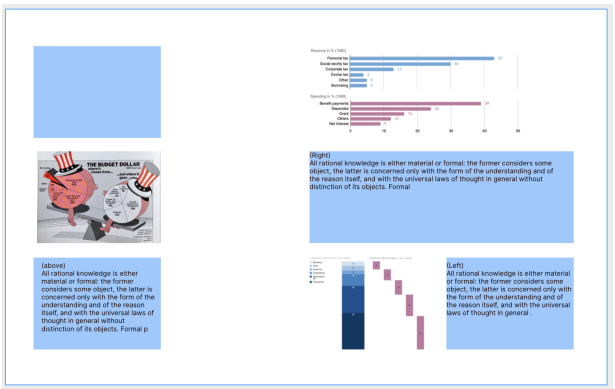
It depends on the graph's visual balance as well - I switched the column chart into bar chart to fit into the layout.

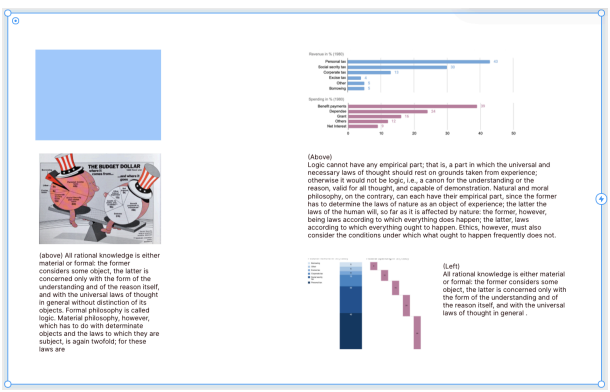
Then test with the texts // remove the background color.





Also test with three row layout (it turns to be 4x3 grid system):

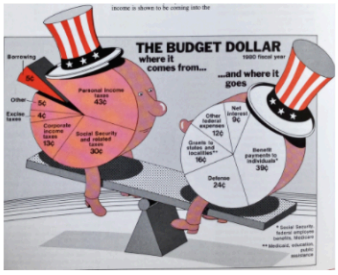




There are two versions created: I would pick one that looks more suitable for the real description.

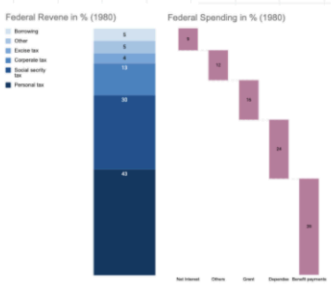
DH150 Visualization
Demo03: Information Visualization

Assignment02:
Redraw the graphs



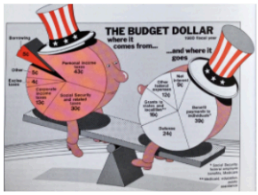
(above)
All rational knowledge is either material or formal: the former considers some object, the latter is concerned only with the form of the understanding and of the reason itself, and with the universal laws of thought in general without distinction of its objects. Formal philosophy is called logic. Material philosophy, however, which has to do with determinate objects and the laws to which they are subject, is again twofold; for these laws are either laws of nature or of freedom. The science of the former is physics, that of the latter, ethics; they are also called natural philosophy and moral philosophy respectively.

(Right)
All rational knowledge is either material or formal: the former considers some object, the latter is concerned only with the form of the understanding and of the reason itself, and with the universal laws of thought in general without distinction of its objects. Formal

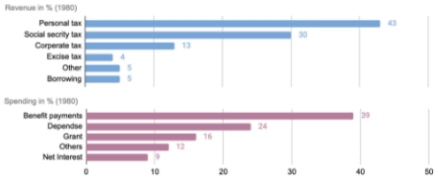


(Left)
All rational knowledge is either material or formal: the former considers some object, the latter is concerned only with the form of the understanding and of the reason itself, and with the universal laws of thought in general .

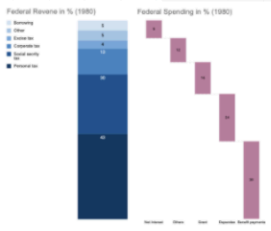
Assignment02:
Redraw the graphs



(above) All rational knowledge is either material or formal: the former considers some object, the latter is concerned only with the form of the understanding and of the reason itself, and with the universal laws of thought in general without distinction of its objects. Formal philosophy is called logic. Material philosophy, however, which has to do with determinate objects and the laws to which they are subject, is again twofold; for these laws are



(Above)
Logic cannot have any empirical part; that is, a part in which the universal and necessary laws of thought should rest on grounds taken from experience; otherwise it would not be logic, i.e., a canon for the understanding or the reason, valid for all thought, and capable of demonstration. Natural and moral philosophy, on the contrary, can each have their empirical part, since the former has to determine the laws of nature as an object of experience; the latter the laws of the human will, so far as it is affected by nature: the former, however, being laws according to which everything does happen; the latter, laws according to which everything ought to happen. Ethics, however, must also consider the conditions under which what ought to happen frequently does not.



(Left)
All rational knowledge is either material or formal: the former considers some object, the latter is concerned only with the form of the understanding and of the reason itself, and with the universal laws of thought in general .