The design theme this week was lines. In particular, how to organize many possibly overlapping lines so the paths they form are readable.

To tackle this challenge, I drew inspiration from highways and roads.

To illustrate, consider the four maps at left. All are of the same section of Chinatown (San Francisco), with a thick thoroughfare running horizontally down the center. Two people (blue & green) could take many different paths to reach the yellow star on the right. Some routes are more roundabout than others, and some more often use the thoroughfare.

If the thoroughfare is the fastest road, then the map at bottom-right would be the best. What's interesting is that the paths in this map are also the easiest to compare, partly because of how much they line up with each other and partly because they're so simple (they have only one turn).

Also notice how the routes take up space. In the first three maps, the routes take up more horizontal *and* vertical space around the center. The chance that a new line will overlap in them is much more likely.

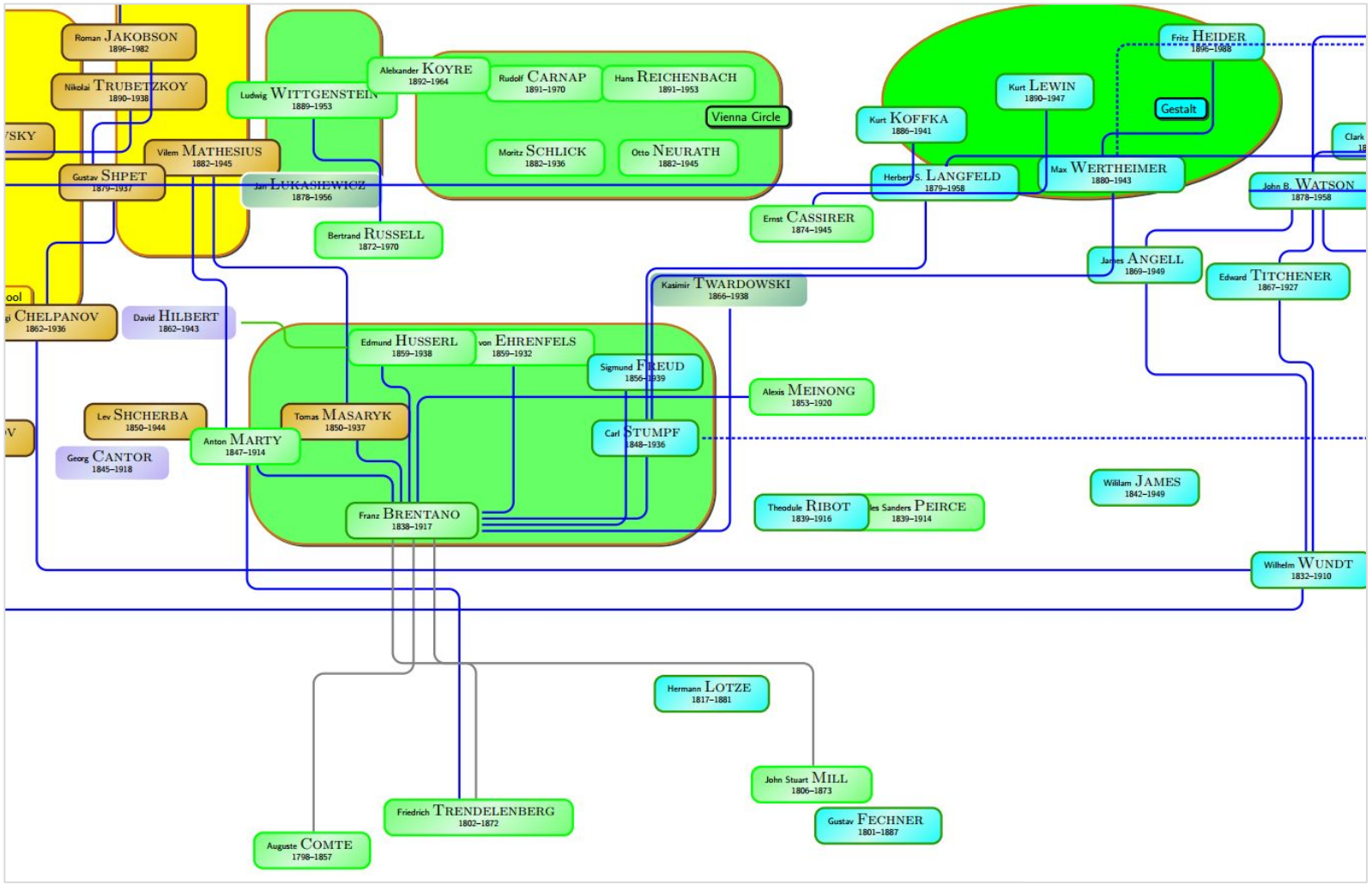
This general idea, to prefer highways like we do in real life and like in the bottom-right map, is how lines were organized in this week's d3.js prototypes:

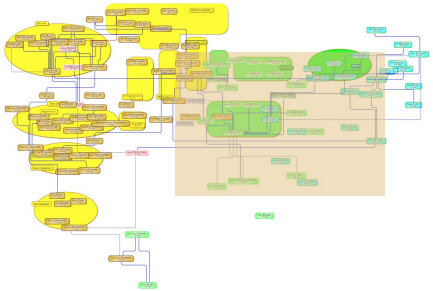
1. Paths coming from the same source should flow in the same direction for as long as possible.

2. Paths coming from or going to the same location should stick together for as long as possible.

3. Paths should be as simple as possible with the fewest turns.

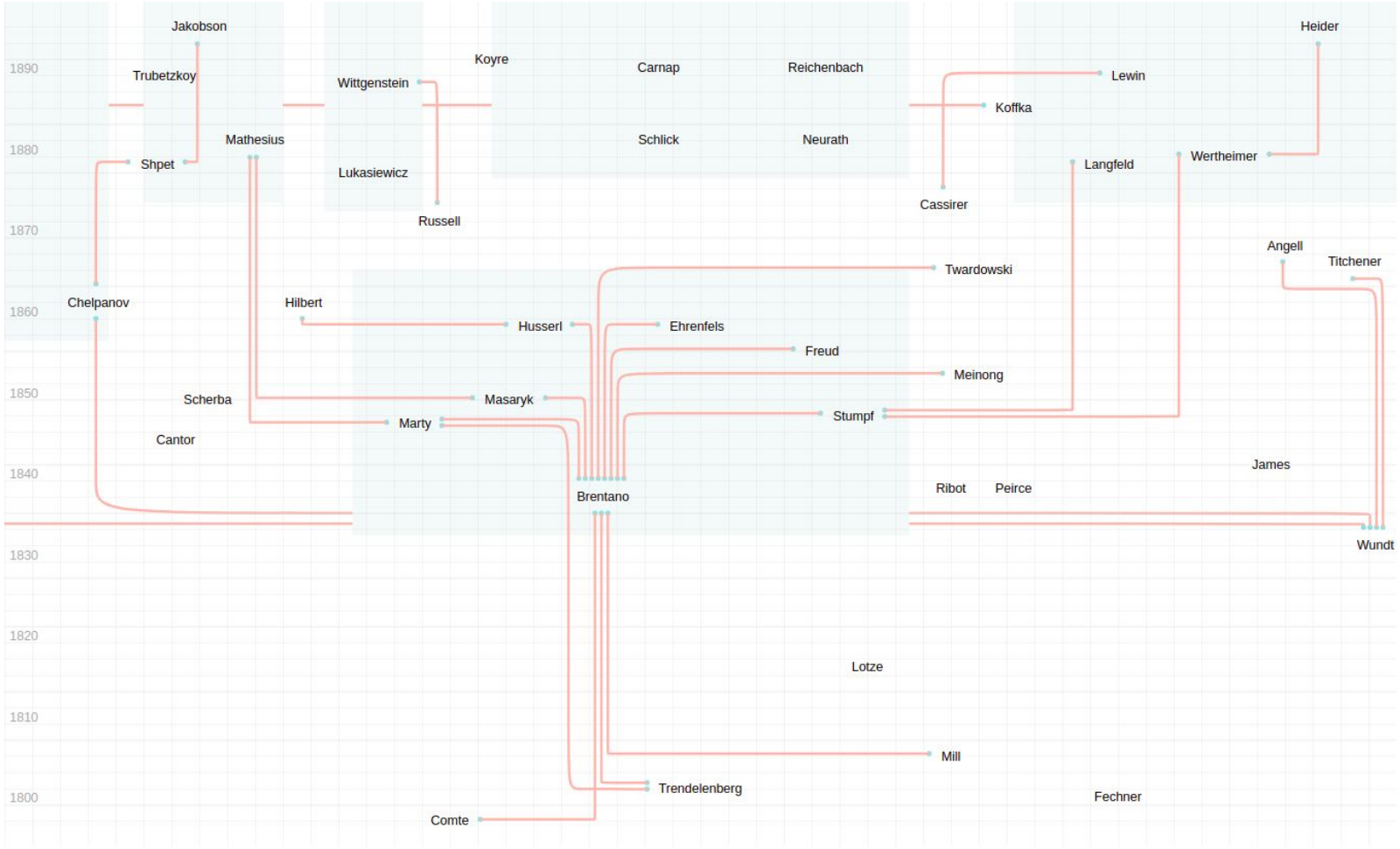
When these principles are applied, "highways" (clustered pathways) emerge, making a complex network diagram like the Battle in the Mind Fields poster much easier to read.





At left is a section of the Battle in the Mind Fields poster, with a focus on Franz Brentano's connections. It was used as the content of this week's d3.js prototypes, with all people and connections included minus Watson at right, to test the highway layout idea.

This section is quite busy with many overlapping lines, making for a good test case. See the last page for ongoing work that extends this work to the entire diagram.



This is the first version of this week's prototype, showing clusters of paths along virtual highways. All lines and people look the same (red lines, blue endpoints, last names only) because the goal of this version was to experiment only with line *layout and organization*.

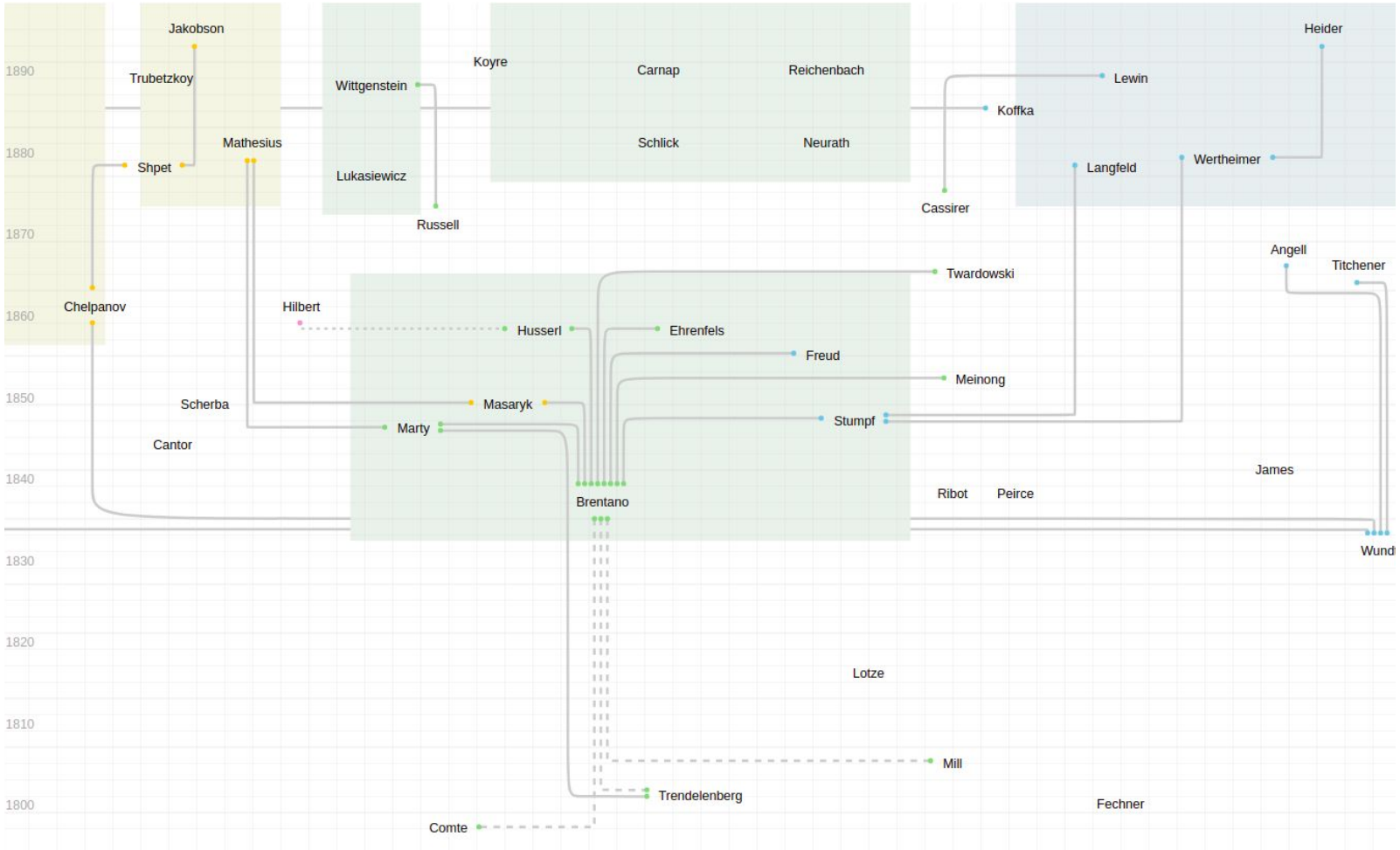
The blue boxes correspond to circles of thought, matching up with those represented in the Battle in the Mind Fields poster. In order from left to right:

- Moscow school
- Prague linguistic circle
- unnamed - Wittgenstein's circle
- unnamed - Brentano's circle
- Vienna circle
- Gestalt

Notice the virtual highway from Comte, Trendelenberg, and Mill up through Brentano, with minor expressways up through Mathesius and Stumpf. It's also interesting to see more clearly the effect of Wundt (right) on the Moscow and Prague circles (left). This was achieved by clustering Wundt's lines together, under Brentano's group as if in a 3D space. Notice the same effect for Koffka at top.

All people were organized on the y-axis by birth, and on the x-axis in roughly the same way as the Battle in the Mind Fields poster.

The year labels on the y-axis can be removed and full names and birthdates can be placed inside the diagram itself, without changing the layout of the lines much at all. The faint grey grid also isn't necessary, but it was useful during prototyping to organize the space.

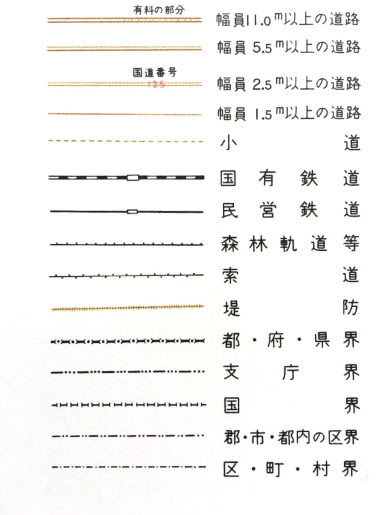


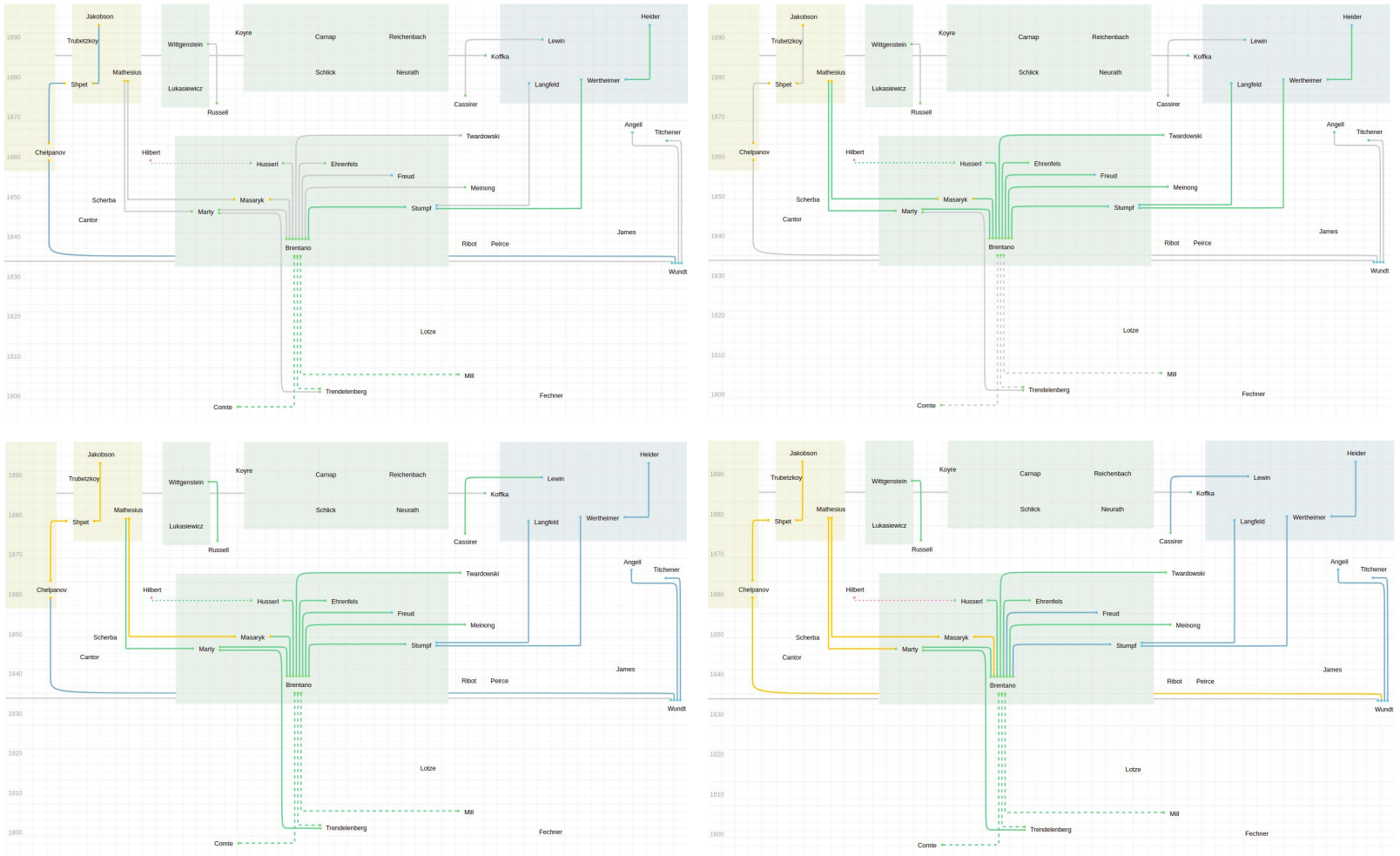
This is the second version of this week's prototype, similar to the first but with colored endpoints corresponding to professions (yellow - linguist, green - philosopher, blue - psychologist), textured lines for types of relationships (dashed - unknown, solid - teacher/student, dotted - influence), and circles of thought colored as in the Battle in the Mind Fields poster.

Since the lines are all the same color (grey), it's easier to see the overall structure. And with the colored dots next to connected names, and with the line textures, it's possible to get even more information by simply leaning in.

One downside of this approach is that unconnected names aren't color-coded (e.g. Ribot, Pierce, James). This could be fixed by putting unconnected colored dots next to those names.

Also notice that the dashed and dotted lines are hard to differentiate here. With more experimentation, more richly detailed lines could be used. For example, from a Japanese map legend:





This is an extension of the second version of this week's prototype, showing how color can be added to lines to show cross-disciplinary influence.

In the Battle in the Mind Fields poster, line color was used to show types of relationships, whereas in these samples, line texture is used instead (dashed, dotted, solid). In the original poster, blue meant two different things (psychologist and teacher/student relationship), and in these samples it refers only to a field of study (psychology).

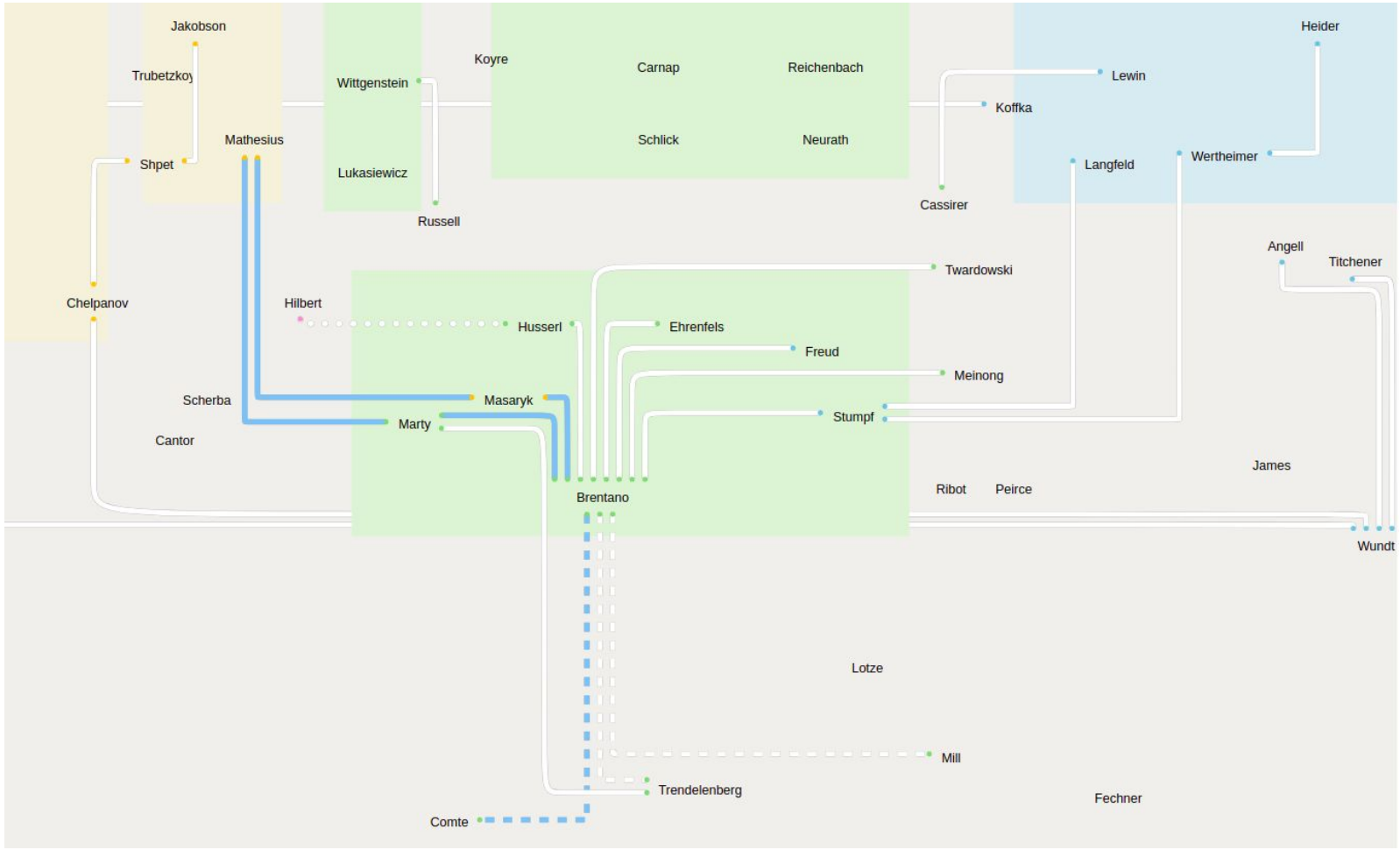
This gives us an opportunity to use color consistently to show cross-disciplinary influences. For example, at the top-left, we trace two cross-disciplinary lineages. First, from Wundt (blue) to the Moscow school and Prague linguistic circle (yellow), showing an influence of psychology on linguistics. Second, from philosophers Comte, Trendelenberg, and Mill (green) to psychologists Wertheimer and Heider in Gestalt (blue), showing an influence of philosophy on psychology.

At top-right is the extended influence of Brentano. Notice how the green fans out to influence both yellow and blue circles of thought. This use of color to highlight a subtree also helps to tell a story about Brentano, a particularly influential character.

The examples at bottom are almost fully colored, except for lines that travel off the page (Wundt and Koffka). On the bottom-left, colors change with the connecting person, going up. On the bottom-right, the same thing, but colors change moving down.

The bottom-left diagram makes it easy to trace influencers (reading down), whereas the bottom-right diagram makes it easy to trace who was influenced (reading up), in a strictly historical fashion.

Overall, the unified color story makes it possible to see cross-disciplinary influence in a richer way.



This is the third version of this week's prototype, inspired by the colors and styles of Google Maps (bottom-left).

Notice how paths are highlighted, similar to how a route would be highlighted on Google Maps. It's useful for strongly pointing out specific relationships, but it's less rich, particularly in meaningful color differences, than the previous version. The lighter color palette may also make it harder to read.

Overall, the allusion to Google Maps makes the diagram feel more like a map.

Ongoing work

I'm currently experimenting with the vertical arc diagram from last week, and will have more variations to share soon.

I'm also able to generalize the highway line layout algorithm so new diagrams can be generated on the fly, but this work would best be suited to the implementation phase of the project.

Next week I'll be experimenting with all of the data in the Battle in the Mind Fields poster to test the limits of the highway layout concept, and to experiment with showing macro and micro detail (font sizes, emphasized sections of the diagram with many connections, etc).