Clustering results

Figure C.1 shows the full result of all the clustered sketches. Each sketch is linked to an ID structured as follows: group_id-participant_id-sketch_number. Sketches made by the authors use a1, a2, and a3 as participant IDs. The different shades of pink post-its indicate problems with the encoding of relationships (lightest pink), time (medium pink), and space (dark pink). Yellow post-its show the names of sub-clusters. The following images show each final cluster in detail, and include all sketches from the workshop.

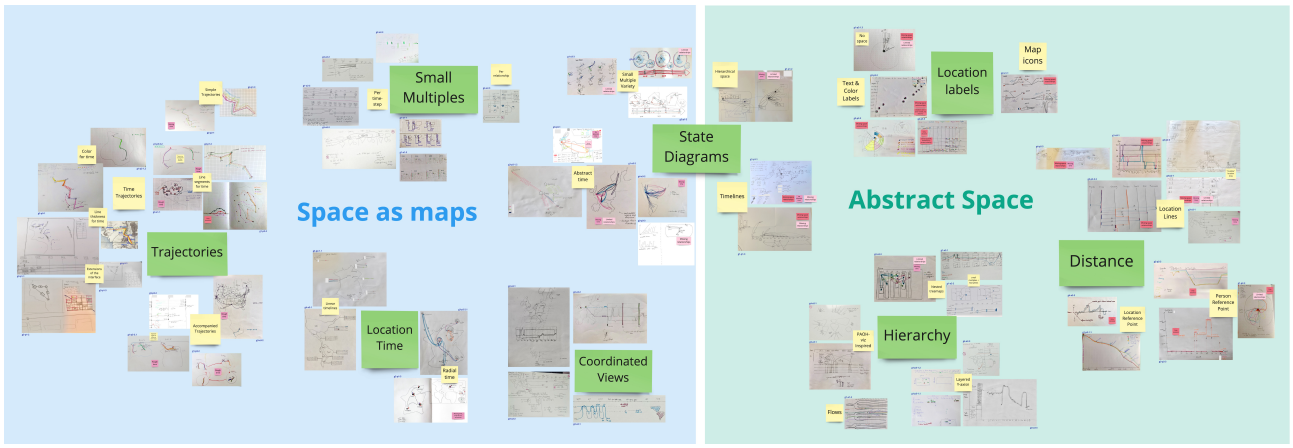

Figure C.1: Caption

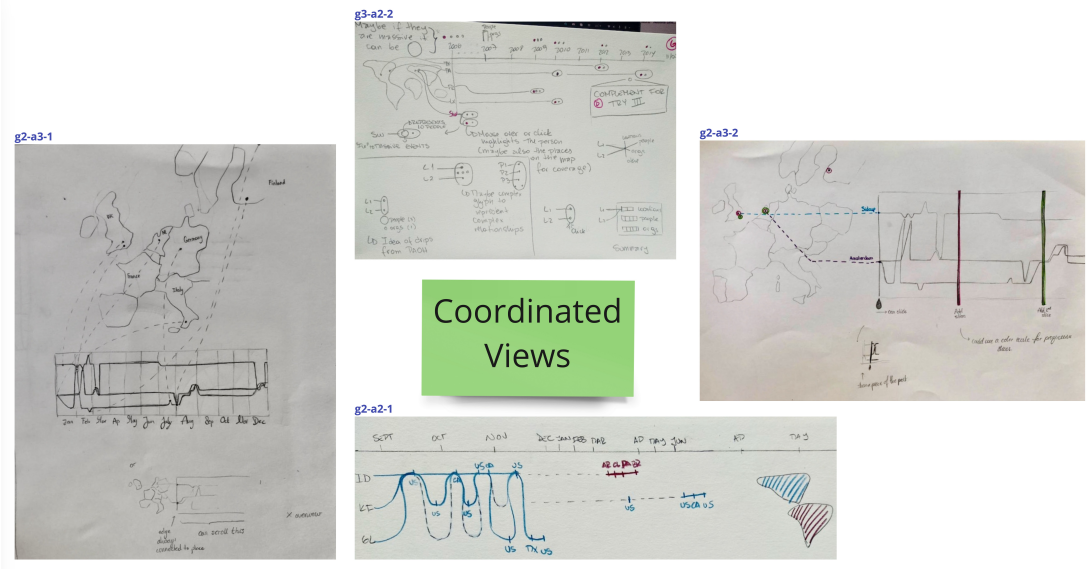

Figure C.2: Coordinated View Cluster

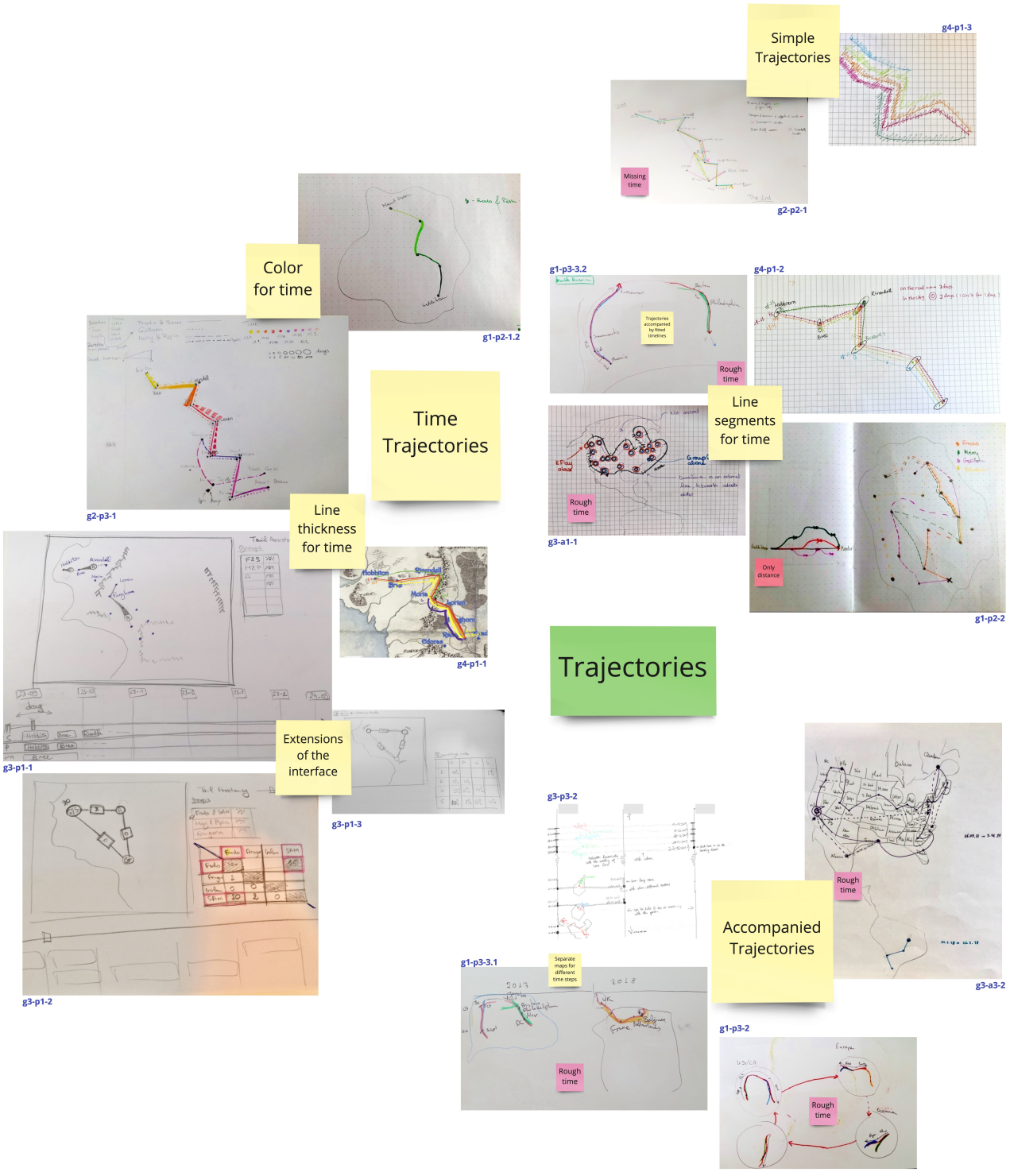

Figure C.3: Trajectories Cluster

Figure C.4: Small Multiples Cluster

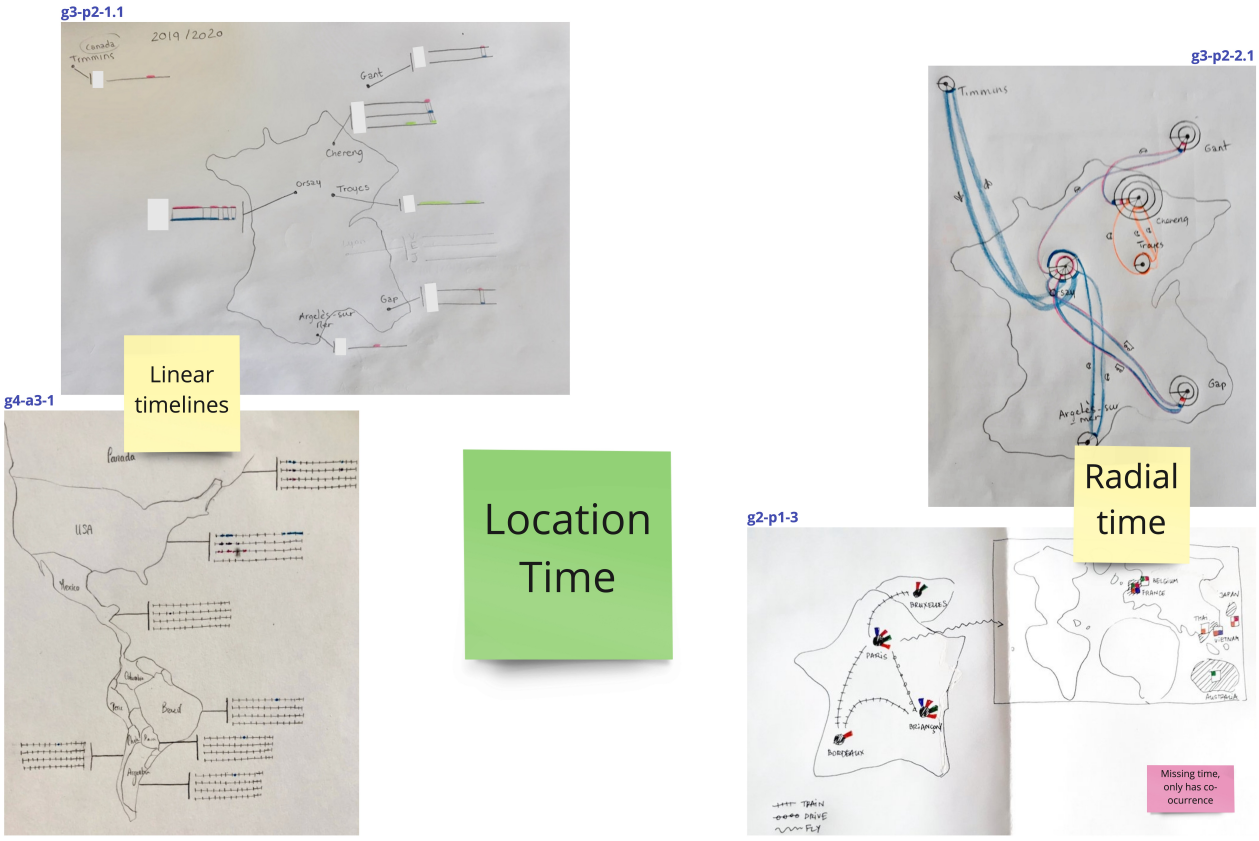

Figure C.5: Location Time Cluster

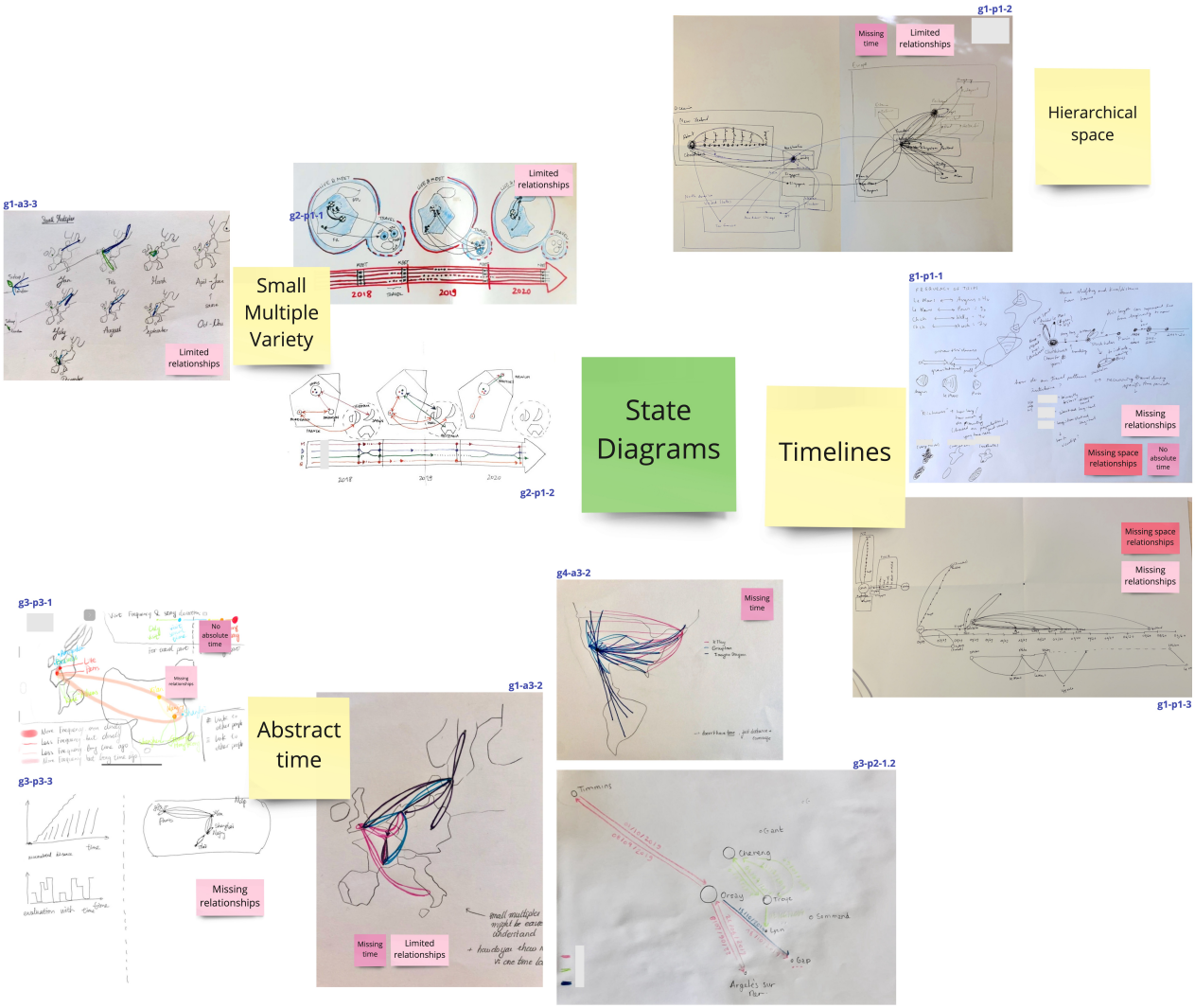

Figure C.6: State Diagram Cluster

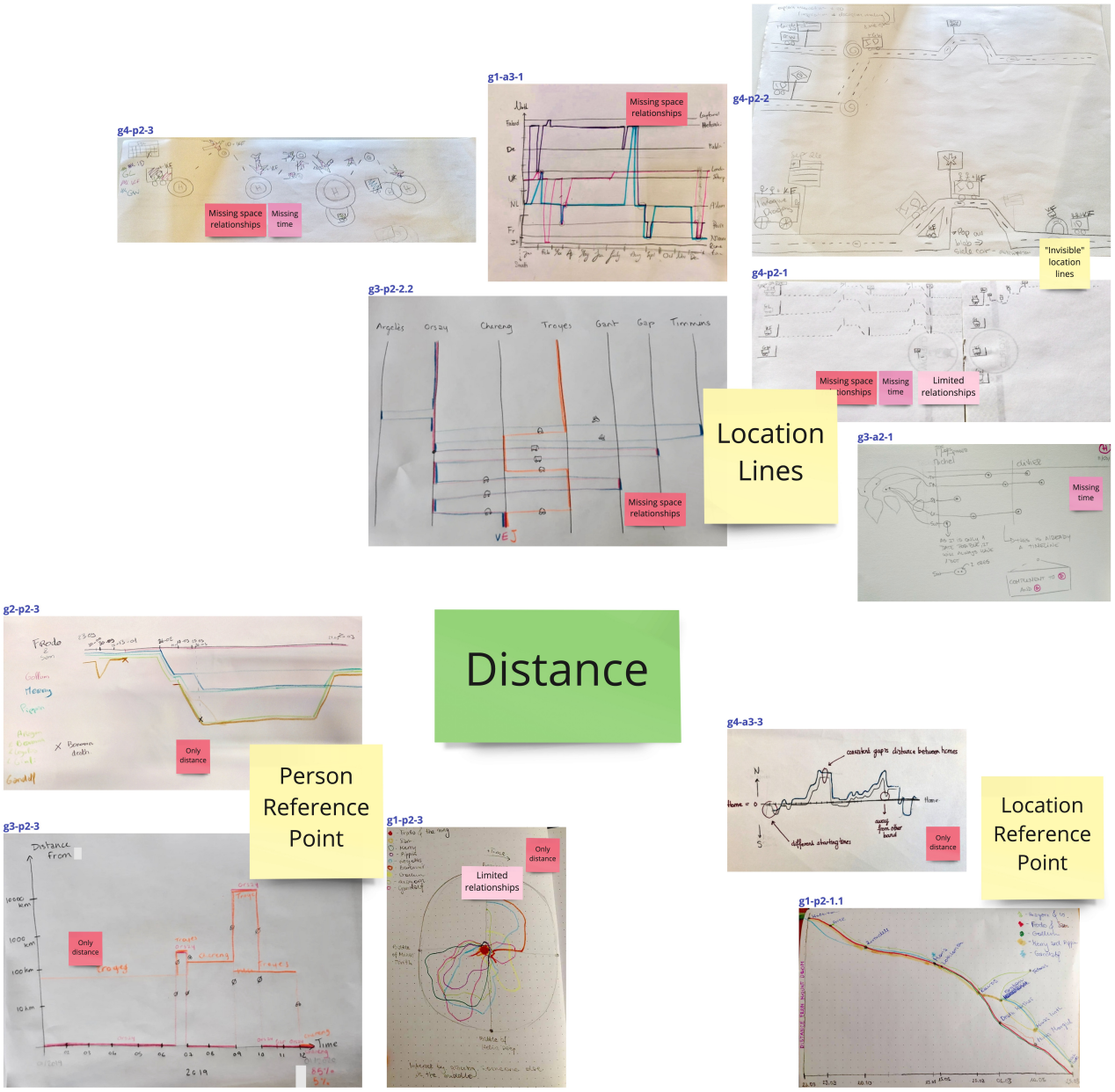

Figure C.7: Distance Cluster

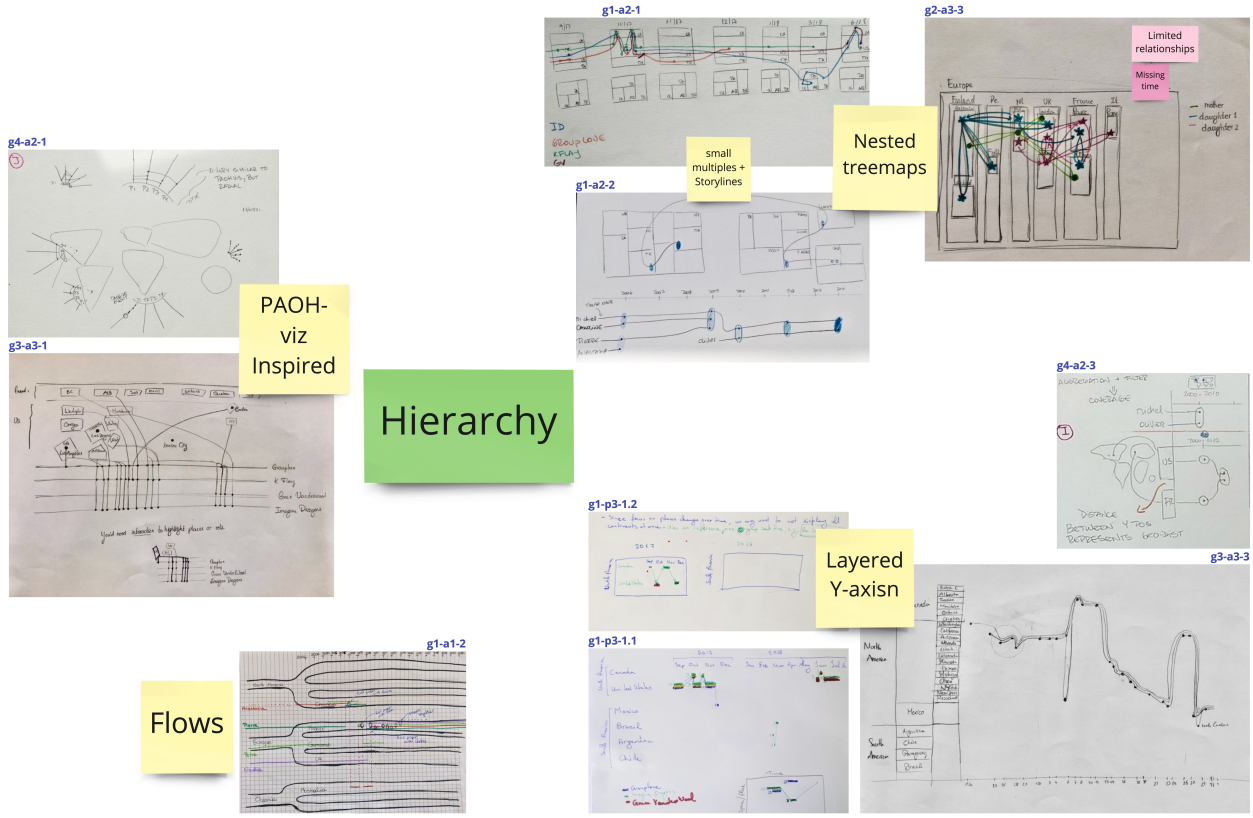

Figure C.8: Hierarchy Cluster

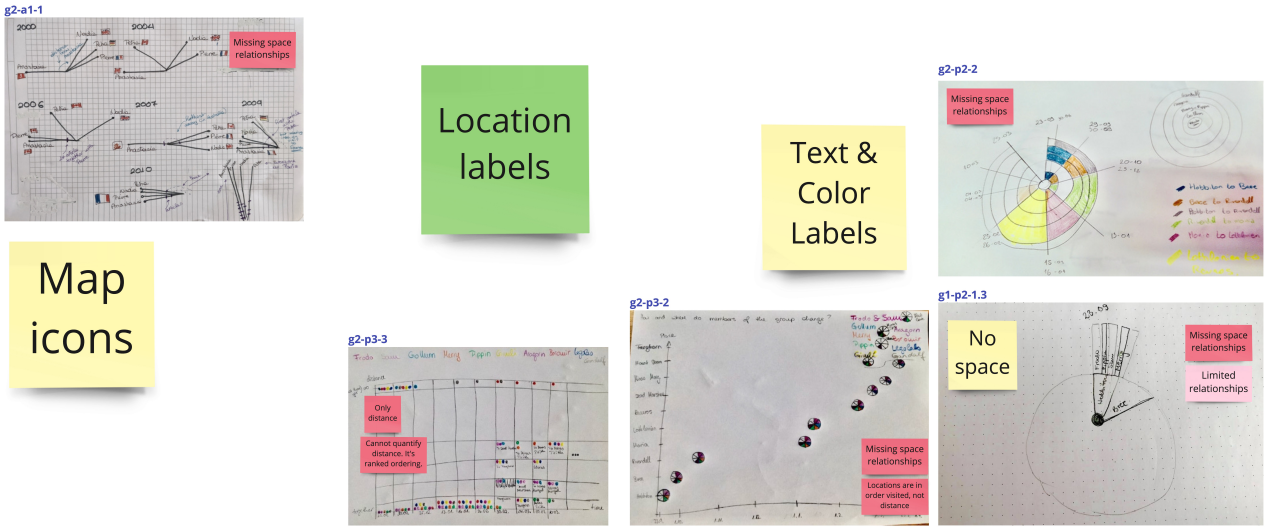

Figure C.9: Location Labels Cluster

In summary, the eight clusters are: Trajectories, Small Multiples, Location Time, Coordinated Views, State Diagrams, Location Labels, Hierarchy, and Distance. Figures C.2 to C.9 show close ups of these clusters. They are summarized in Fig. C.10

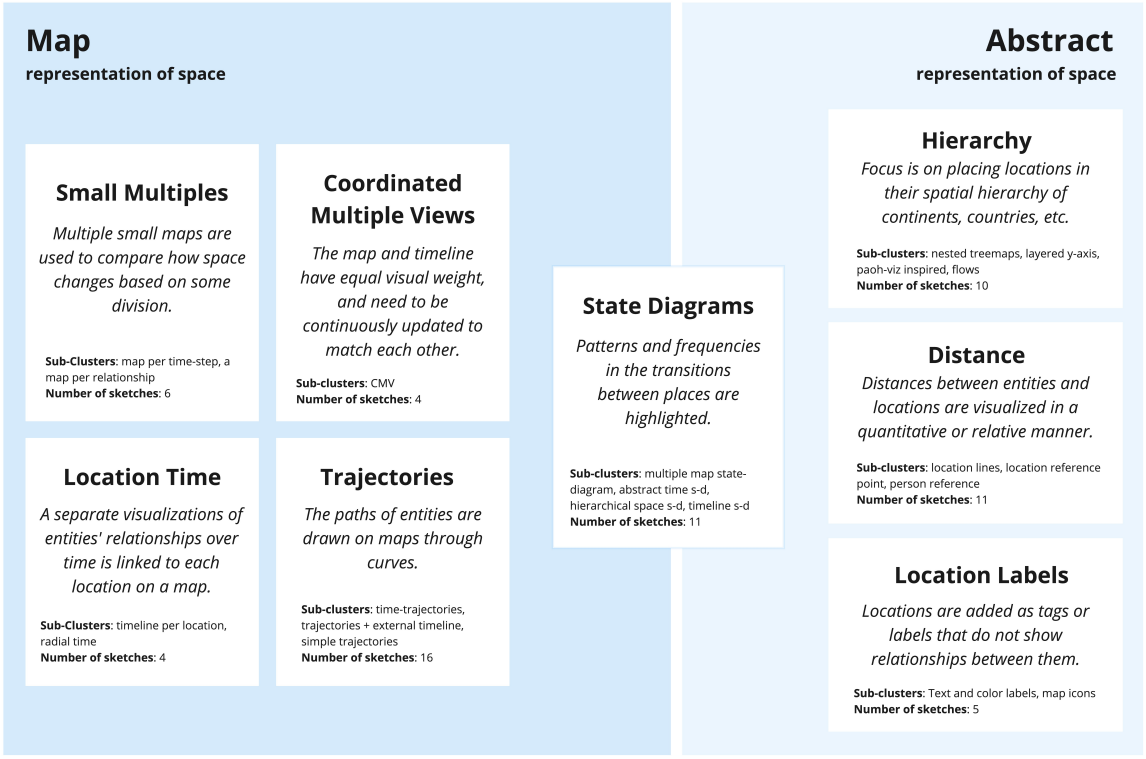

Figure C.10: Overview of the 21 initial clusters classified into 8 high level clusters

This categorization of the clusters was used to generate the designs space described in Sections 3 and 4 of the paper. Please note that the abstract clusters are not part of our design space.

Clustering process

We performed a bottom-up card sorting of the workshop sketches in several iterations.

The clusters obtained from the first iteration of sorting are based on similarities in the visual encoding of the data. This encoding is the way the sketch visualizes each dimension of the data. For example, several visualizations represent people through their trajectories on maps, with time encoded through the color of trajectory lines (e.g. the *Time-Trajectories* sketch in Figure C.3). A full table that shows how sketches were grouped in the 1st and 2nd iteration can be found under the spreadsheet design_space_coding.xlsx.

The first iteration produced many small clusters of two to three visualizations. To reduce the number of clusters, a second iteration grouped visualizations based on what aspect of the data they highlight. For instance, the color-time trajectory cluster mentioned above can be merged with other clusters that highlight peoples' trajectories but encode time in different ways.

We examined the resulting clusters in terms on whether they can satisfy our goal to represent the relationships of multiple people and their spatial evolution. We eliminated clusters that rely on abstract representations of space, as they are either unable to show spatial relationships

between locations, or only show a single spatial relationship (such as distance or hierarchy only). This left us with five clusters whose characteristics we analysed to create a design space.

We note that the workshop sketches did not always include Storylines: for example some included other timeline representations, like some seen in Figure C.2 that associates a separate custom timeline representation to each location. We thus created representative designs for each cluster that illustrate the sketch concepts, but are adapted for storylines. In other words, we replaced the custom timeline with a Storyline. These representative designs are seen in our paper. As the *Small Multiples* cluster presents two promising design variations, one with a map per relationship, and one with a map per time-step, we included two representative designs.

Please see our paper for a description of the design space.

To verify that these dimensions were complete, we re-analyzed each workshop sketch separately and coded the visual encoding of time, space, and people as well as the visualizations' composition. We also conducted such an analysis for a set of related work. These also appear under the spreadsheet design_space_coding.xlsx.