# Visual Inference Lineups

Stephanie Kobakian and Dianne Cook

### Lineups

Each lineup had twelve map displays, this gave participants the choice of any plot, and the choice to not provide a response. this non-reponse is indicated by 0. The choices made by participants are displayed in Fig. **??**. The height of each orange lollipop indiates the proportion of participants that selected the map display of real data, they represent the correct choices. The green lollipops show the proportion of participants that selected the incorrect displays in each lineup.

The proportion of choices are also presented separately for each trend model in Table. **??**, Table. **??**, and Table. **??**. The correct map display in lineups with a North West to South East trend was chosen correctly with much greater frequency. In the lineups of All Cities displays, participants were misled by the choropleth display, but not the hexagon display for all except (2). All of Three Cities displays, except (4), were detected in the hexagon display. All except one lineup had at least one participant select the correct map in the lineup as shown in Fig. **??**.

## All cities Example 1:

The same data set is shown in both displays, the difference is the land area of each SA3 is coloured in the choropleth and the hexagon representing the SA3 is coloured in the Hexagon Tile Map.

Lineups were created using the Australian Statistical Areas at Level 3.

Replicate 3 of the All Cities distribution is shown in Fig. **??** and Fig. **??**.

## All Citites Example 2:

The higher values for the inner city areas in the capital cities result in them being coloured red. However, the colour blue dominates the display as the large rural areas are filled. There were no other choropleth maps that were coloured as blue as the map at location 3. This meant the detection rate was quite high, participants were able to select the correct distribution, even without being able to see the colours of inner-city areas of the capital cities.

Table 1: NW-SE

| Rep | Type | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Choro. | 0.02 | 0.05 | 0.4 | 0 | 0 | 0.02 | 0.18 | 0.05 | 0 | 0.15 | 0.02 | 0.02 | 0.08 |
| | Hex. | 0.06 | 0.02 | 0.69 | 0 | 0.02 | 0.06 | 0.04 | 0 | 0 | 0.04 | 0 | 0.02 | 0.06 |
| 2 | Choro. | 0.08 | 0.02 | 0.02 | 0.48 | 0.18 | 0.05 | 0.12 | 0 | 0.02 | 0 | 0 | 0.02 | 0 |
| | Hex. | 0.08 | 0.19 | 0 | 0.62 | 0.06 | 0.02 | 0.02 | 0 | 0.02 | 0 | 0 | 0 | 0 |
| 3 | Choro. | 0.04 | 0.02 | 0.06 | 0.06 | 0.04 | 0.52 | 0.02 | 0.08 | 0.06 | 0.04 | 0 | 0.02 | 0.06 |
| | Hex. | 0.02 | 0.02 | 0.02 | 0.02 | 0.12 | 0.57 | 0.02 | 0 | 0.02 | 0.08 | 0 | 0 | 0.08 |
| 4 | Choro. | 0.02 | 0 | 0.02 | 0.02 | 0.23 | 0.08 | 0.6 | 0 | 0.02 | 0 | 0 | 0 | 0.02 |
| | Hex. | 0.05 | 0.1 | 0 | 0.02 | 0.18 | 0 | 0.52 | 0 | 0.02 | 0 | 0.08 | 0 | 0.02 |

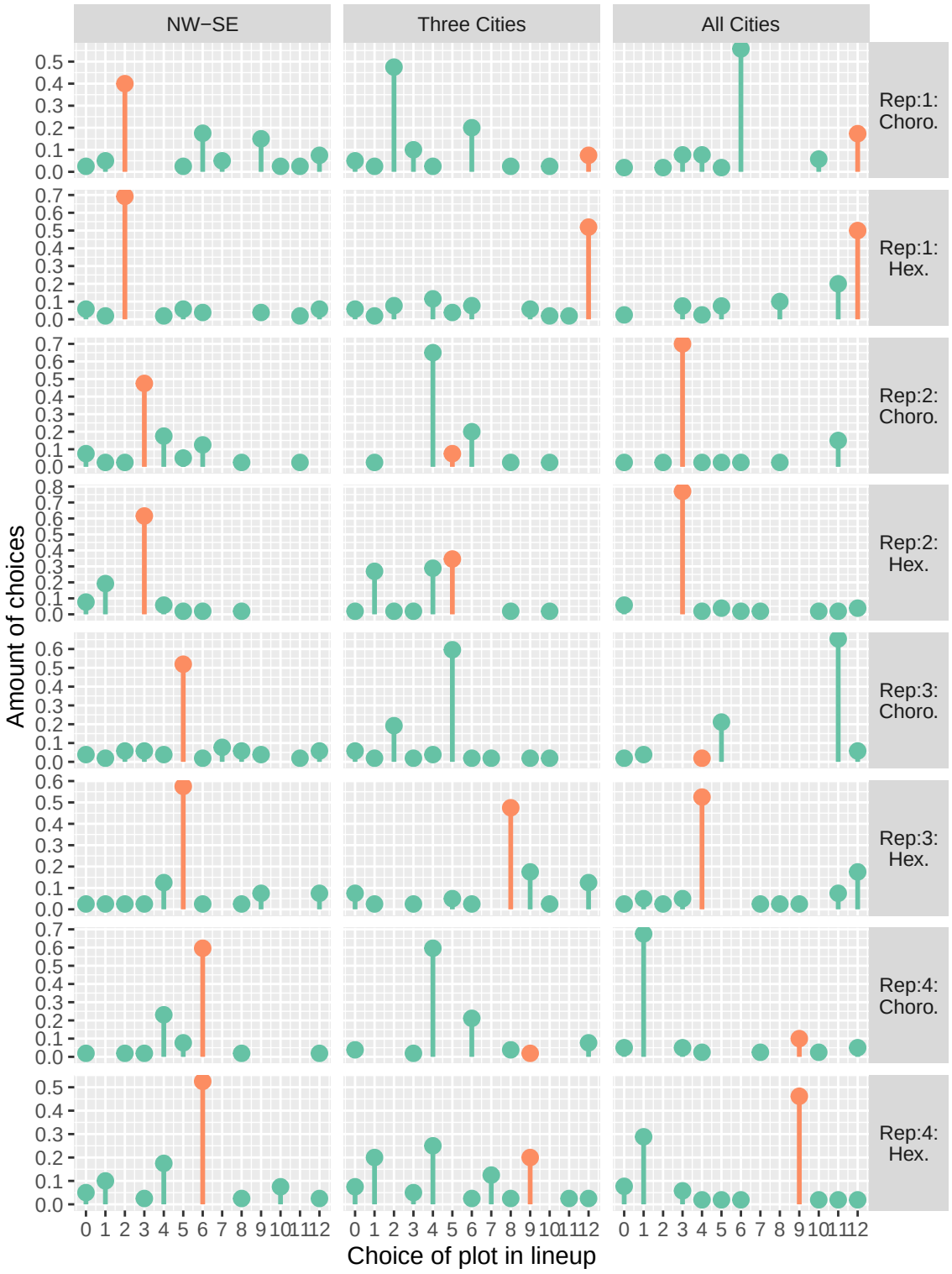


Figure 1: Each facet is associated with one lineup, the height of the points show the proportion of the participants that made each choice when considering each lineup. The points coloured orange show the map which contained a trend model, these are the correct choices. The numbers differentiate the replicates of each trend model and type of map display. Participants were able to select 0 to indicate they did not want to choose a map.

Table 2: Three Cities

| Rep | Type | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Choro. | 0.05 | 0.02 | 0.48 | 0.1 | 0.02 | 0 | 0.2 | 0 | 0.02 | 0 | 0.02 | 0 | 0.08 |
| | Hex. | 0.06 | 0.02 | 0.08 | 0 | 0.12 | 0.04 | 0.08 | 0 | 0 | 0.06 | 0.02 | 0.02 | 0.52 |
| 2 | Choro. | 0 | 0.02 | 0 | 0 | 0.65 | 0.08 | 0.2 | 0 | 0.02 | 0 | 0.02 | 0 | 0 |
| | Hex. | 0.02 | 0.27 | 0.02 | 0.02 | 0.29 | 0.35 | 0 | 0 | 0.02 | 0 | 0.02 | 0 | 0 |
| 3 | Choro. | 0.06 | 0.02 | 0.19 | 0.02 | 0.04 | 0.6 | 0.02 | 0.02 | 0 | 0.02 | 0.02 | 0 | 0 |
| | Hex. | 0.08 | 0.02 | 0 | 0.02 | 0 | 0.05 | 0.02 | 0 | 0.48 | 0.18 | 0.02 | 0 | 0.12 |
| 4 | Choro. | 0.04 | 0 | 0 | 0.02 | 0.6 | 0 | 0.21 | 0 | 0.04 | 0.02 | 0 | 0 | 0.08 |
| | Hex. | 0.08 | 0.2 | 0 | 0.05 | 0.25 | 0 | 0.02 | 0.12 | 0.02 | 0.2 | 0 | 0.02 | 0.02 |

Table 3: All Cities

| Rep | Type | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Choro. | 0.02 | 0 | 0.02 | 0.08 | 0.08 | 0.02 | 0.56 | 0 | 0 | 0 | 0.06 | 0 | 0.17 |
| | Hex. | 0.02 | 0 | 0 | 0.08 | 0.02 | 0.08 | 0 | 0 | 0.1 | 0 | 0 | 0.2 | 0.5 |
| 2 | Choro. | 0.02 | 0 | 0.02 | 0.7 | 0.02 | 0.02 | 0.02 | 0 | 0.02 | 0 | 0 | 0.15 | 0 |
| | Hex. | 0.06 | 0 | 0 | 0.77 | 0.02 | 0.04 | 0.02 | 0.02 | 0 | 0 | 0.02 | 0.02 | 0.04 |
| 3 | Choro. | 0.02 | 0.04 | 0 | 0 | 0.02 | 0.21 | 0 | 0 | 0 | 0 | 0 | 0.65 | 0.06 |
| | Hex. | 0.02 | 0.05 | 0.02 | 0.05 | 0.52 | 0 | 0 | 0.02 | 0.02 | 0.02 | 0 | 0.08 | 0.18 |
| 4 | Choro. | 0.05 | 0.68 | 0 | 0.05 | 0.02 | 0 | 0 | 0.02 | 0 | 0.1 | 0.02 | 0 | 0.05 |
| | Hex. | 0.08 | 0.29 | 0 | 0.06 | 0.02 | 0.02 | 0.02 | 0 | 0 | 0.46 | 0.02 | 0.02 | 0.02 |

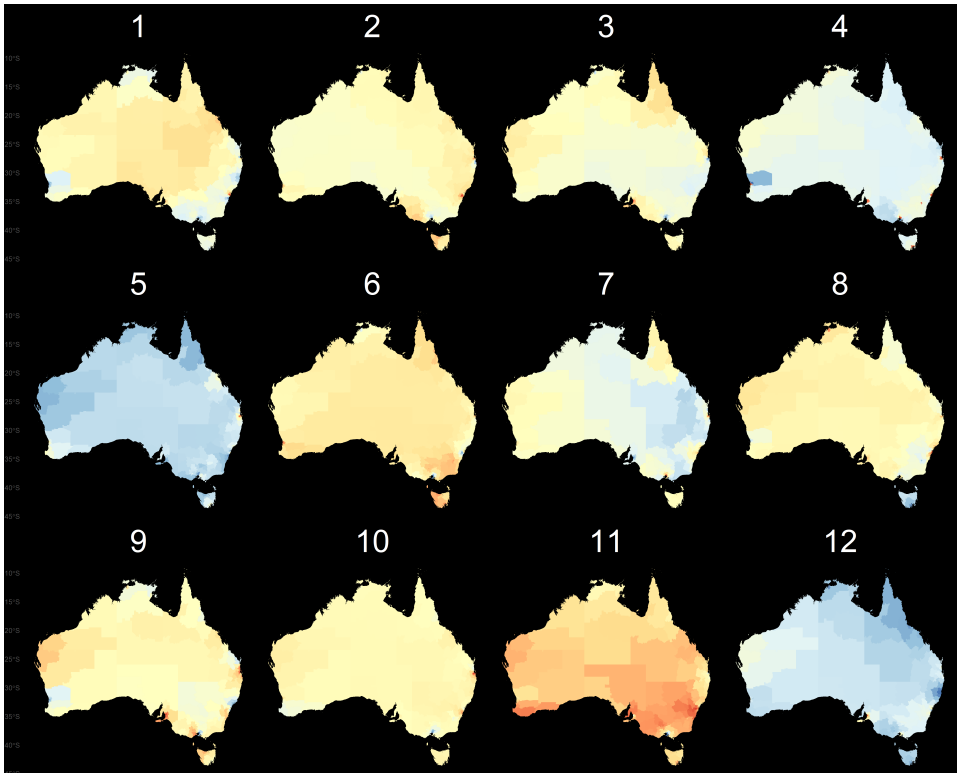


Figure 2: The lineup of choropleth map displays hides a distribution that affects all capital cities.

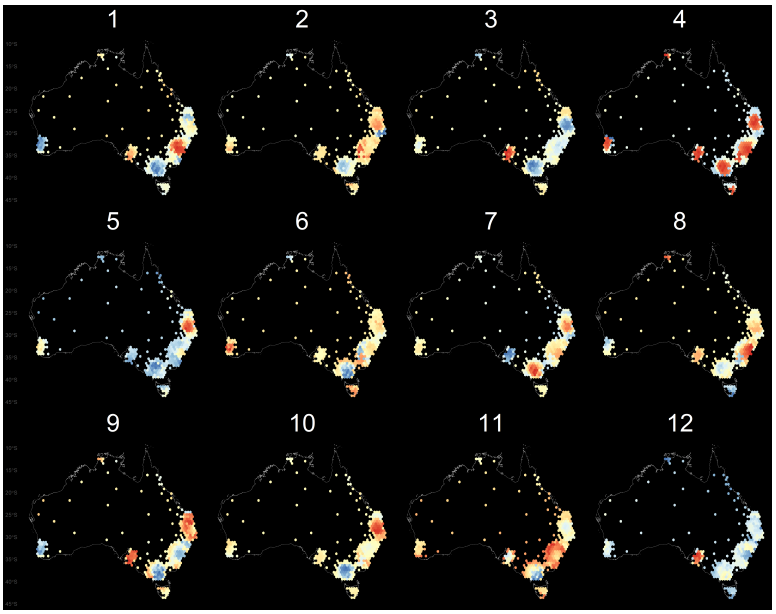


Figure 3: The lineup of choropleth map displays shows a distribution that affects all capital cities. The values for the inner city areas in the capital cities result in them being coloured red. However, the colour blue dominates the display as the large rural areas are filled. Replicate (2) for All Cities.


Figure 4: The lineup of choropleth map displays hides a distribution that affects all capital cities.

The same data showed in the hexagon tile map display shows varied distributions across the lineup. They are more diverse in colour than the choropleth counterparts. The same location, 3, holds the real data plot, the red city centres are now visible and surrounded by yellow, and then blue hexagons. For different reasons the participants were able to make the same correct choice for this replicate, with a detection rate of .

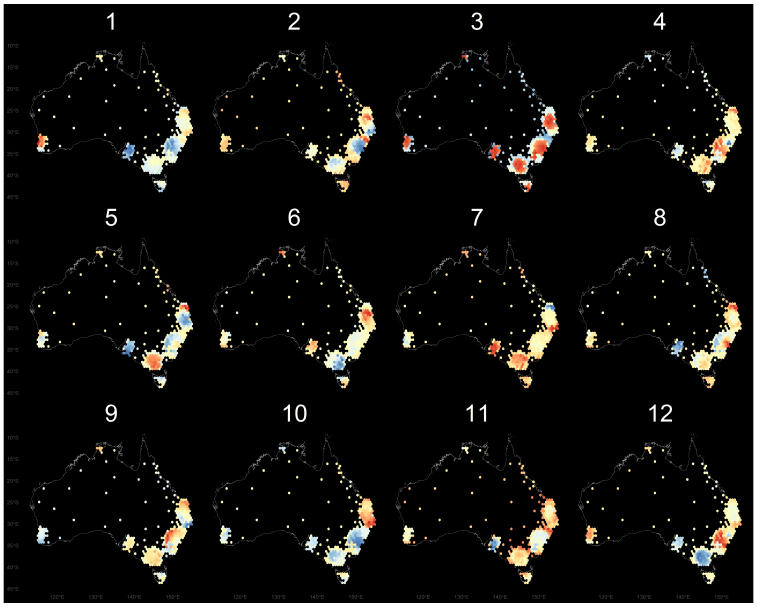


Figure 5: The lineup of choropleth map displays shows a distribution that affects all capital cities. The values for the inner city areas in the capital cities result in them being coloured red. However, the colour blue dominates the display as the large rural areas are filled. Replicate (2) for All Cities.