Lecture 04: Layered and Interactive Graphics

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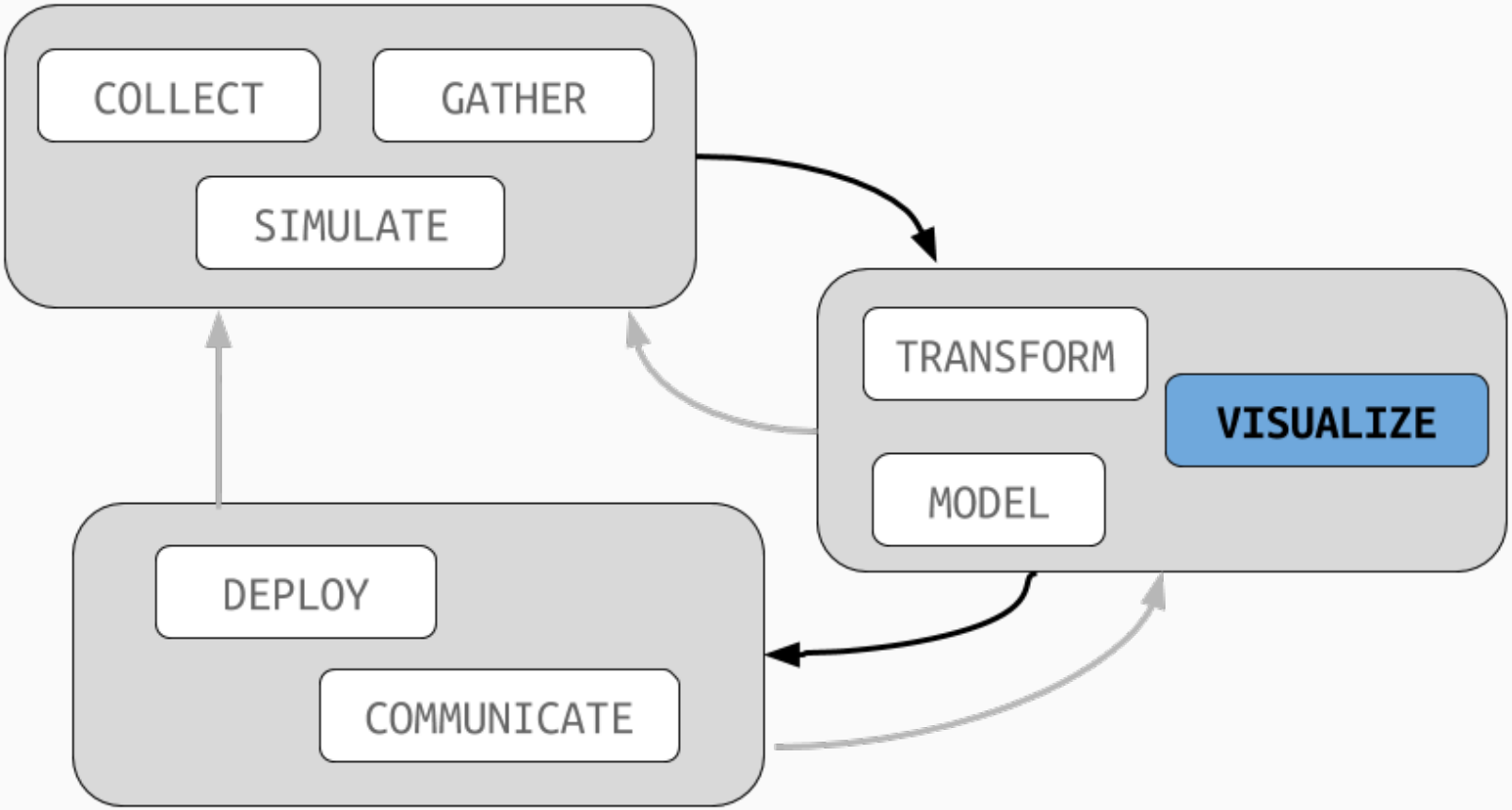
Grammar of Graphics


COLLECT
GATHER
SIMULATE
TRANSFORM
VISUALIZE
MODEL
DEPLOY
COMMUNICATE

ggplot2

Last time, we used the **ggplot2** package to construct graphics using the `qplot` function.

The philosophy of the package is that graphics should be built by combining graphical elements called *layers*. We combine these in R by using the + sign.

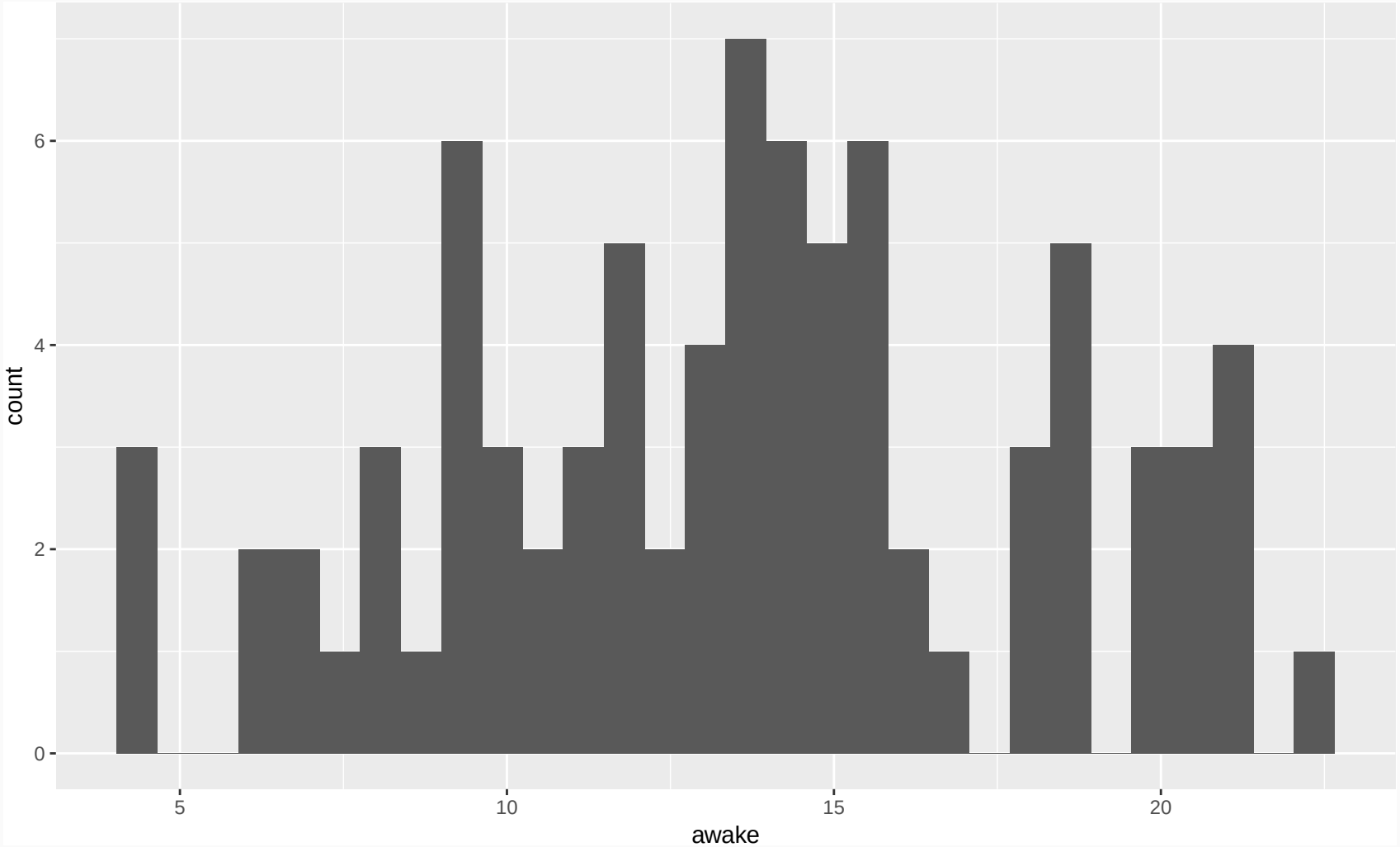
themes

For example, take one of the plots from last time:

```
qplot(awake, vore, data = msleep)
```

themes

```
qplot(awake, data = msleep)
```



themes

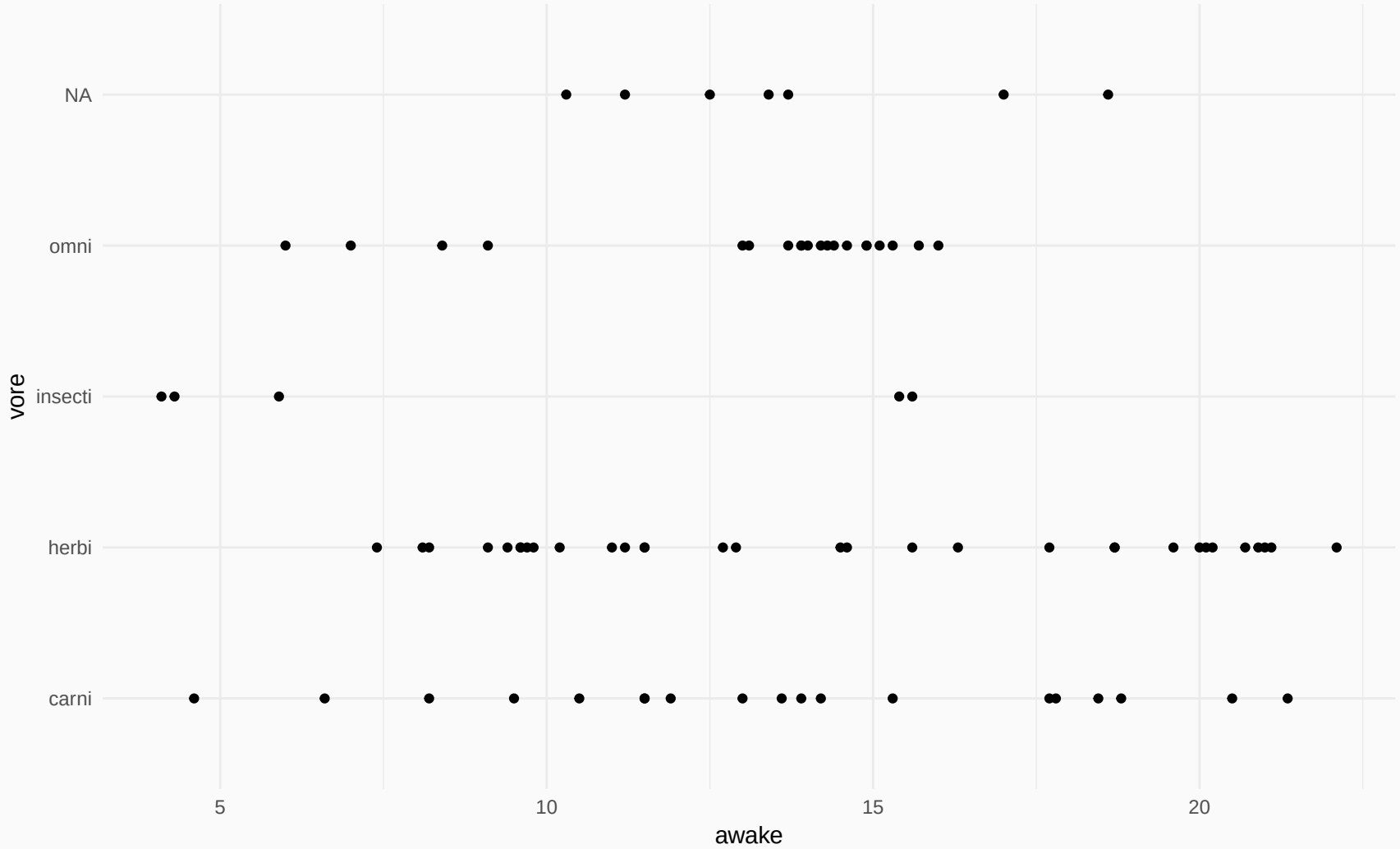
We can add a layer called a theme to the plot to change the way the plot looks. Personally, I prefer the minimal theme:

```
qplot(awake, vore, data = msleep) +
    theme_minimal()
```

Most notably, output no longer has a grey background. Much of the fonts and other elements are also cleaned up a bit from the default.

themes

```
qplot(awake, vore, data = msleep) +
    theme_minimal()
```



themes

Today we'll see some of the most useful layers that can be added to a plot.

geom layers

geom_line

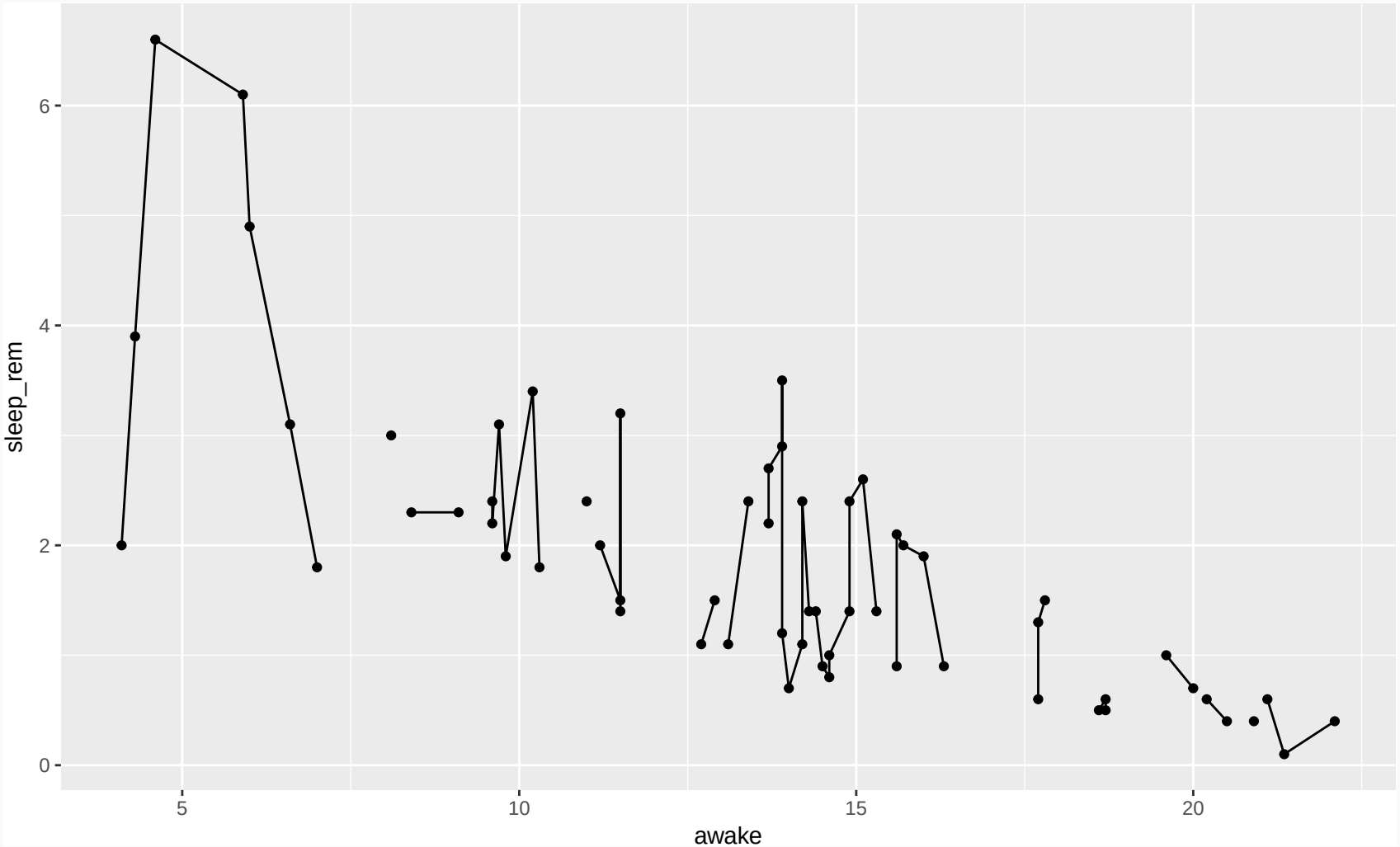
It is often useful to add additional plots over the top of the default types supplied by `qplot`. To do this we simply add functions that start with `geom_`. For example, a line plot (which actually does not make any sense here) can be produce by:

```
qplot(awake, sleep_rem, data = msleep) +
    geom_line()
```

It looks strange in part because of missing values in the dataset.

geom_line

```
qplot(awake, sleep_rem, data = msleep) +
    geom_line()
```



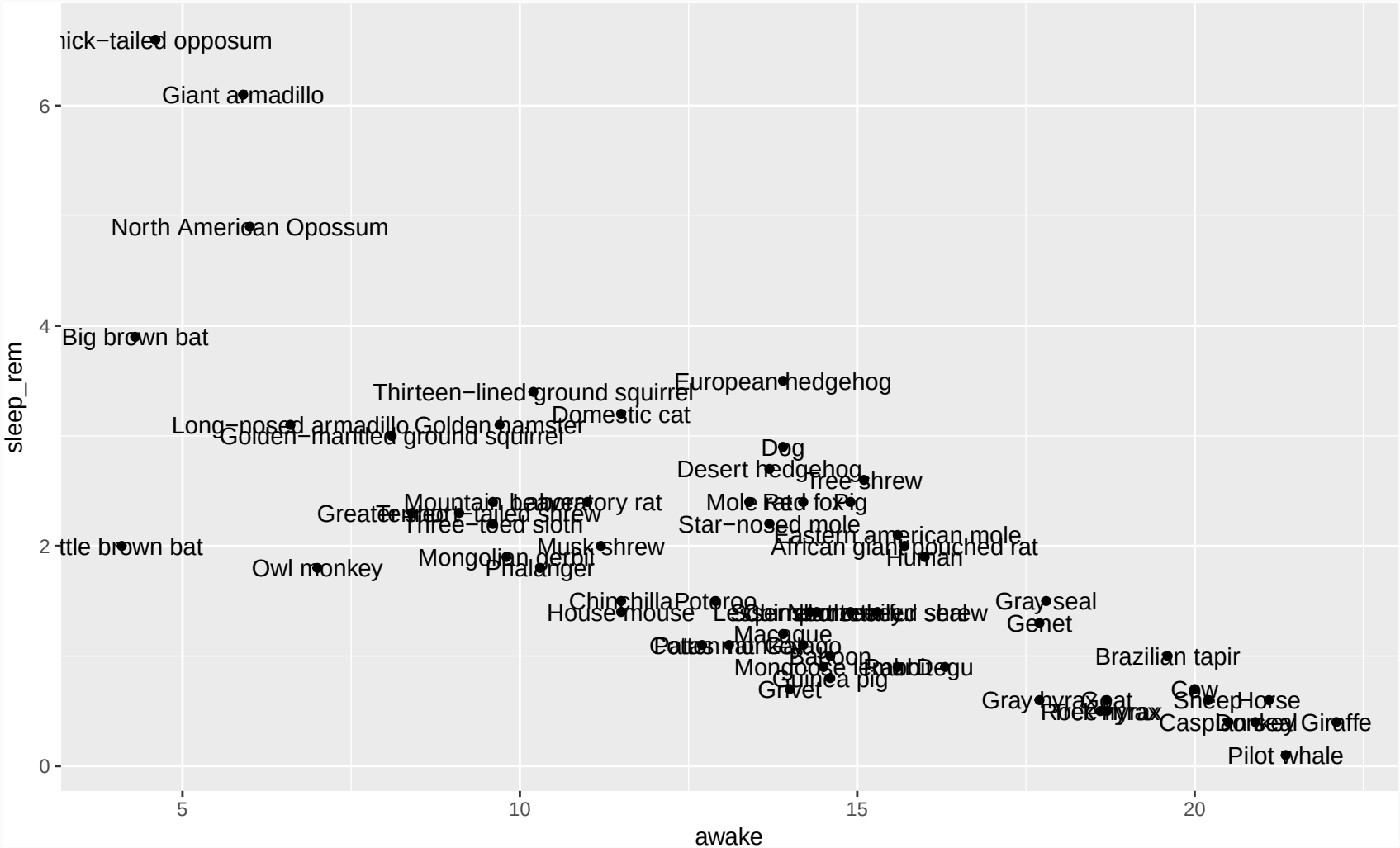
geom_text

We might also want to display the names of the animals on the plot. To do, so we use the `geom_text` layer. However, this requires that we give qplot a `label` aesthetic.

```
qplot(awake, sleep_rem, data = msleep, label = name) +
    geom_text()
```

geom_text

```
qplot(awake, sleep_rem, data = msleep, label = name) +
    geom_text()
```



geom_boxplot

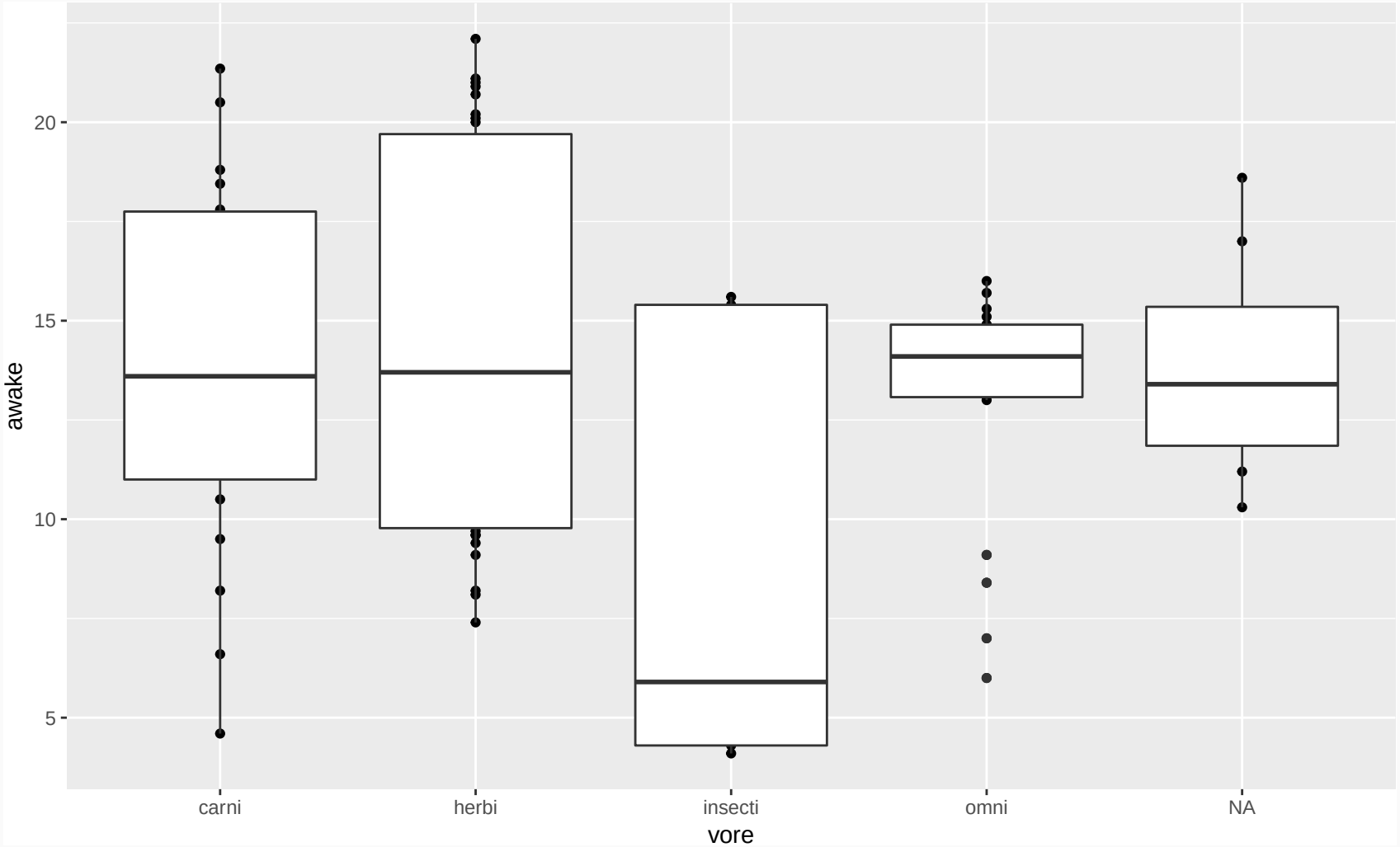
Another common alternative plot when we have both a continuous and a categorical variable is called a *box plot*:

```
qplot(vore, awake, data = msleep) + geom_boxplot()
```

The details of this plot will be described in a future handout. We can also add a smoothing curve with.

geom_boxplot

```
qplot(vore, awake, data = msleep) + geom_boxplot()
```



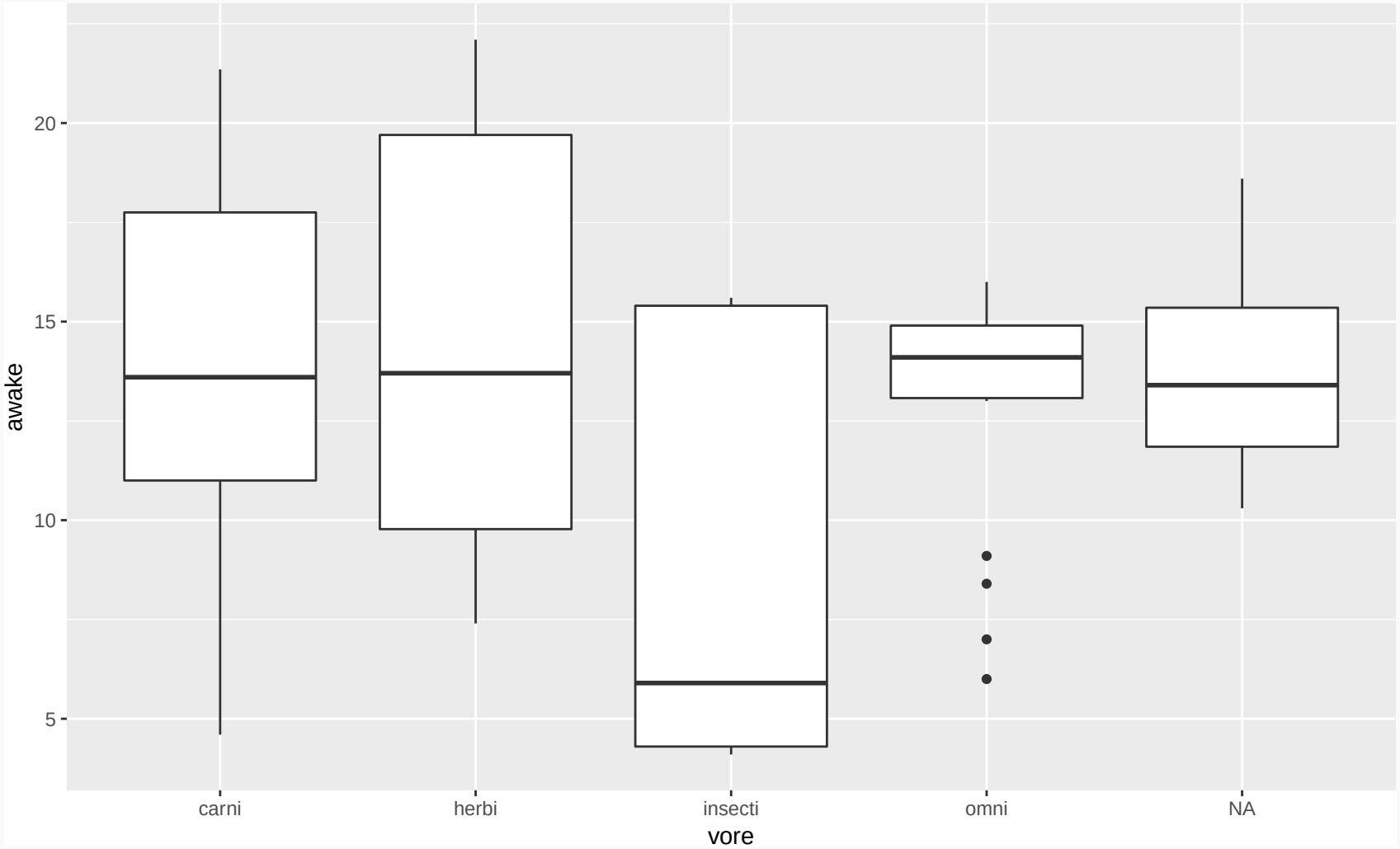
geom_blank

With the boxplot, we probably want to suppress the default `qplot` layer rather than just adding on top of it. To do this, set the geom argument of `qplot` to "blank":

```
qplot(vore, awake, data = msleep, geom = "blank") +
    geom_boxplot()
```

geom_blank

```
qplot(vore, awake, data = msleep, geom = "blank") +
    geom_boxplot()
```



geom_smooth

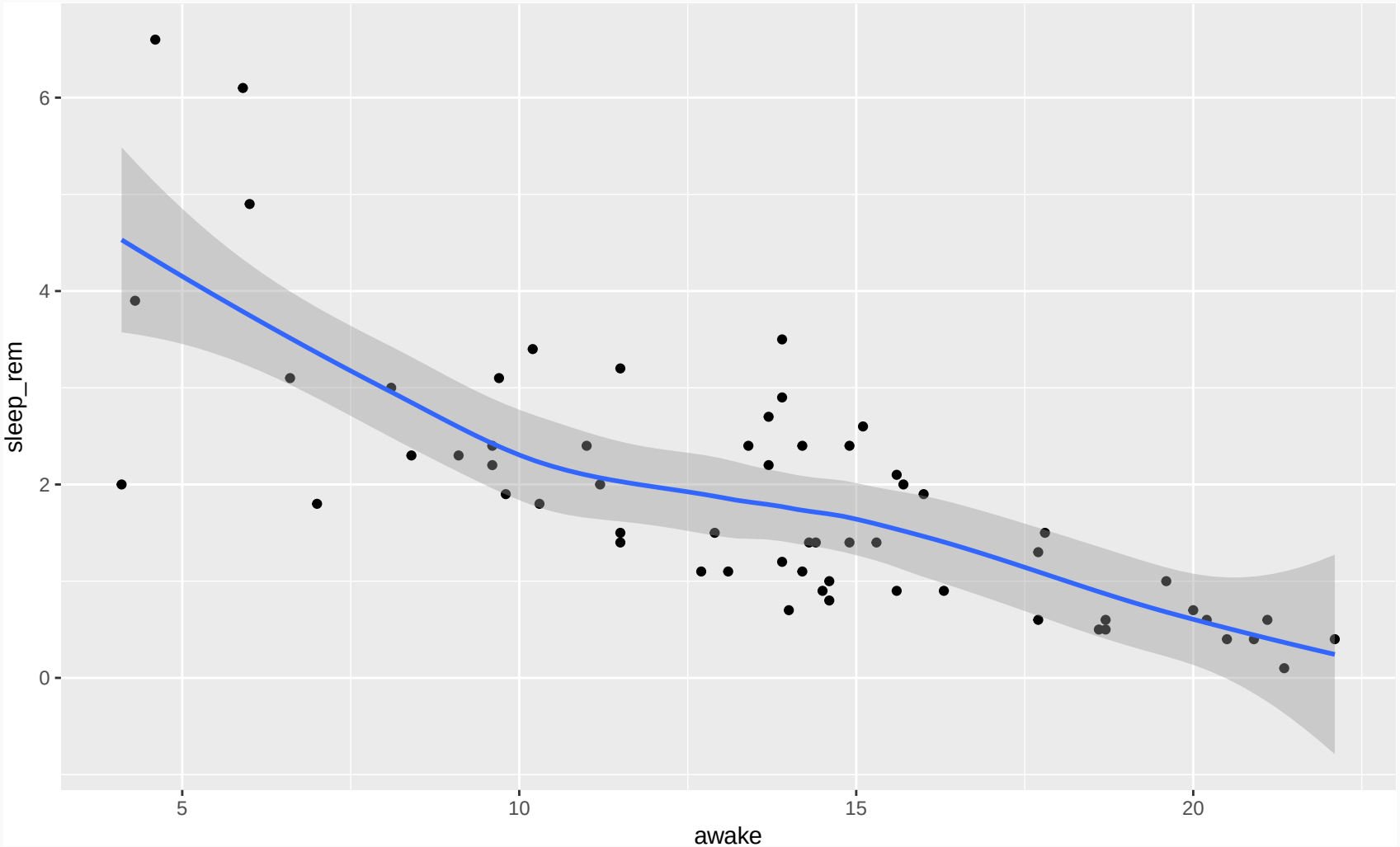
We can also add a smoothing curve with:

```
qplot(awake, sleep_rem, data = msleep) +
    geom_smooth()
```

This adds a line that attempts to run through the data points without wiggling too much.

geom_smooth

```
qplot(awake, sleep_rem, data = msleep) +
    geom_smooth()
```



geom_smooth

If we want a best fit line, the option `method` can be set to `lm`:

```
qplot(awake, sleep_rem, data = msleep) +
    geom_smooth(method = "lm")
```

These plots will be very helpful as we approach statistical modelling in the upcoming weeks.

geom_smooth

If we want a best fit line, the option `method` can be set to `lm`:

```
qplot(awake, sleep_rem, data = msleep) +
    geom_smooth(method = "lm")
```

geom_smooth

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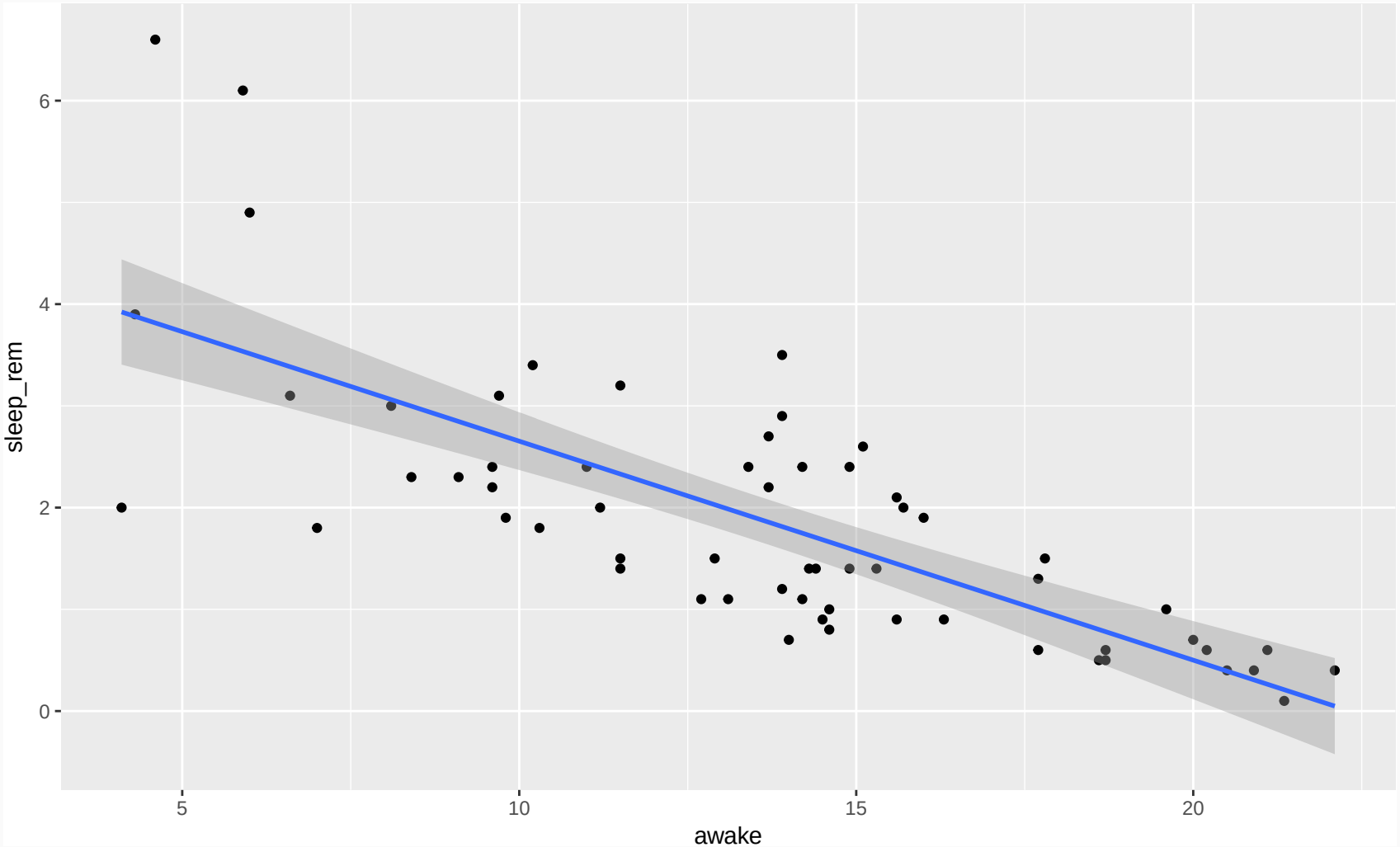
qplot(awake, sleep_rem, data = msleep) +
    geom_smooth(method = "lm")
```



facets

facet_wrap

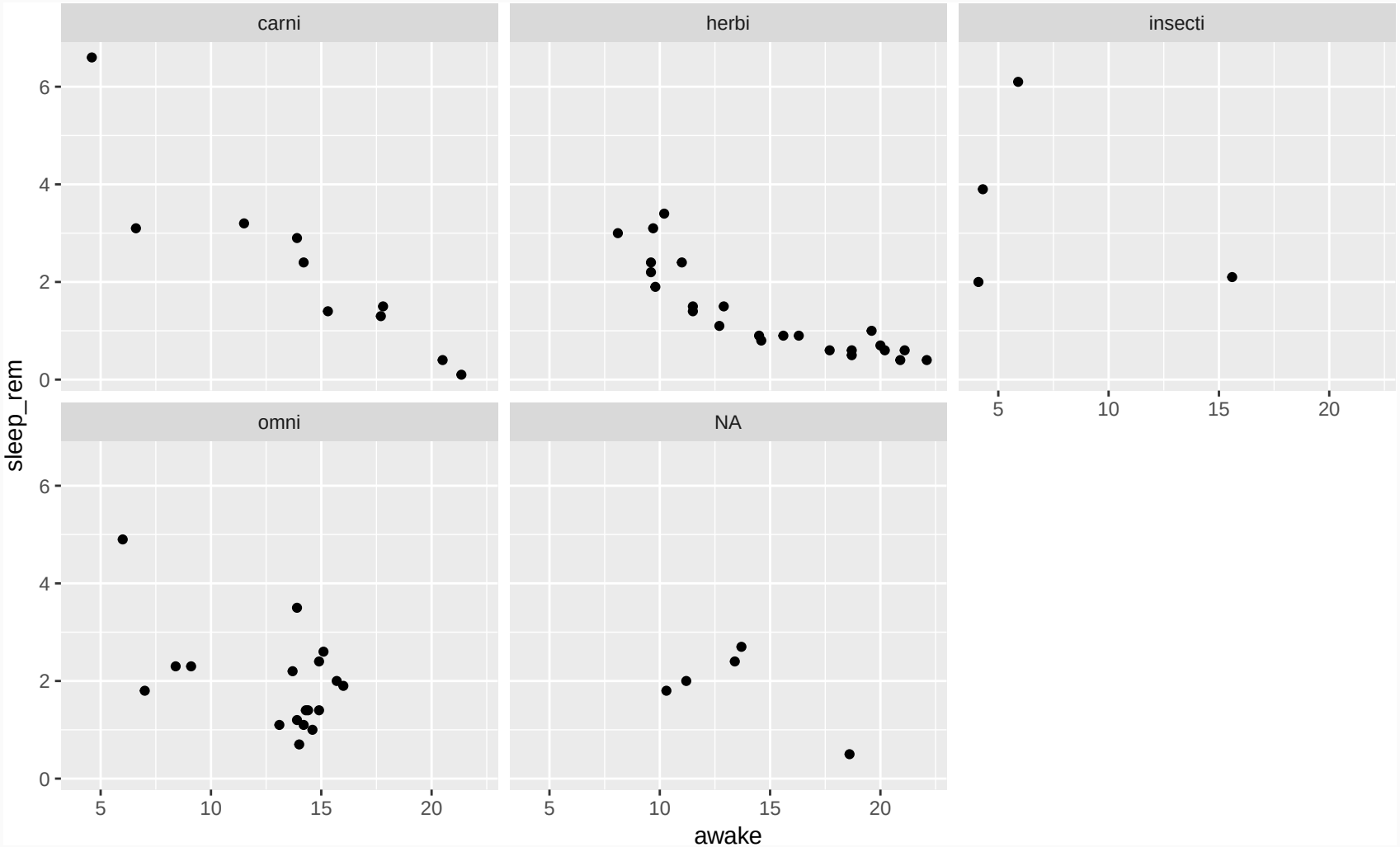
One particularly powerful layer that we can add to plots is the `face_wrap` layer. As an input we start with the `~` operator (more on this latter) followed by the name of a continuous variable.

```
qplot(awake, sleep_rem, data = msleep) +
    facet_wrap(~vore)
```

The package then create the requested plot for every single unique value of the discrete variable.

facet_wrap

```
qplot(awake, sleep_rem, data = msleep) +
    facet_wrap(~vore)
```



plotly

interactive graphics

The **plotly** package allows us to turn ordinary graphics into interactive ones. Simply load the library, run any standard ggplot graphic:

```
library(plotly)
qplot(awake, sleep_rem, data = msleep, color = vore)
```

And then call the `ggplotly` function:

```
ggplotly()
```

interactive graphics

tooltip

By default, **plotly** includes any variables used for the plot in the tooltip (the box that comes up when you hover over a point). Note that we can include a label name without actually using text labels to include them in the interactive plot.

For example:

```
qplot(awake, sleep_rem, data = msleep, color = vore,
      label = name)
ggplotly()
```

tooltip


math329 - Google Sheets
index.html
file:///var/folders/7h/gb7yf5cn6xdd6vmwjfy7bxyc0000gn/T/RtmpjfpHwE/viewhtml58ab6bf3292a/index.html
vore: carni
awake: 11.50
sleep_rem: 3.2
carni
herbi
insecti
omni
NA
sleep_rem
awake
0
2
4
6
5
10
15
20

interactive graphics

- interactive graphics are a fantastic tool in doing data analysis
- use caution with larger datasets; consider sub-sampling or only working with a smaller collection
- when possible, try to replicate the most useful interactive views with static graphics for reproducibility and publication purposes