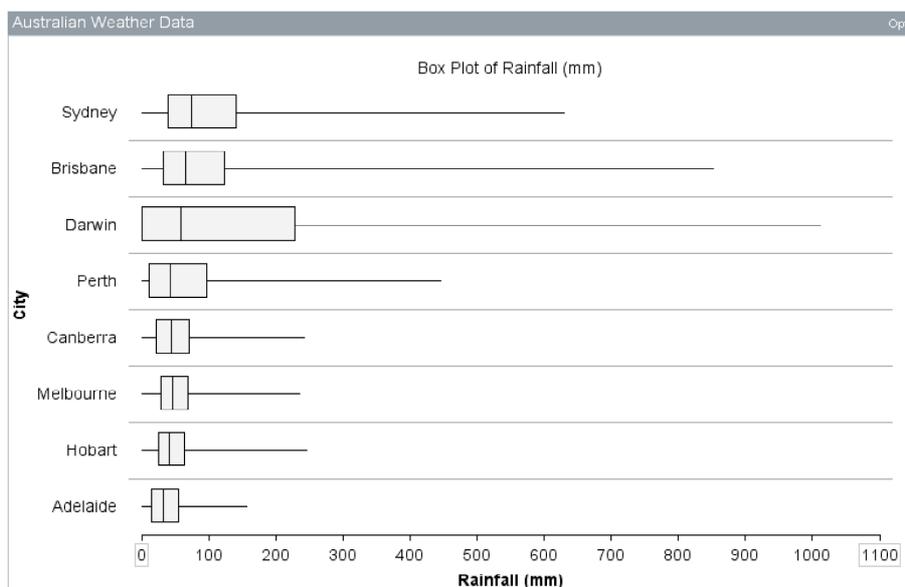


Informal inference with box plots: Teacher notes

<http://topdrawer.aamt.edu.au/Statistics/Misunderstandings/Difficulties-with-informal-inference/Examples-of-box-plots>

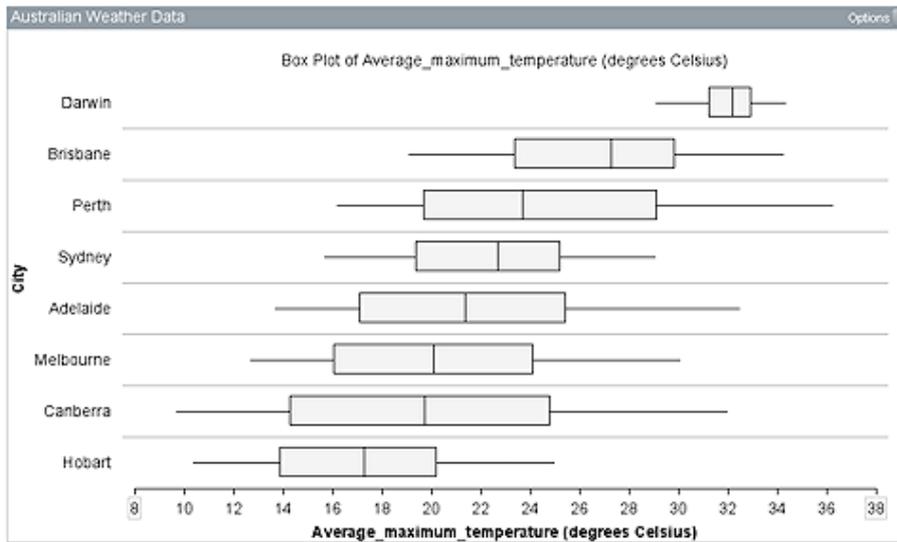


Monthly rainfall for 56 years

This plot represents over 600 months of rainfall data (all 12 months of the year). On the surface it may appear that the medians (50th percentile of the data) are quite similar for the cities but looking at the scale of the plot we see that Darwin had at least one month of over 1000 mm. We see that the largest 25% of values are for Sydney and Brisbane, and are very spread out, whereas Adelaide has much more consistent rainfall. Also Darwin has no left whisker indicating that for at least 25% of the months, it had no rain at all. All of the data sets are somewhat skewed to the higher end because of the presence of around one quarter of months with little rainfall compared to the rest of the months.

In comparing Sydney and Adelaide, looking closely at the box plots indicates that three quarters of the months in Sydney have more rain than half of the months in Adelaide. It is fairly safe to claim that generally we expect Sydney to have more rain than Adelaide.

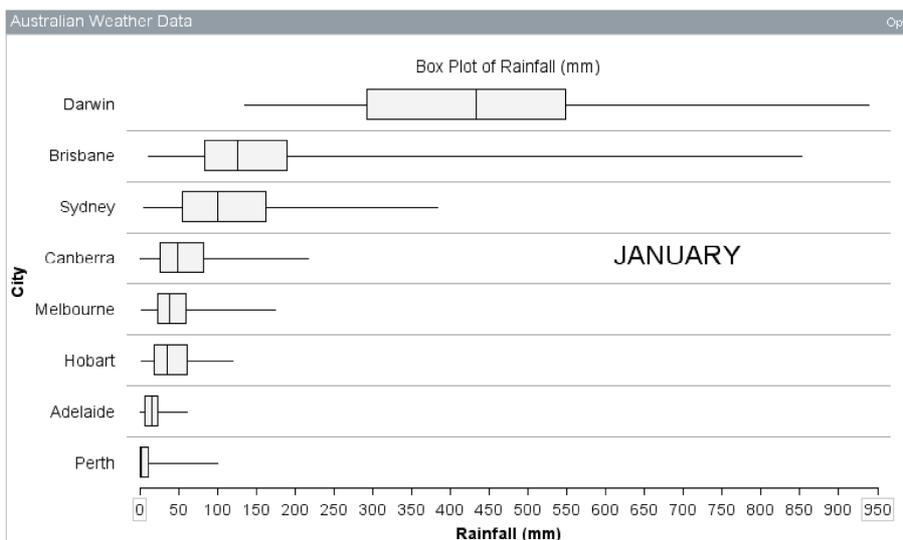




Average monthly maximum temperature for 56 years

Considering the placement of the central boxes in the box plots for average maximum monthly temperature (each plot representing more than 600 months), it is easy to conclude that we can expect a higher maximum in Darwin than any of the other capital cities. Such a strong claim cannot be made for Hobart being colder than all others.

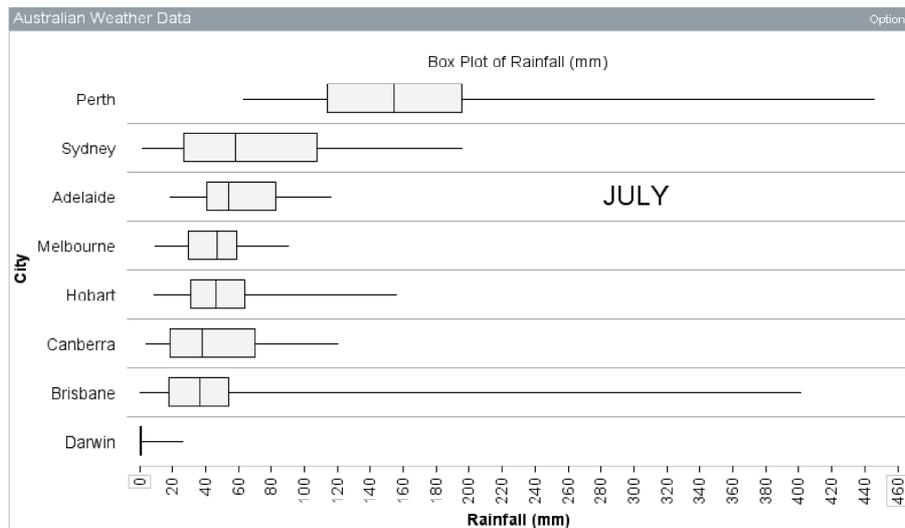
However, if we use a $\frac{3}{4} - \frac{1}{2}$ rule (that $\frac{3}{4}$ of Hobart's data are less than $\frac{1}{2}$ of the data of other cities), we can be quite confident that generally Hobart is cooler than Adelaide, Sydney, Perth and Brisbane (and of course Darwin). It is not possible to make a claim of difference between Melbourne and Canberra for their average maximum monthly temperature. We could only say that the Canberra data are somewhat more spread, indicating a greater variation of average maximum monthly temperature.



January rainfall for 56 years

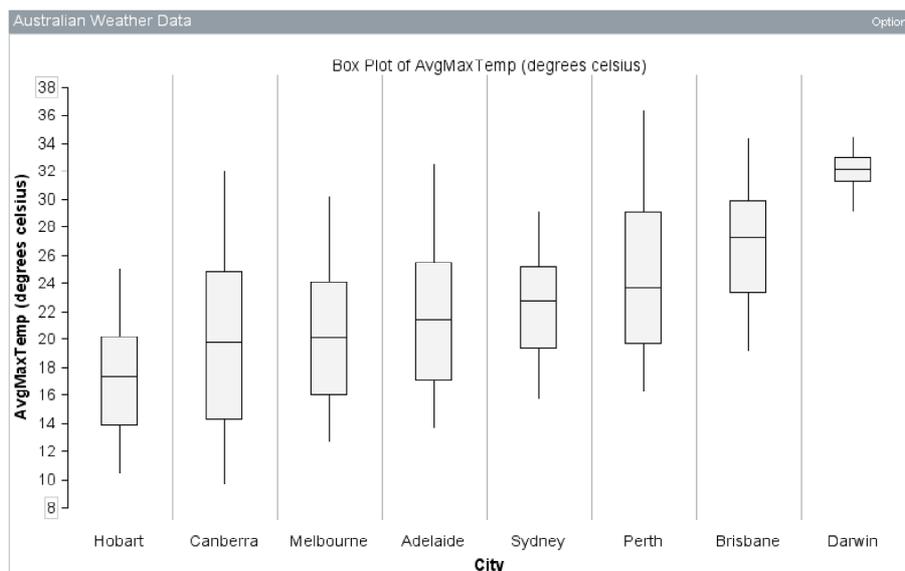
Considering rainfall only for January, there are more extreme differences between the cities. Again we can claim with confidence that Darwin generally has more rainfall than all other capitals and Perth has less than all others. Hobart and Melbourne are very

similar but Melbourne has a few more extreme months. Brisbane has the greatest spread among its highest 25% of values.



July rainfall for 56 years

Comparing the July plot with the January plot it is interesting to see the change in order, with Perth moving to the top and Darwin and Brisbane moving to the bottom. This time we can be confident in saying that generally Perth has more rain in July than any other capital city and Darwin has less! It is interesting to note that Sydney is third place in January and second place in July, which fits with it being at the top of the first plot for the entire year. Again, Melbourne and Hobart are very similar but this time Hobart has more variation in its highest 25% of values. Except for Perth and Darwin, it is more difficult in July to make confident claims about differences between other pairs of capital cities.



Average monthly maximum temperature for 56 years

This plot has exactly the same information as the second plot. Often box plots are present vertically and we must be able to make the same claims in each type of presentation. Reread the claims for the second plot and confirm in this form.