1. The notion of a confidence interval. (A procedure that computes an interval that has a high probability of containing the parameter in question.)

2. Confidence interval for $\mu$ using the $t$ distribution

$$\bar{x} \pm t^* \frac{s}{\sqrt{n}}$$

where $t^* = t_{0.025, n-1}$.

3. General form of confidence interval

$$\text{estimate} \pm \text{critical value} \cdot \text{standard error}$$

4. More on Gossett (Student)

5. What is $X$ is not normal? First answer: $t$ is robust. (Longer version: if $n$ is very large or moderately large with a relatively symmetric population and no large outliers, we are probably okay.)

6. The normal error model.

$$\begin{align*}
\text{observed} &= \text{model} + \text{error} \\
\text{observed} &= \text{fitted} + \text{residual}
\end{align*}$$

$$\begin{align*}
x_i &= \mu + e_i \\
x_i &= \bar{x} + r_i
\end{align*}$$

**Homework**

To turn in on Tuesday, April 7, Problems 5.10,11.

**R**

```r
> attach(sleep)
> dextro=extra[group==1]
> laevo=extra[group==2]
> t.test(dextro-laevo)

One Sample t-test

data:  dextro - laevo
t = -4.0621, df = 9, p-value = 0.002833
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
-2.4598858 -0.7001142
sample estimates:
mean of x
-1.58
```