

Hypothesis Tests for a Mean

Stat 145

You may have noticed that although we have created confidence intervals for a mean, we have not done hypothesis tests for a mean – until now.

Remember that a randomization distribution should simulate a situation that

- reflects the design of our study and our sample data, and
- **forces the null hypothesis to be true.**

The randomization distributions we have seen so far have either used

- `rflip()` to simulate categorical data with a specified proportion, or
- `shuffle()` to ensure that there is no association between two variables.

Neither of these will work for a hypothesis about a mean. We need a new idea. Here it is:

We can create a randomization distribution for a test about a single mean by shifting the bootstrap distribution to make it centered in the right location.

This will give us a distribution that is centered at the value specified by the null hypothesis and the appropriate amount of variability. Here's how.

```
mean(~BodyTemp, data = BodyTemp50)
```

```
## [1] 98.26
```

```
# Create the Bootstrap distribution
```

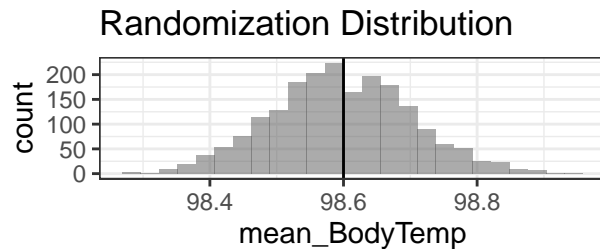
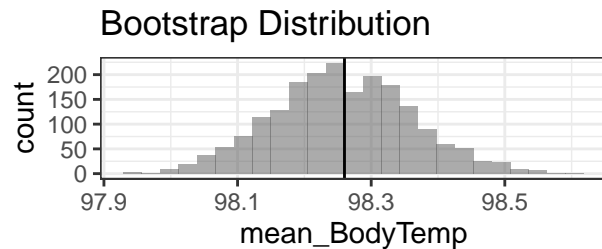
```
Temp_boot <-
```

```
  do(2000) * df_stats( ~ BodyTemp, data = resample(BodyTemp50), mean_BodyTemp = mean)
```

```
# Shift it so that it is centered in the correct place for our hypothesis
```

```
Temp_null <-
```

```
  Temp_boot %>% mutate(mean_BodyTemp = mean_BodyTemp + (98.6 - 98.26))
```



Notice that 98.6 lies outside the 95% confidence interval and the p-value is than 0.05.

```
# 95% confidence interval
```

```
cdata(~ mean_BodyTemp, data = Temp_boot)
```

```
##      lower upper central.p
```

```
## 2.5% 98.05 98.47      0.95
```

```
# p-value for test of H0: mu = 98.6
```

```
2 * prop(~ (mean_BodyTemp <= 98.26), data = Temp_null)
```

```
## prop_TRUE
##          0
```