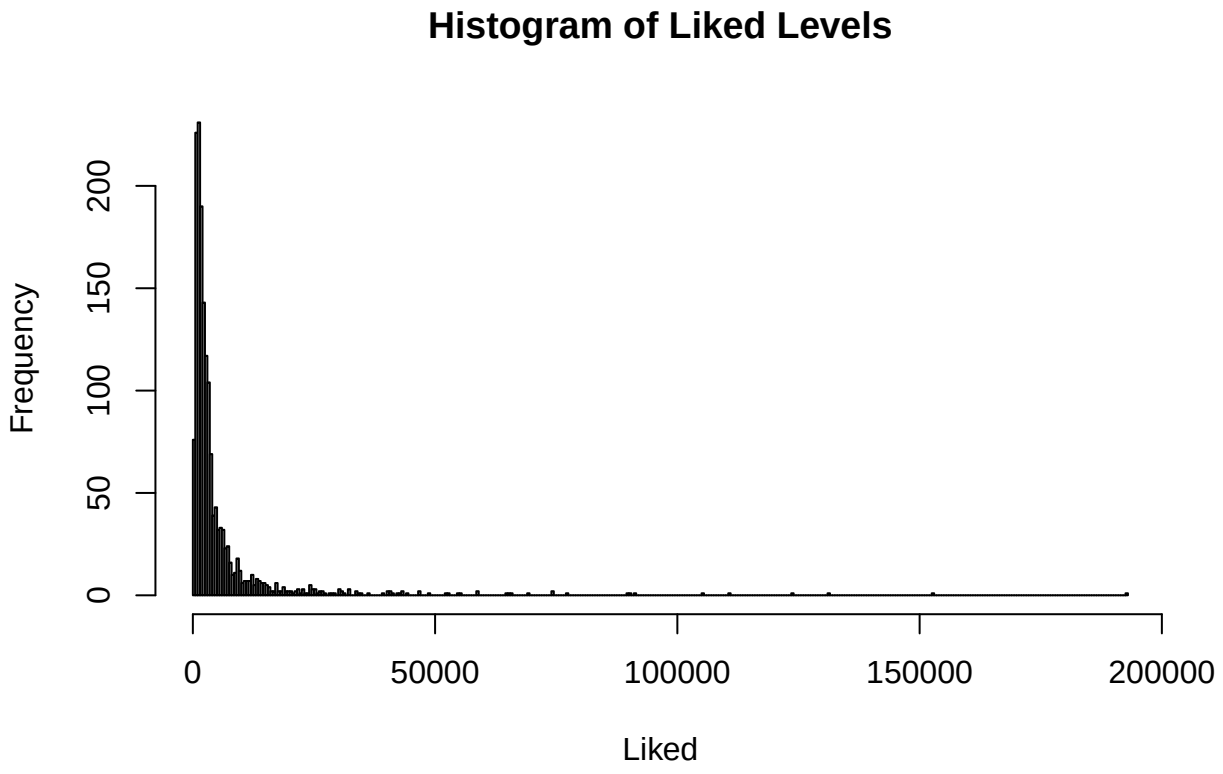
Bootstrap SMM

Here we will use the population to examine the bootstrap procedure on three attributes. We use Pearson's second skewness coefficient (median skewness). The sample was obtained by random sampling sampling without replacement.

A histogram for the liked variable. We calculate the mean and Pearson's second skewness coefficient.

```
# ########
# REDACTED
# ########
```



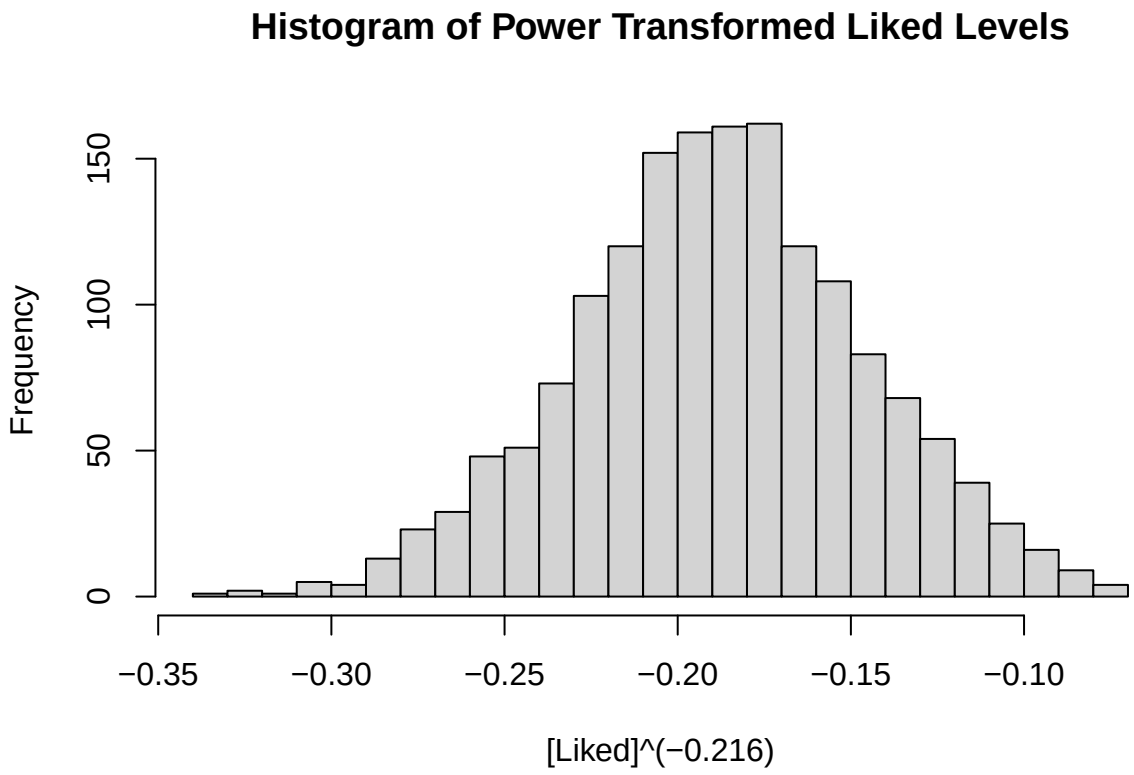
If we apply the power transformation using α as the power we can change the skewness. Using the uniroot function we find the value of α which makes the skewness of the power-transformed variable equal to zero.

```
# ########
# REDACTED
# ########
```

Using the value of α from above, we calculate the skewness on the power-transformed variable and construct a histogram of the power-transformed variable.

```
# ########
# REDACTED
# ########
```

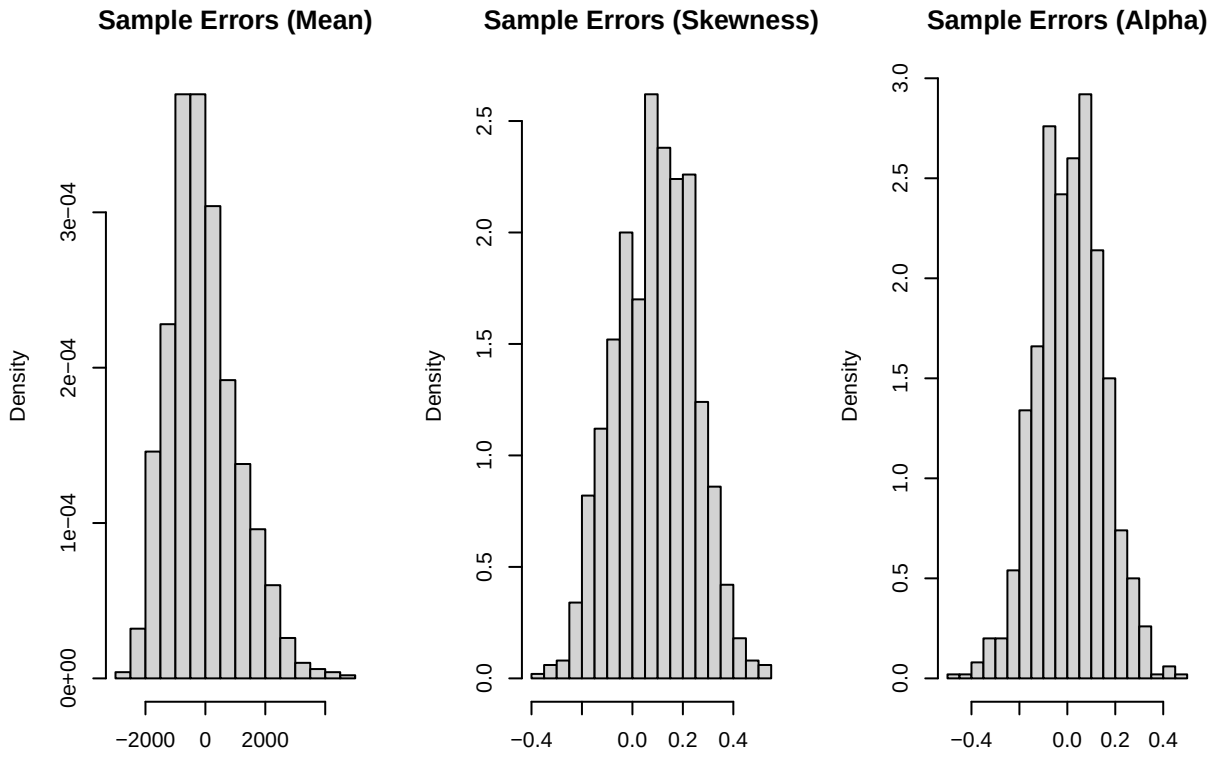
```
## [1] -6.367443e-07
```



Sampling Distribution of the attributes

We select 1000 samples of size 100 without replacement and for each sample and construct three histograms of the sample error for each attribute.

```
# ########
# REDACTED
# ########
```



A Sample and the Bootstrap.

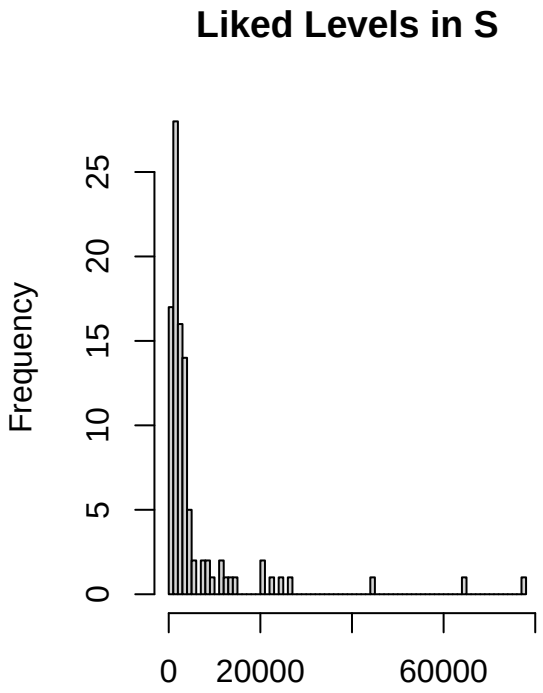
We calculate the three attributes of interest.

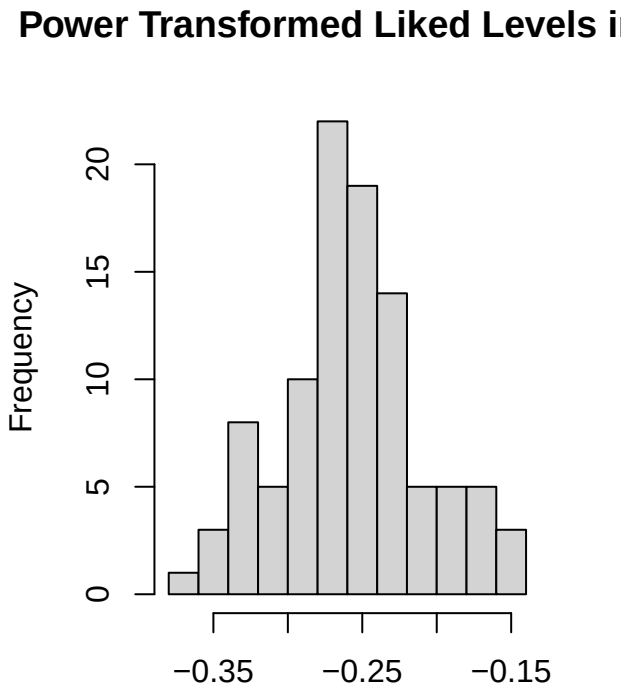
```
# ########
# REDACTED
# ########
```

```
sampleAttr <- attr3(smm_levels[levelsSample, "liked"])
#sampleAttr
```

We construct two histograms; one of the raw values and another the power-transformed variable liked using the value of α from above.

```
# ########
# REDACTED
# ########
```

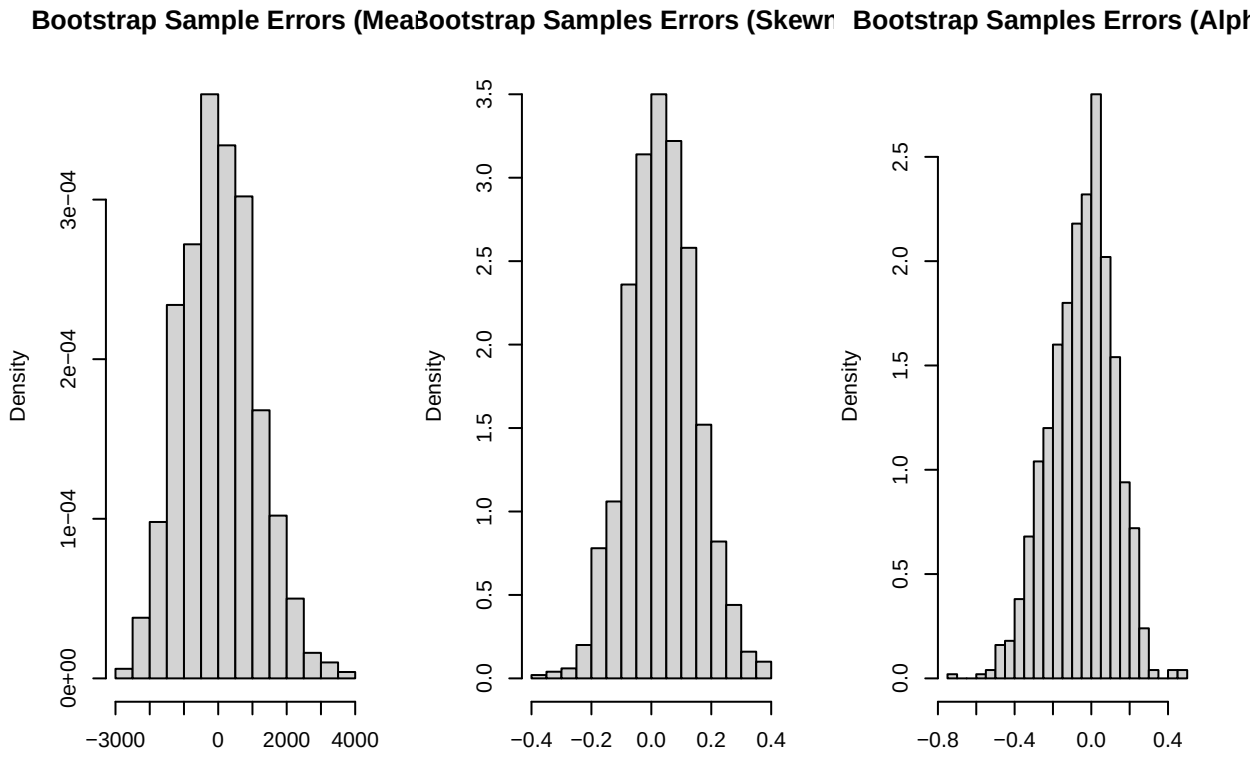




Bootstrap

By resampling the sample with replacement, we construct 1000 bootstrap samples and calculate the three attributes of interest on each bootstrap sample. Then we construct three histograms of the bootstrap sample error for each attribute.

```
# ########
# REDACTED
# ########
```




```
##     2.5%    97.5%
## 0.725839 1.175843
```

```
##        2.5%       97.5%
## -0.55179834  0.06088933
```

Sampling Properties of the Bootstrap

For each of three attributes of interest we estimate the coverage probability when using the percentile method and give a standard error.

```
# ########
# REDACTED
# ########
```

```
## [1] 0.85
```

```
## [1] 0.82
```