Level Diff. SMM

Here we explore the relationship between the level difficulty and log(tries_taken).

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

We construct a figure with two histograms of log_tries_taken.

```
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# ########
```

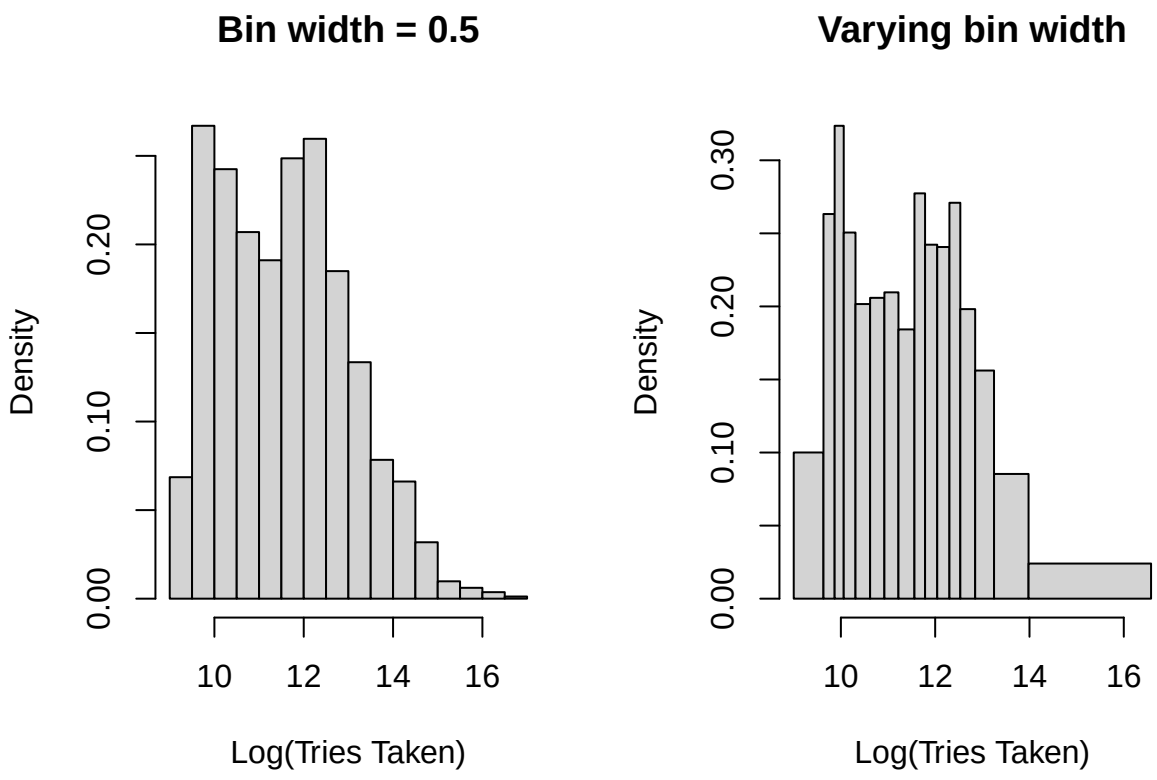

We can model the relationship between log_tries_taken and level difficulty non-parametrically by calculating proportions.

In addition, for partition we construct a table.

```
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```
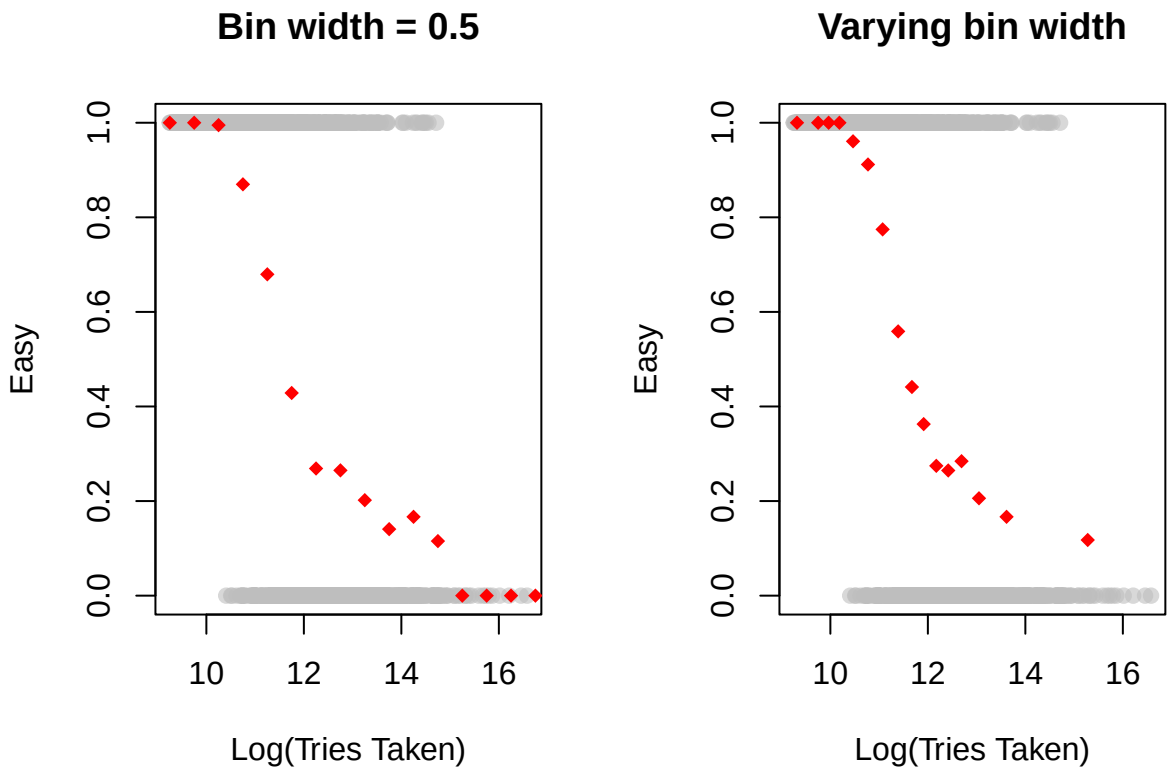

```
##    lower upper num_levels num_easy_levels      prop
## 1    9.0   9.5         56              56 1.0000000
## 2    9.5  10.0        218             218 1.0000000
## 3   10.0  10.5        198             197 0.9949495
## 4   10.5  11.0        169             147 0.8698225
## 5   11.0  11.5        156             106 0.6794872
## 6   11.5  12.0        203              87 0.4285714
## 7   12.0  12.5        212              57 0.2688679
## 8   12.5  13.0        151              40 0.2649007
## 9   13.0  13.5        109              22 0.2018349
## 10  13.5  14.0         64               9 0.1406250
## 11  14.0  14.5         54               9 0.1666667
## 12  14.5  15.0         26               3 0.1153846
## 13  15.0  15.5          8               0 0.0000000
## 14  15.5  16.0          5               0 0.0000000
## 15  16.0  16.5          3               0 0.0000000
## 16  16.5  17.0          1               0 0.0000000
```




```
##        lower     upper num_levels num_easy_levels      prop
## 1   9.000000  9.630431        102             102 1.0000000
## 2   9.630431  9.867705        102             102 1.0000000
```

```
## 3   9.867705 10.060705        102             102 1.0000000
## 4  10.060705 10.309985        102             102 1.0000000
## 5  10.309985 10.619765        102              98 0.9607843
## 6  10.619765 10.923147        102              93 0.9117647
## 7  10.923147 11.221088        102              79 0.7745098
## 8  11.221088 11.560038        102              57 0.5588235
## 9  11.560038 11.785217        102              45 0.4411765
## 10 11.785217 12.043048        102              37 0.3627451
## 11 12.043048 12.302582        102              28 0.2745098
## 12 12.302582 12.533111        102              27 0.2647059
## 13 12.533111 12.848332        102              29 0.2843137
## 14 12.848332 13.248395        102              21 0.2058824
## 15 13.248395 13.980168        102              17 0.1666667
## 16 13.980168 16.578554        102              12 0.1176471
```

Another approach is to model the proportion using a parametric model. We will consider using the the cumulative distribution function of the standard normal distribution denoted by Φ and is also known as the inverse probit function. We plot the Φ function over the range $[-6, 6]$.

```
# ########
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# ########
```

```
##        lower     upper num_levels num_easy_levels      prop
## 1   9.000000  9.630431        102             102 1.0000000
## 2   9.630431  9.867705        102             102 1.0000000
## 3   9.867705 10.060705        102             102 1.0000000
## 4  10.060705 10.309985        102             102 1.0000000
## 5  10.309985 10.619765        102              98 0.9607843
## 6  10.619765 10.923147        102              93 0.9117647
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## 11 12.043048 12.302582        102              28 0.2745098
## 12 12.302582 12.533111        102              27 0.2647059
## 13 12.533111 12.848332        102              29 0.2843137
## 14 12.848332 13.248395        102              21 0.2058824
## 15 13.248395 13.980168        102              17 0.1666667
## 16 13.980168 16.578554        102              12 0.1176471
```

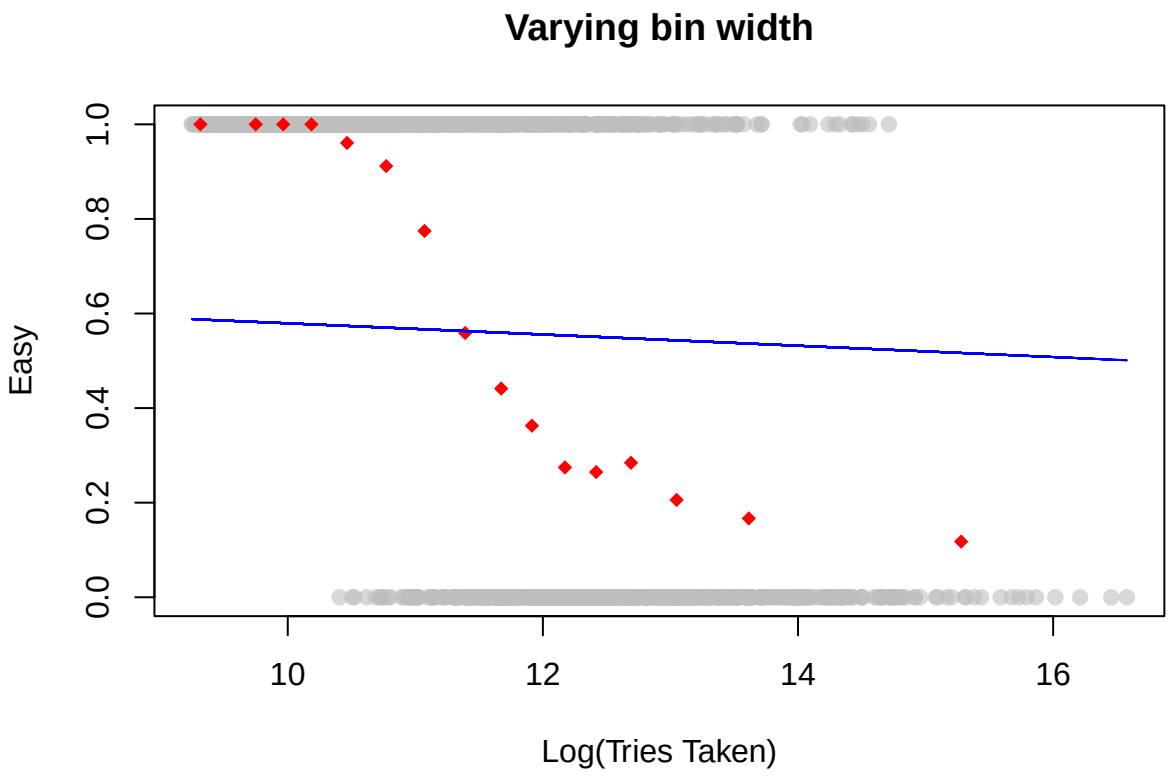
Varying bin width
Easy
0.0
0.2
0.4
0.6
0.8
1.0
10
12
14
16
Log(Tries Taken)