1. see above
2. application of smoothing
3. results:

a 0.048

the 0.24533333333333335

from 0.034666666666666665

retrieval 0.005333333333333333

sun 0.08

rises 0.07733333333333332

in 0.17600000000000002

BM25 0.0026666666666666666

east 0.07200000000000001

sets 0.07733333333333332

west 0.07200000000000001

and 0.10933333333333334

1. u = .01

a 0.00016348773841961853

the 0.27263396911898274

from 0.00011807447774750229

retrieval 1.8165304268846504e-05

sun 0.09087193460490463

rises 0.0908628519527702

in 0.1817983651226158

BM25 9.082652134423252e-06

east 0.09084468664850136

sets 0.0908628519527702

west 0.09084468664850136

and 0.0909718437783833

u = 100

a 0.16216216216216217

the 0.18018018018018017

from 0.11711711711711711

retrieval 0.018018018018018018

sun 0.05405405405405406

rises 0.04504504504504504

in 0.16216216216216217

BM25 0.009009009009009009

east 0.02702702702702703

sets 0.04504504504504504

west 0.02702702702702703

and 0.15315315315315314

As u increases weight increases. This makes sense because looking at the formula for Dirichlet prior smoothing u is multiplied by p(w|C), however it is not multiplied by anything in the denominator. Thus no matter what u is, as it increases the numerator will increase at a faster rate than the denominator, and thus we would expect p(w|d) to increase.

1. lambda = .1

a 0.0018

the 0.27169999999999994

from 0.0013000000000000002

retrieval 0.0002

sun 0.0905

rises 0.0904

in 0.18159999999999998

BM25 0.0001

east 0.0902

sets 0.0904

west 0.0902

and 0.0916

lambda =.5

a 0.09

the 0.22136363636363637

from 0.065

retrieval 0.01

sun 0.07045454545454546

rises 0.06545454545454546

in 0.1709090909090909

BM25 0.005

east 0.05545454545454546

sets 0.06545454545454546

west 0.05545454545454546

and 0.12545454545454546

lambda = .9

a 0.162

the 0.18027272727272728

from 0.117

retrieval 0.018000000000000002

sun 0.05409090909090909

rises 0.04509090909090909

in 0.1621818181818182

BM25 0.009000000000000001

east 0.02709090909090909

sets 0.04509090909090909

west 0.02709090909090909

and 0.1530909090909091

The Dirichlet prior has less smoothing than the Jelinek mercer, which makes sense because for Dirichlet prior the amount of smoothing is weighted by document length, and in this case the length of our document is quite short.