# Generating complete LUTs from annihilation generation rules

Generating for a given $K_e$ or a given Bias is quick and straighforward.

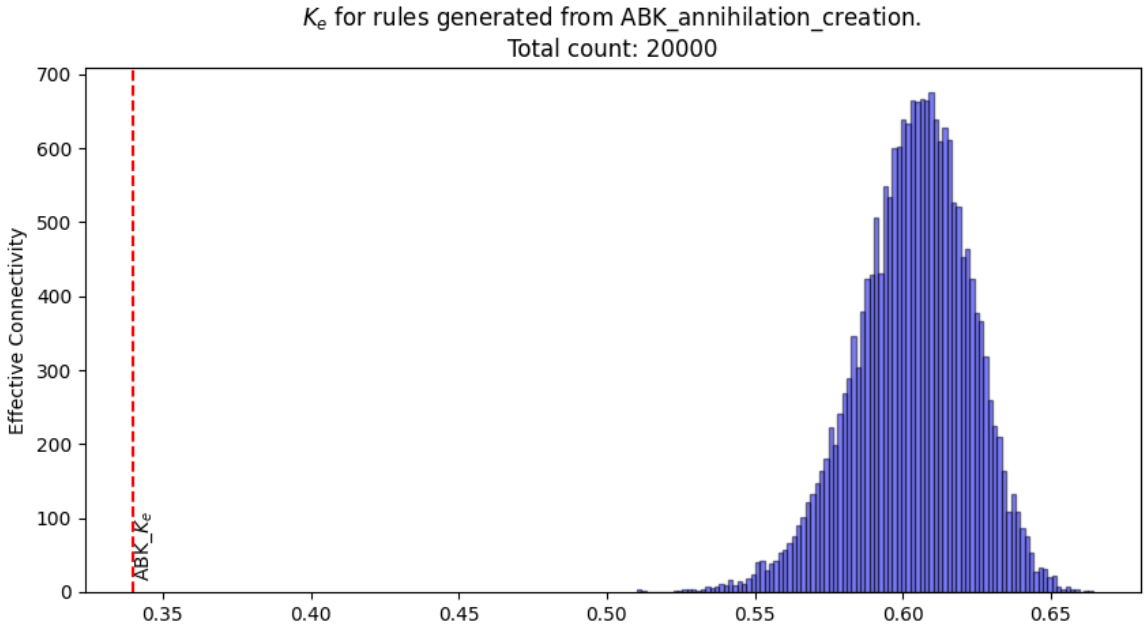
## Generating new rules with parent rule bias and $K_e$

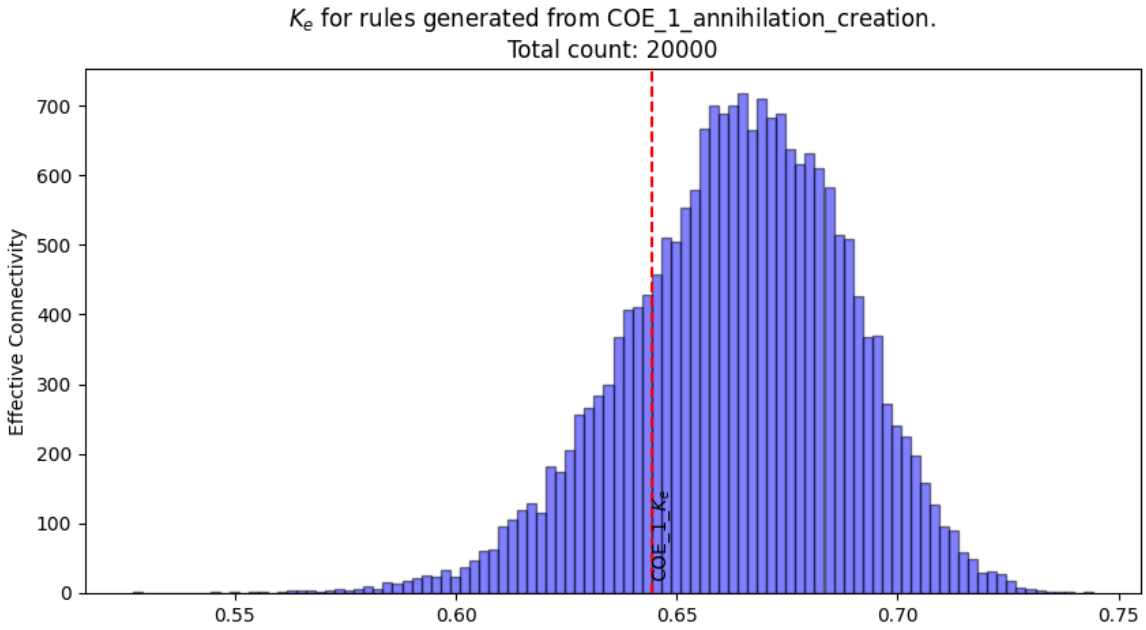
Generating LUTs similar to the parent rule's $K_e$ and Bias (both together) is not so simple. Most famous DCT rules have a bias of 0.5. However, most rules generated with that bias tend to have a much higher $K_e$ than the parent rule.

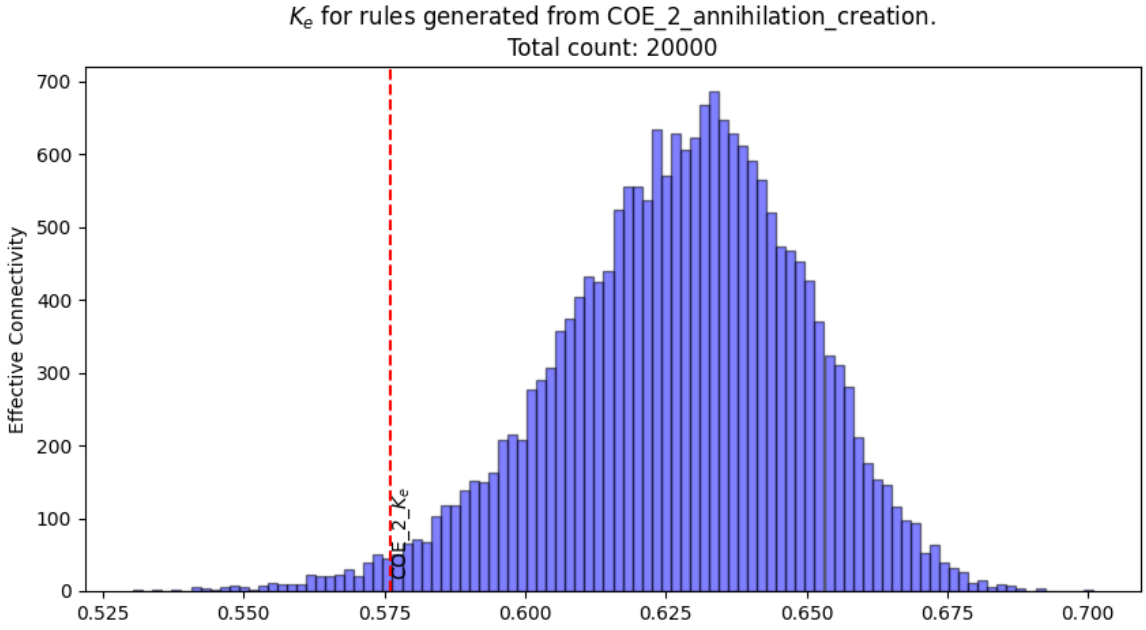
### Existing DCT rules have a rare combination of Bias and $K_e$

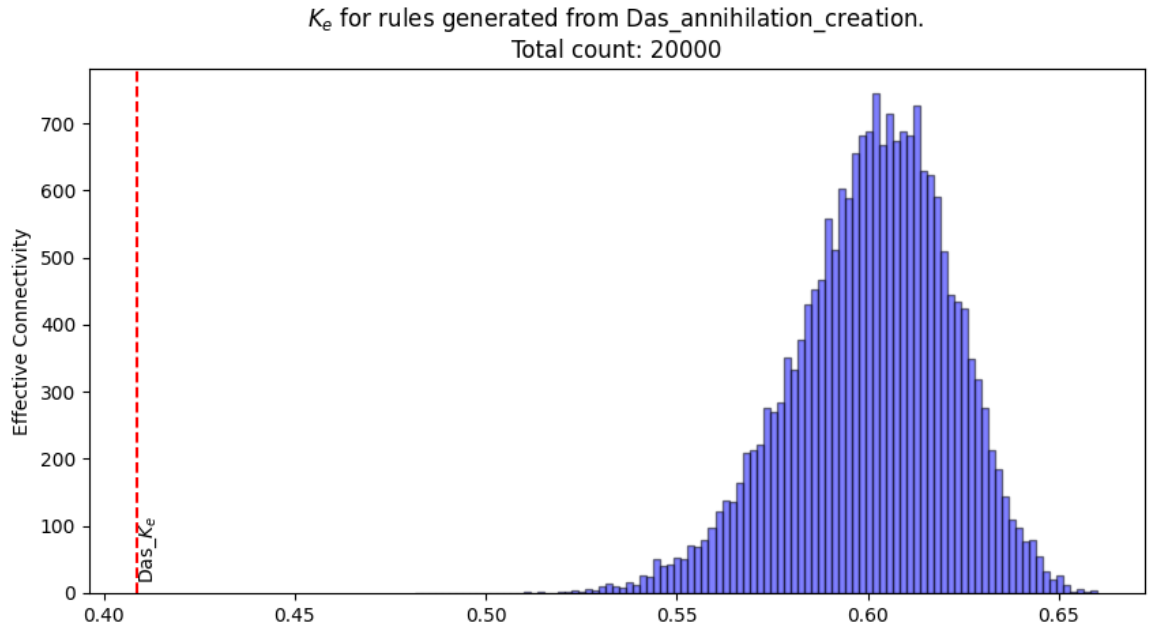
**$K_e$ of generated rules with parent rule bias**

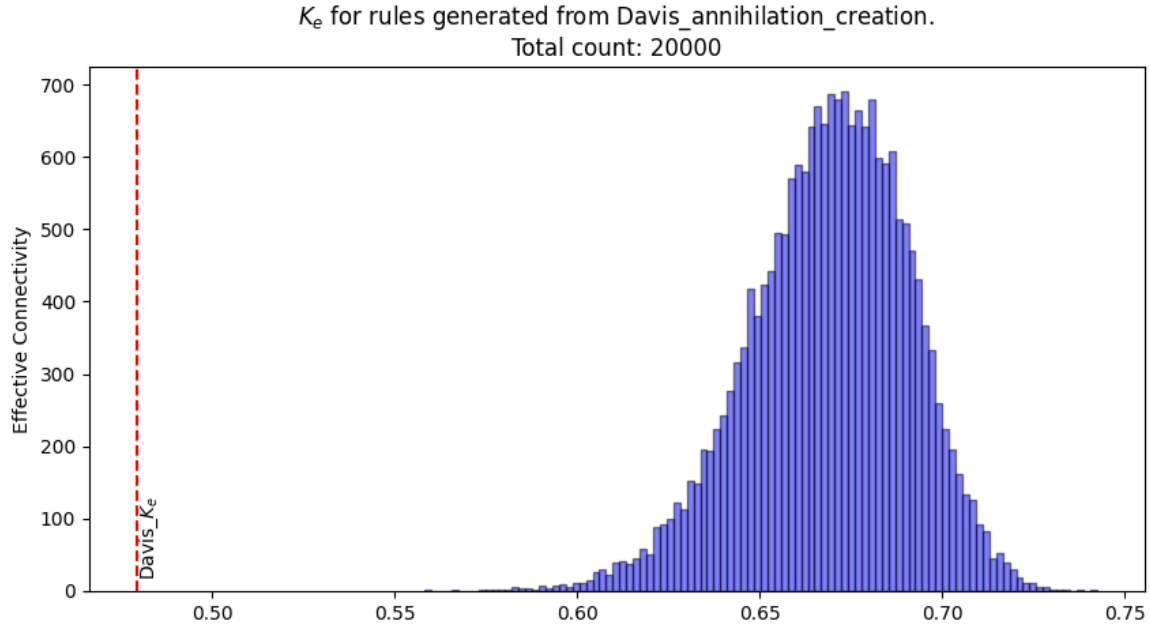
Below are the histograms of the $K_e$ of new rules generated with the parent rule bias.

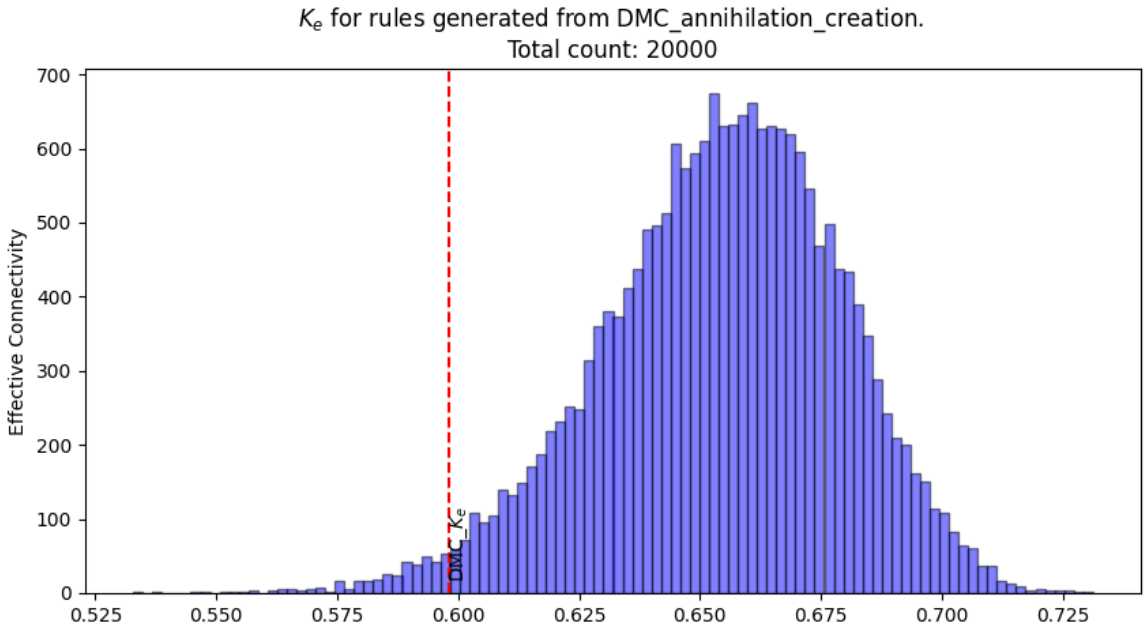


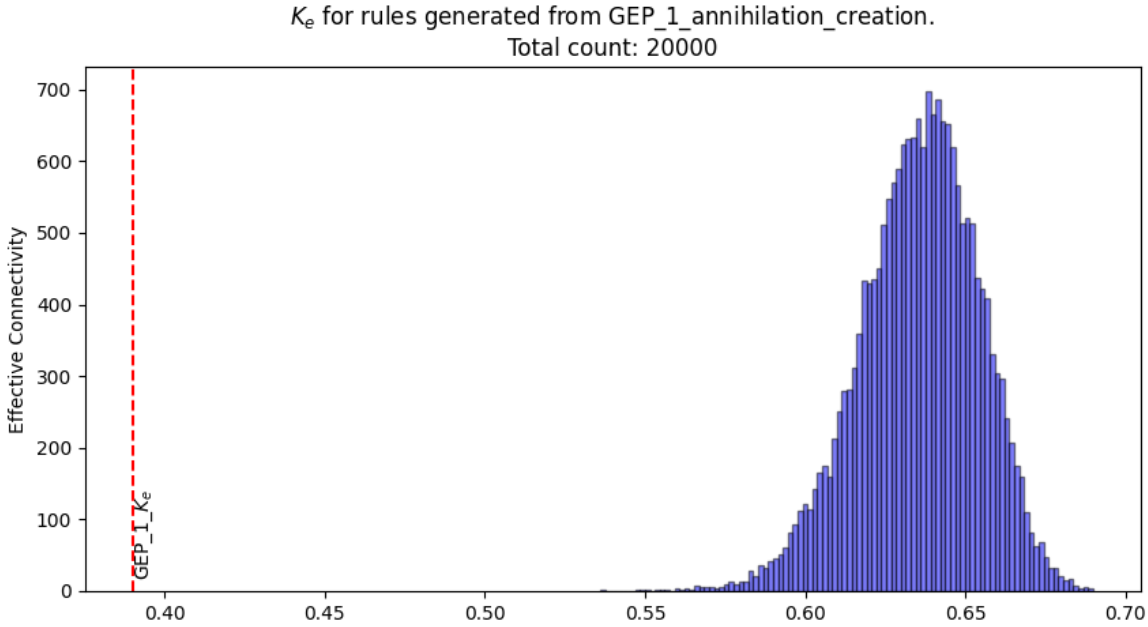

$K_e$ for rules generated from COE_1_annihilation_creation.
Total count: 20000
Effective Connectivity
COE_1 $K_e$
0
100
200
300
400
500
600
700
0.55
0.60
0.65
0.70
0.75

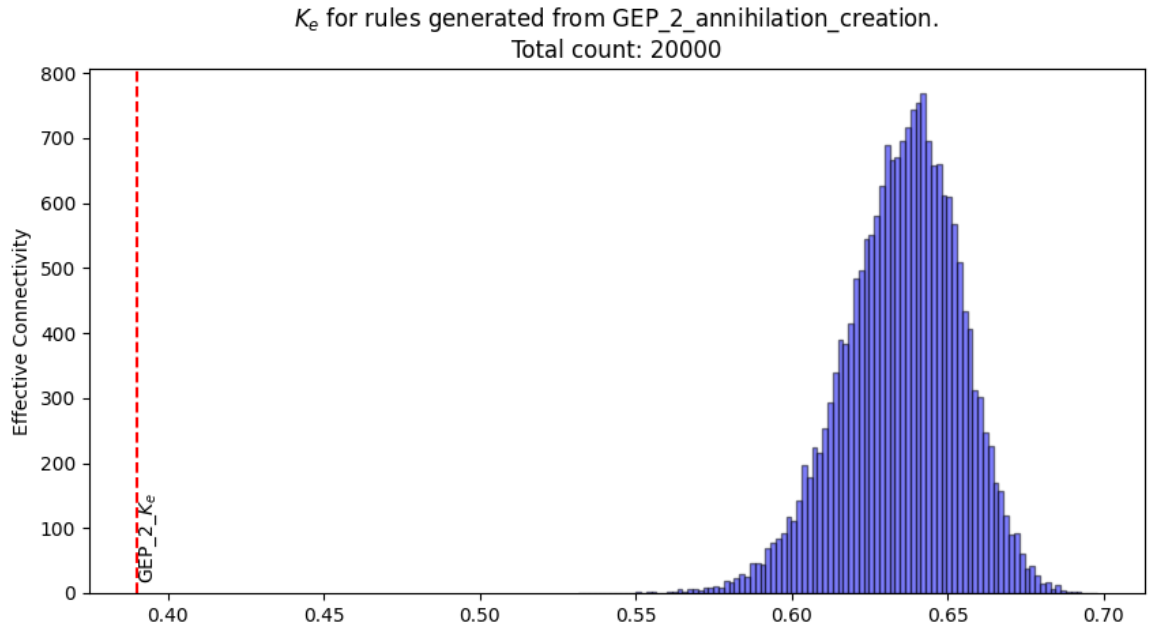

$K_e$ for rules generated from COE_2_annihilation_creation.
Total count: 20000
Effective Connectivity
COE_2 $K_e$
0
100
200
300
400
500
600
700
0.525
0.550
0.575
0.600
0.625
0.650
0.675
0.700

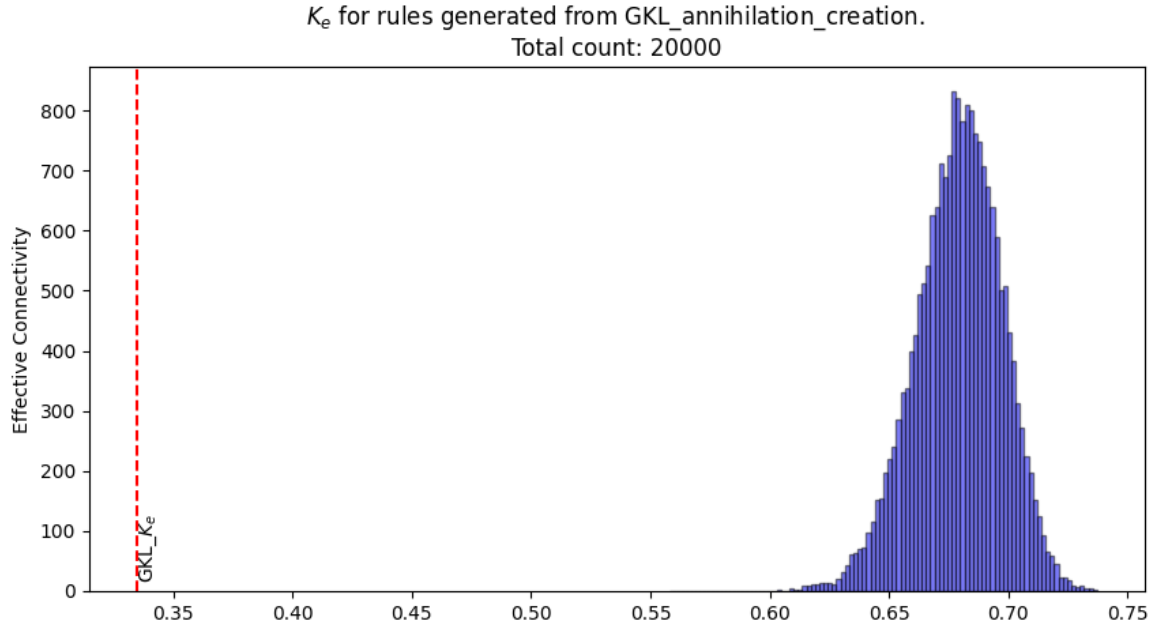

$K_e$ for rules generated from Das_annihilation_creation.
Total count: 20000
Effective Connectivity
Das_$K_e$
0
100
200
300
400
500
600
700
0.40
0.45
0.50
0.55
0.60
0.65

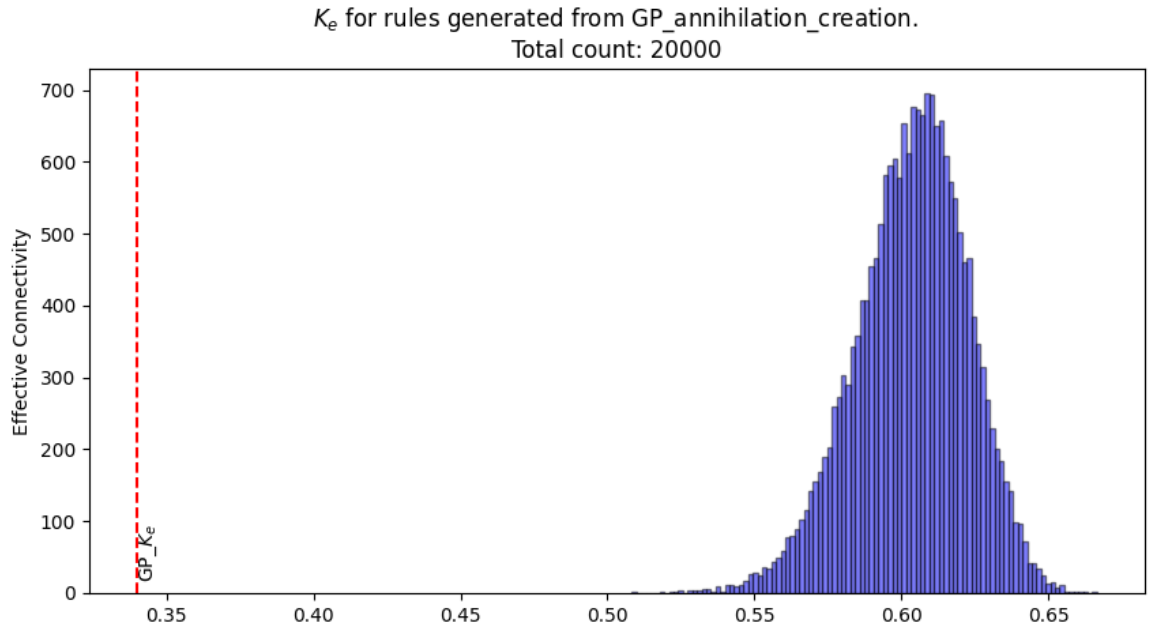

$K_e$ for rules generated from Davis_annihilation_creation.
Total count: 20000
Effective Connectivity
Davis_$K_e$
0
100
200
300
400
500
600
700
0.50
0.55
0.60
0.65
0.70
0.75

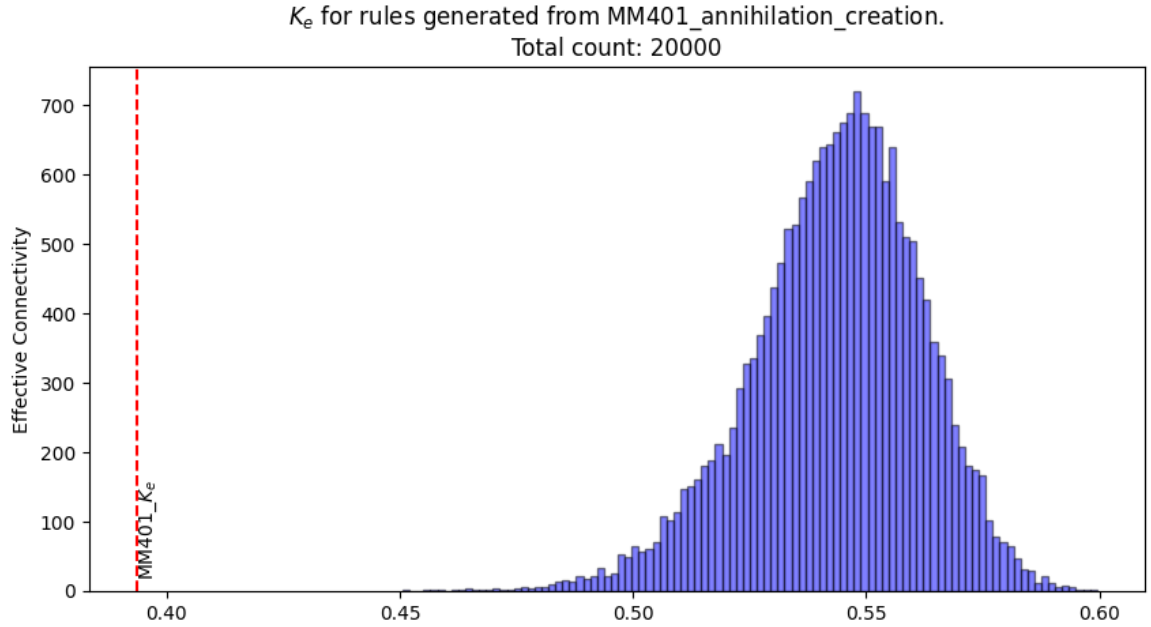

$K_e$ for rules generated from DMC_annihilation_creation.
Total count: 20000
Effective Connectivity
DMC_$K_e$
0
100
200
300
400
500
600
700
0.525
0.550
0.575
0.600
0.625
0.650
0.675
0.700
0.725


$K_e$ for rules generated from GEP_1_annihilation_creation.
Total count: 20000
Effective Connectivity
GEP_1_$K_e$
0
100
200
300
400
500
600
700
0.40
0.45
0.50
0.55
0.60
0.65
0.70


$K_e$ for rules generated from GEP_2_annihilation_creation.
Total count: 20000
Effective Connectivity
GEP_2 $K_e$
0
100
200
300
400
500
600
700
800
0.40
0.45
0.50
0.55
0.60
0.65
0.70


$K_e$ for rules generated from GKL_annihilation_creation.
Total count: 20000
Effective Connectivity
GKL $K_e$
0
100
200
300
400
500
600
700
800
0.35
0.40
0.45
0.50
0.55
0.60
0.65
0.70
0.75

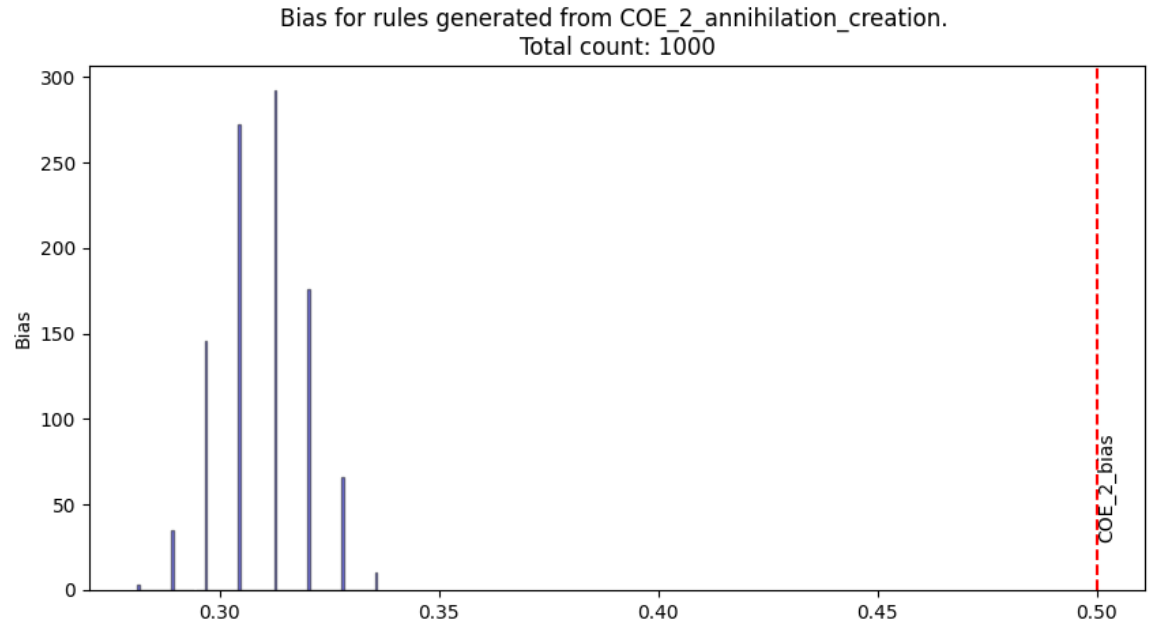


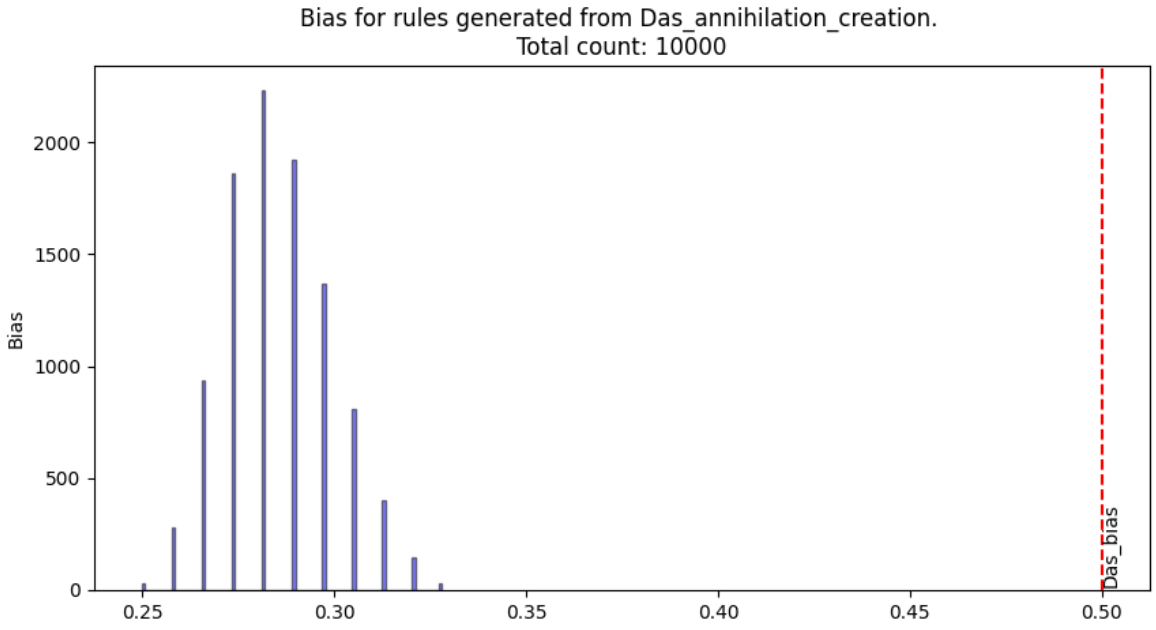



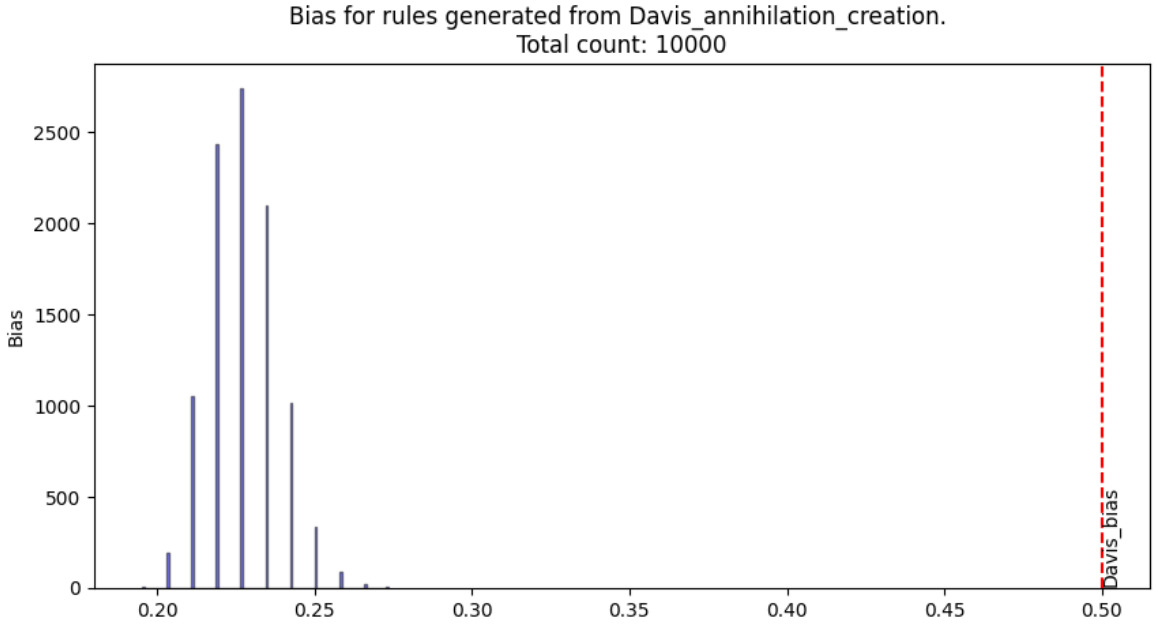

COE_1 $K_e$ is easier to replicate via annihilation generation. The rest, not so much.

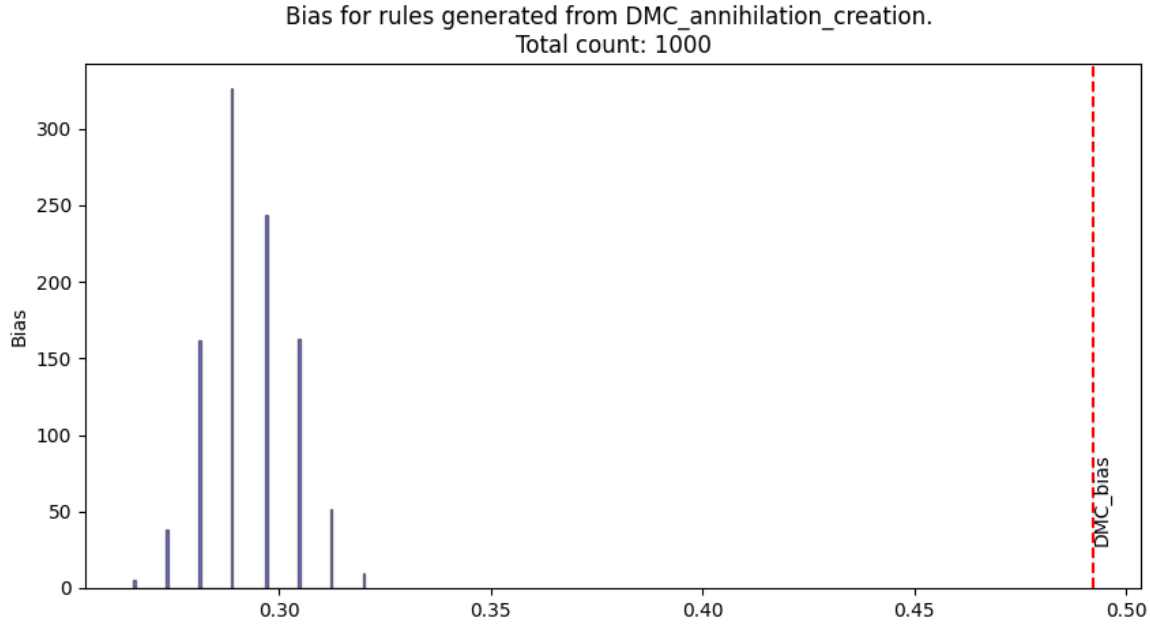
**Bias of generated rules with parent rule Ec**

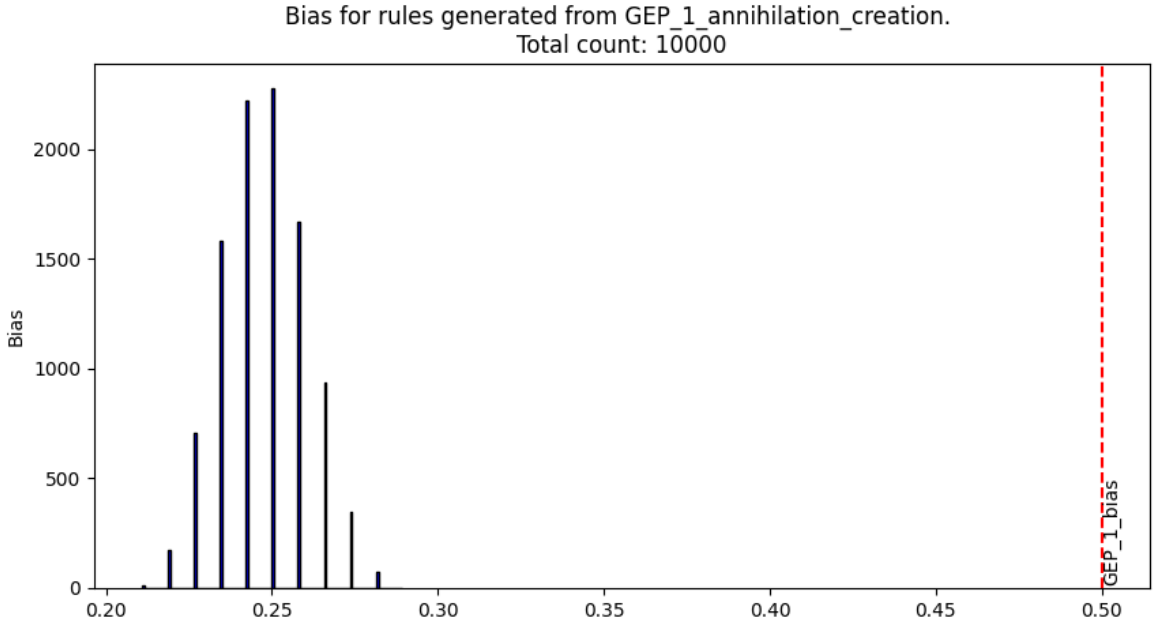
Below are the histograms of the bias of new rules generated with the parent rule $K_e$.

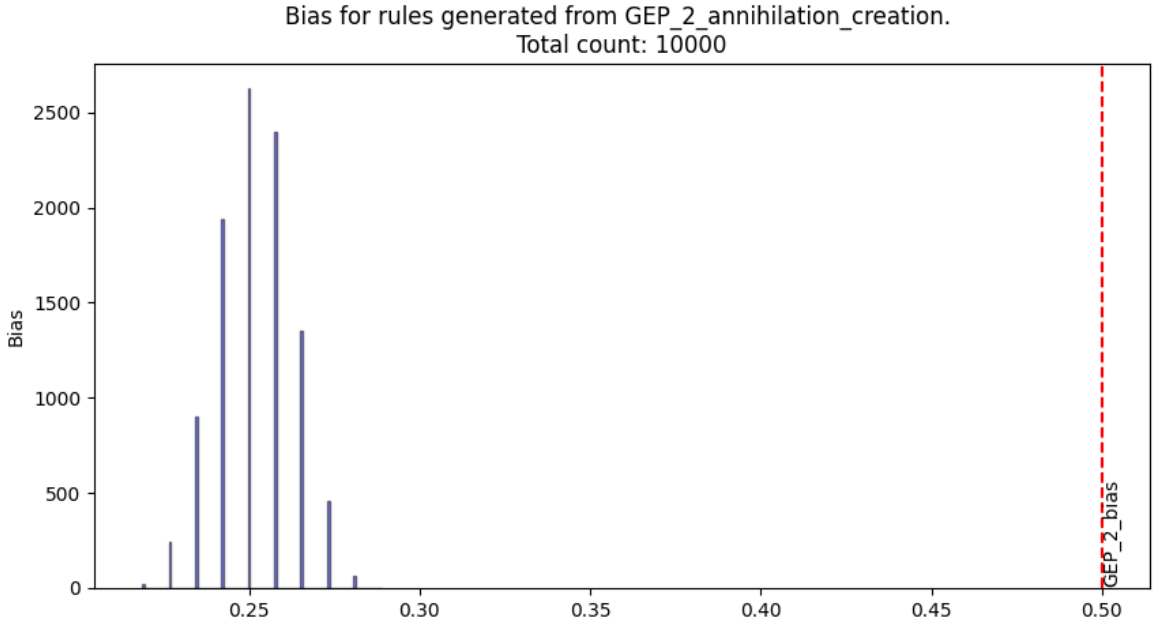


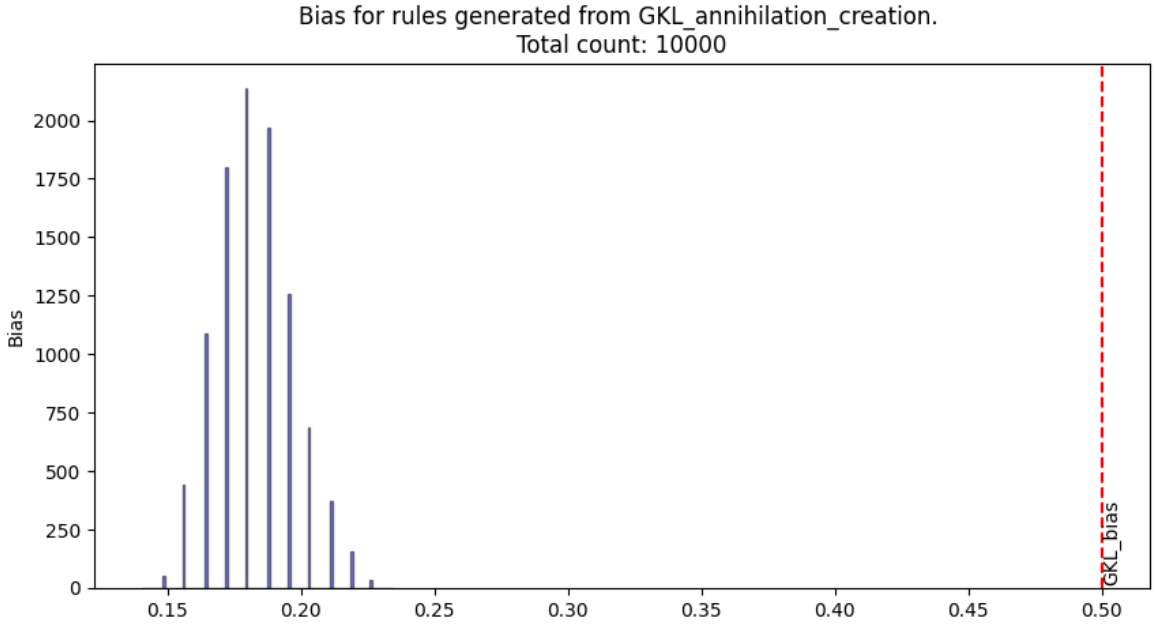



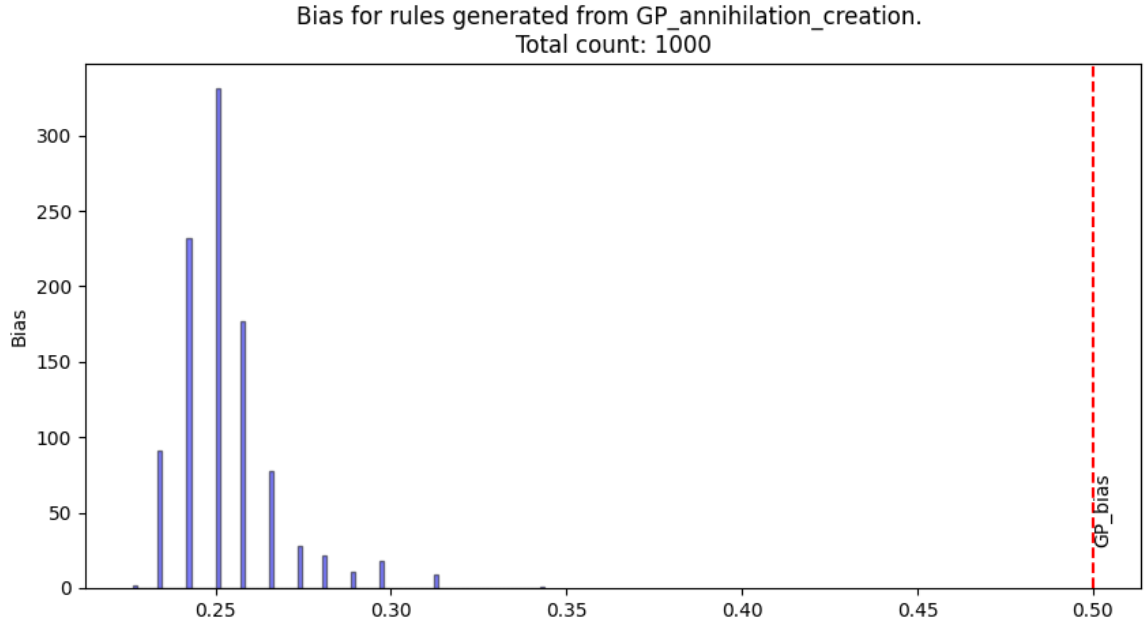

Bias for rules generated from Davis_annihilation_creation.
Total count: 10000
Bias
2500
2000
1500
1000
500
0
0.20
0.25
0.30
0.35
0.40
0.45
0.50
Davis_bias

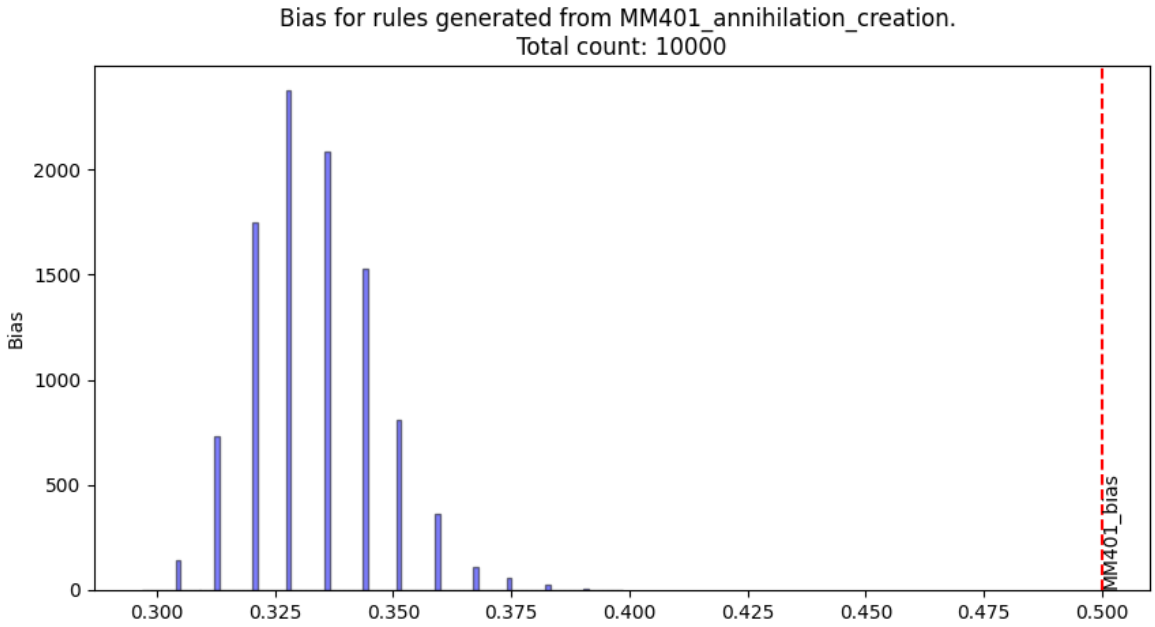

Bias for rules generated from DMC_annihilation_creation.
Total count: 1000
Bias
300
250
200
150
100
50
0
0.30
0.35
0.40
0.45
0.50
DMC_bias


Bias for rules generated from GEP_1_annihilation_creation.
Total count: 10000
Bias
2000
1500
1000
500
0
0.20
0.25
0.30
0.35
0.40
0.45
0.50
GEP_1_bias


Bias for rules generated from GEP_2_annihilation_creation.
Total count: 10000
Bias
2500
2000
1500
1000
500
0
0.25
0.30
0.35
0.40
0.45
0.50
GEP_2_bias


Bias for rules generated from GKL_annihilation_creation.
Total count: 10000
Bias
GKL_bias
0
250
500
750
1000
1250
1500
1750
2000
0.15
0.20
0.25
0.30
0.35
0.40
0.45
0.50


Bias for rules generated from GP_annihilation_creation.
Total count: 1000
Bias
GP_bias
0
50
100
150
200
250
300
0.25
0.30
0.35
0.40
0.45
0.50




Randomly sampled across the permutation space, the bias of generated rules are far away from the bias of the parent rule.