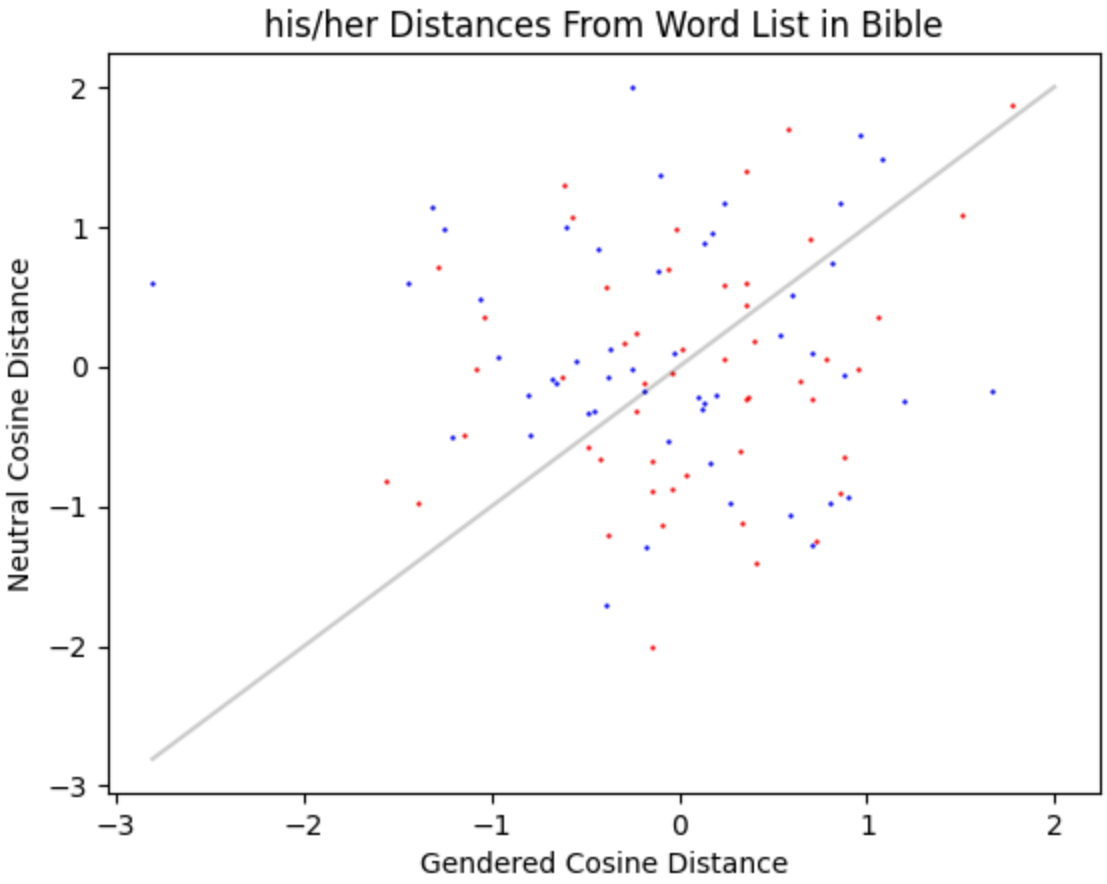
In [ ]:
```
import analyze as a
```

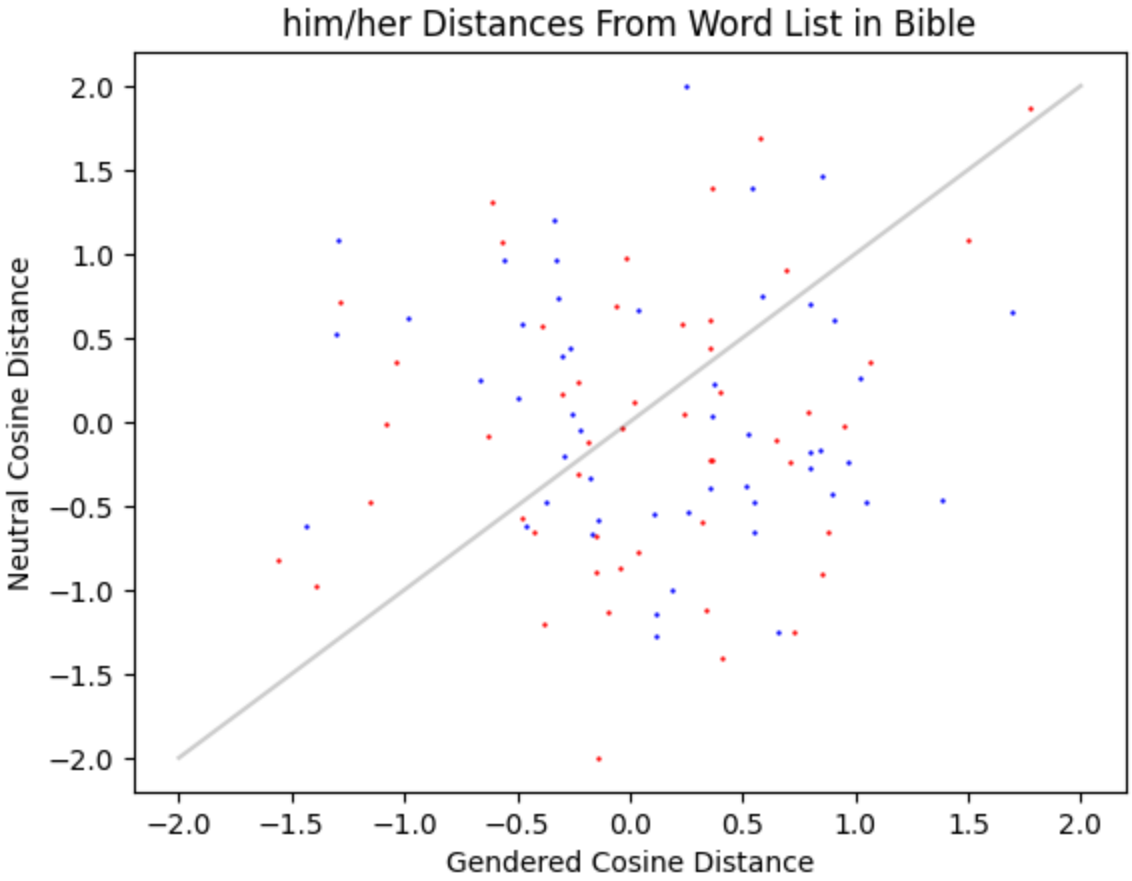
In [ ]:
```
titles = ["Bible", "BUG", "GAP", "Moby Dick"]

bibleNEmbeds = a.embeds('NvectorsBible.txt')
bibleGEmbeds = a.embeds('GvectorsBible.txt')

bugNEmbeds = a.embeds('NvectorsBUG.txt')
bugGEmbeds = a.embeds('GvectorsBUG.txt')

gapNEmbeds = a.embeds('NvectorsGAP.txt')
gapGEmbeds = a.embeds('GvectorsGAP.txt')

mobyNEmbeds = a.embeds('NvectorsMoby.txt')
mobyGEmbeds = a.embeds('GvectorsMoby.txt')

neutralEmbeds = [bibleNEmbeds, bugNEmbeds, gapNEmbeds, mobyNEmbeds]
genderEmbeds = [bibleGEmbeds, bugGEmbeds, gapGEmbeds, mobyGEmbeds]

genderPairs = a.genderPairs('GenderPairs.csv')
spotlightWords = a.spotlightWords('Spotlight.csv')
```

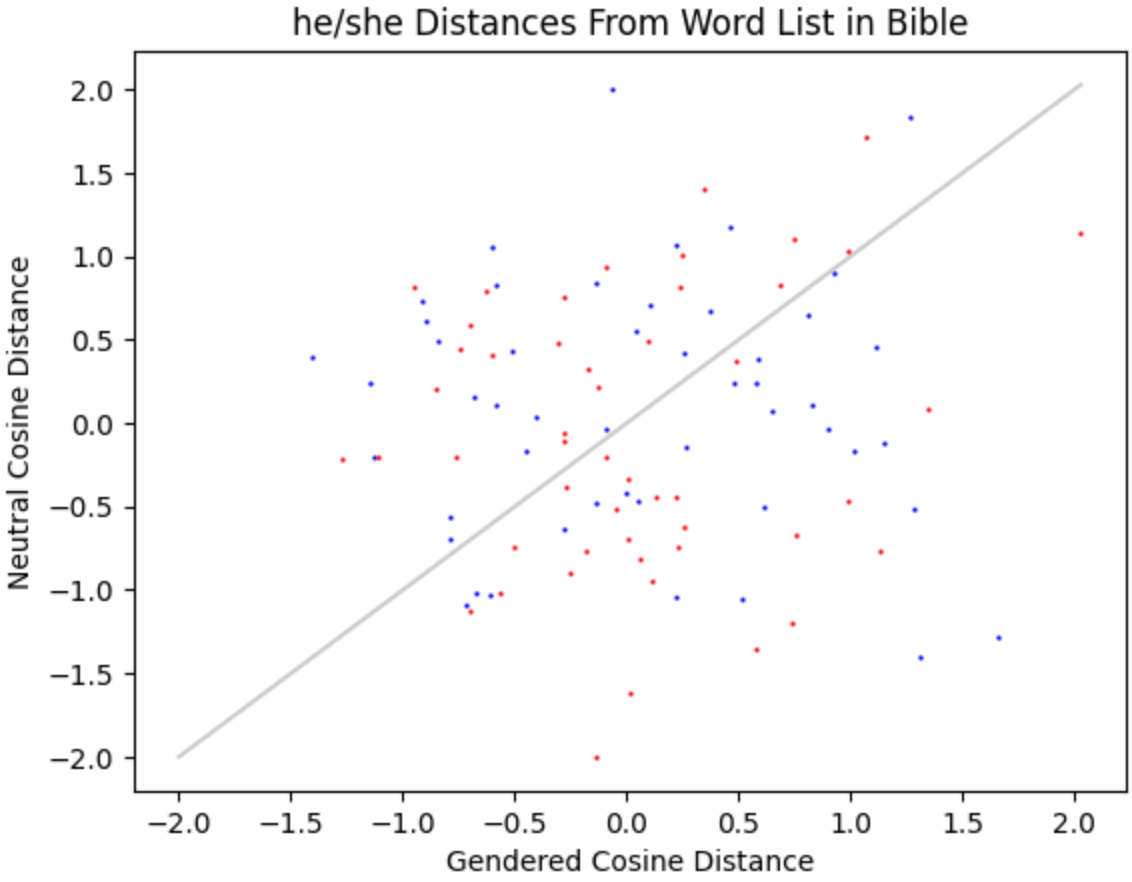
In [ ]:
```
"""for i, title in enumerate(titles):
    print("_____________________________________")
    a.plotter(genderPairs, spotlightWords, neutralEmbeds[i], genderEmbeds[i]
#delete quotes for all graphs - takes up a lot of space
```

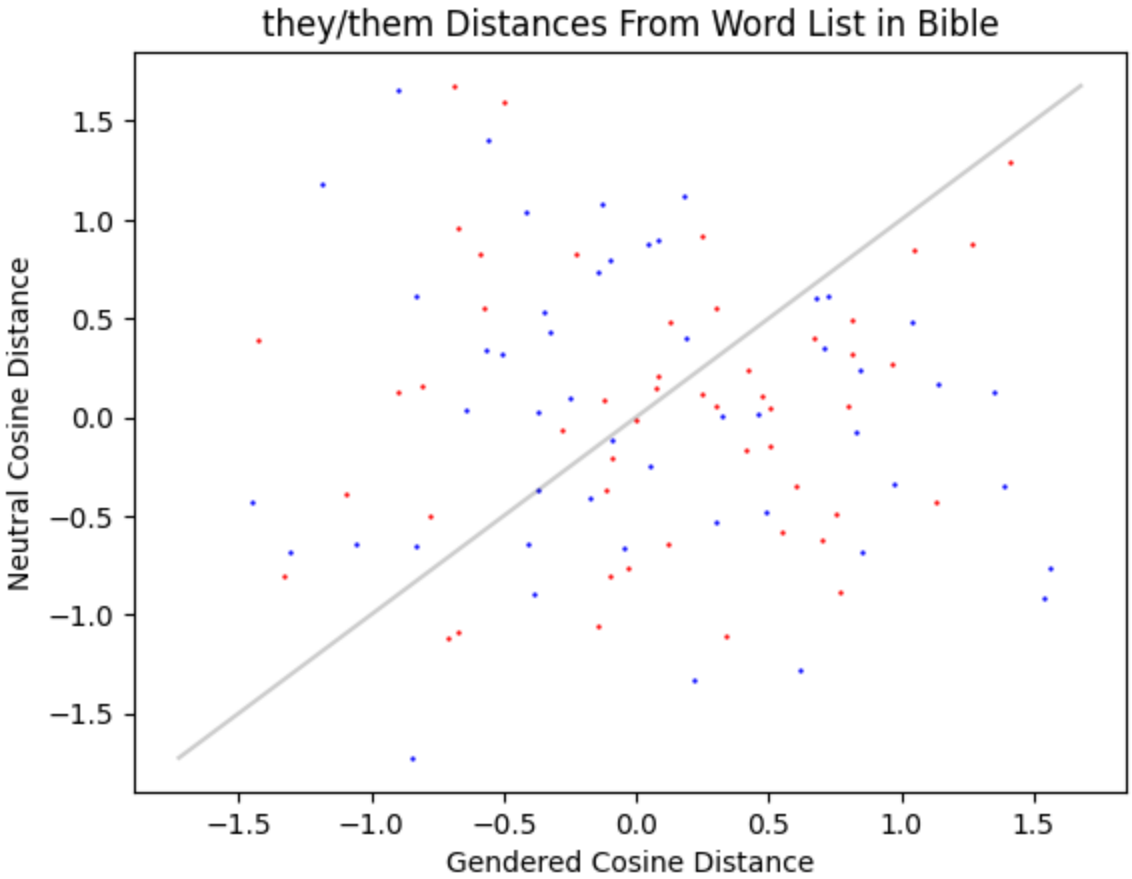
Out[ ]:
```
'for i, title in enumerate(titles):\n    print("_____________________________
_________")\n    a.plotter(genderPairs, spotlightWords, neutralEmbeds[i], g
enderEmbeds[i], title)'
```

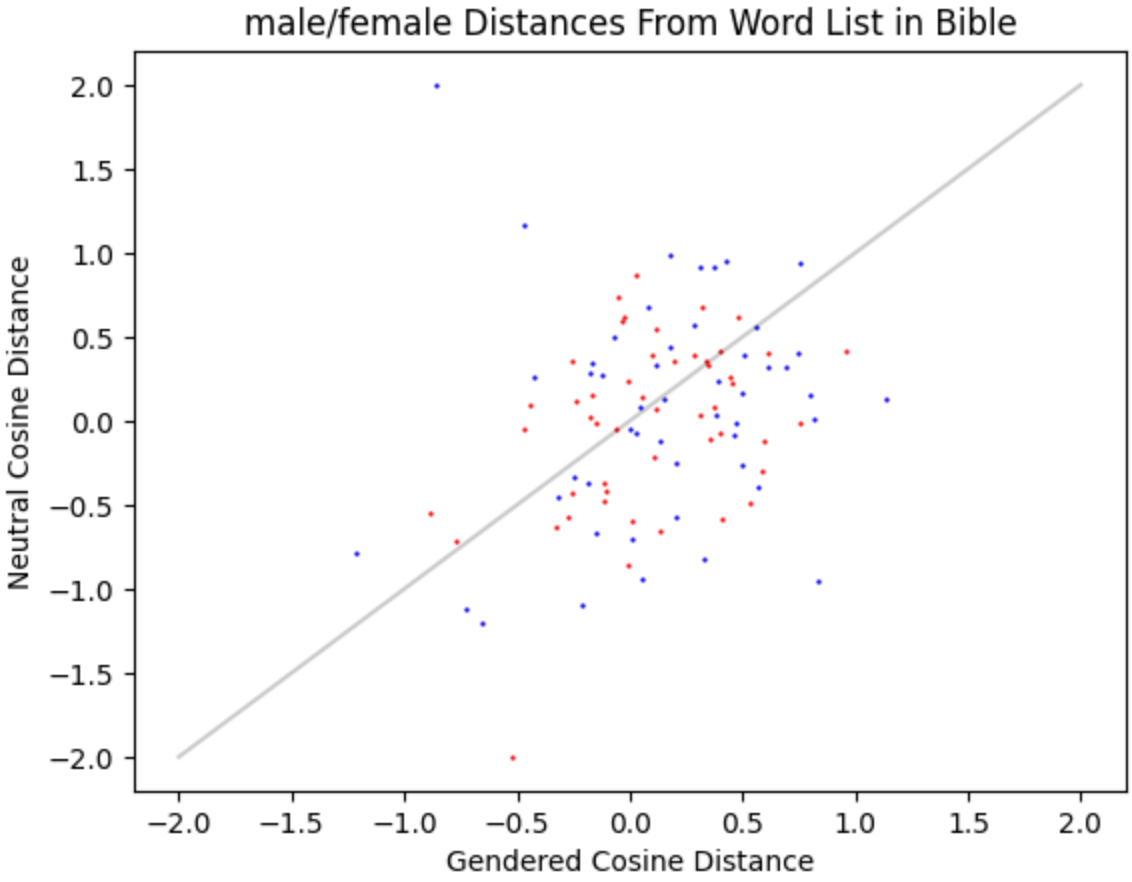
In [ ]:
```
a.plotter(genderPairs, spotlightWords, bibleNEmbeds, bibleGEmbeds, titles[0]
```

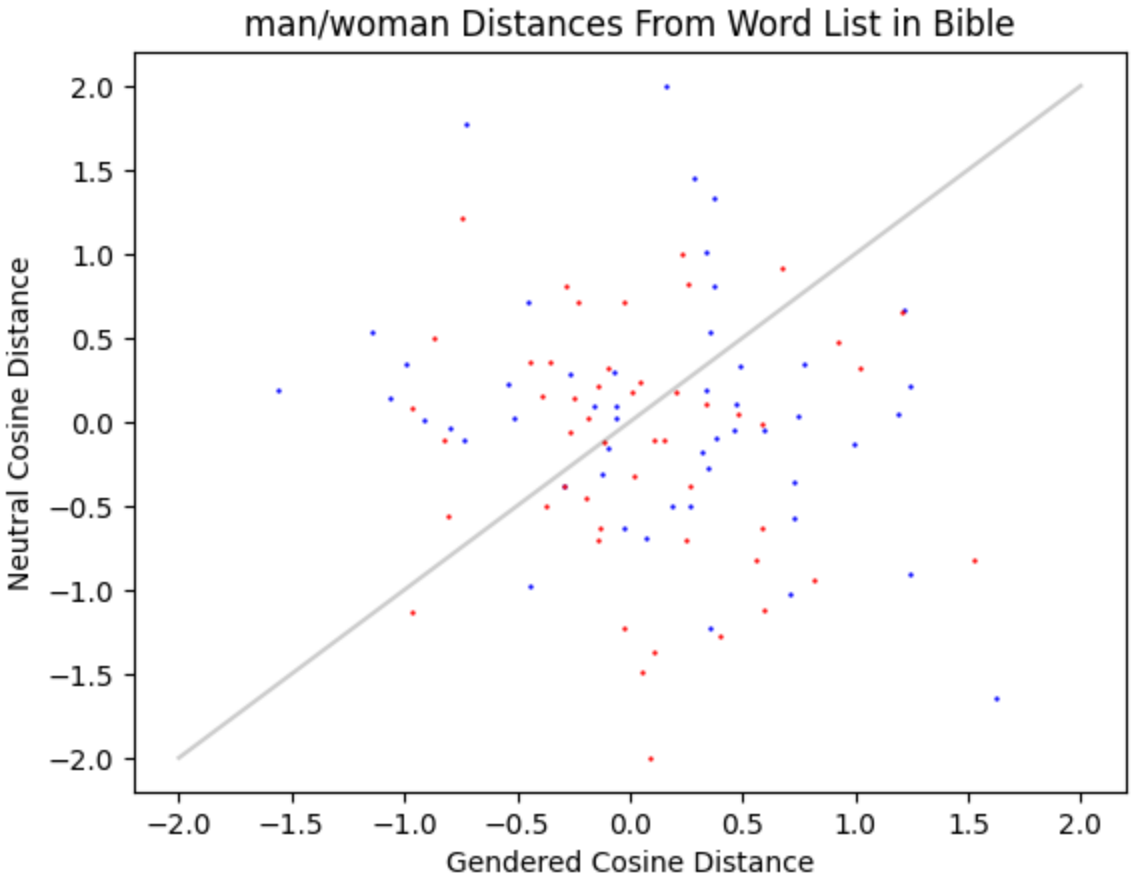

his/her Distances From Word List in Bible
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−3
−3
−2
−1
0
1
2

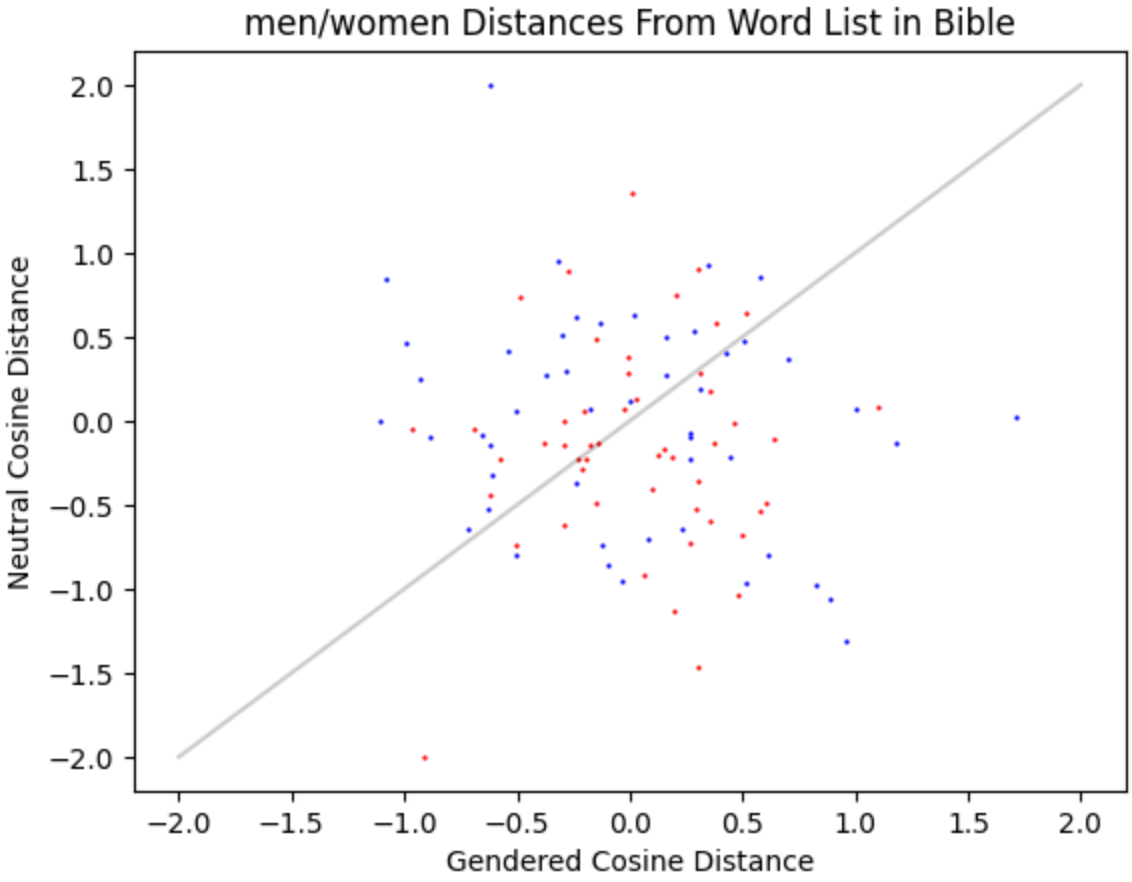

him/her Distances From Word List in Bible
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

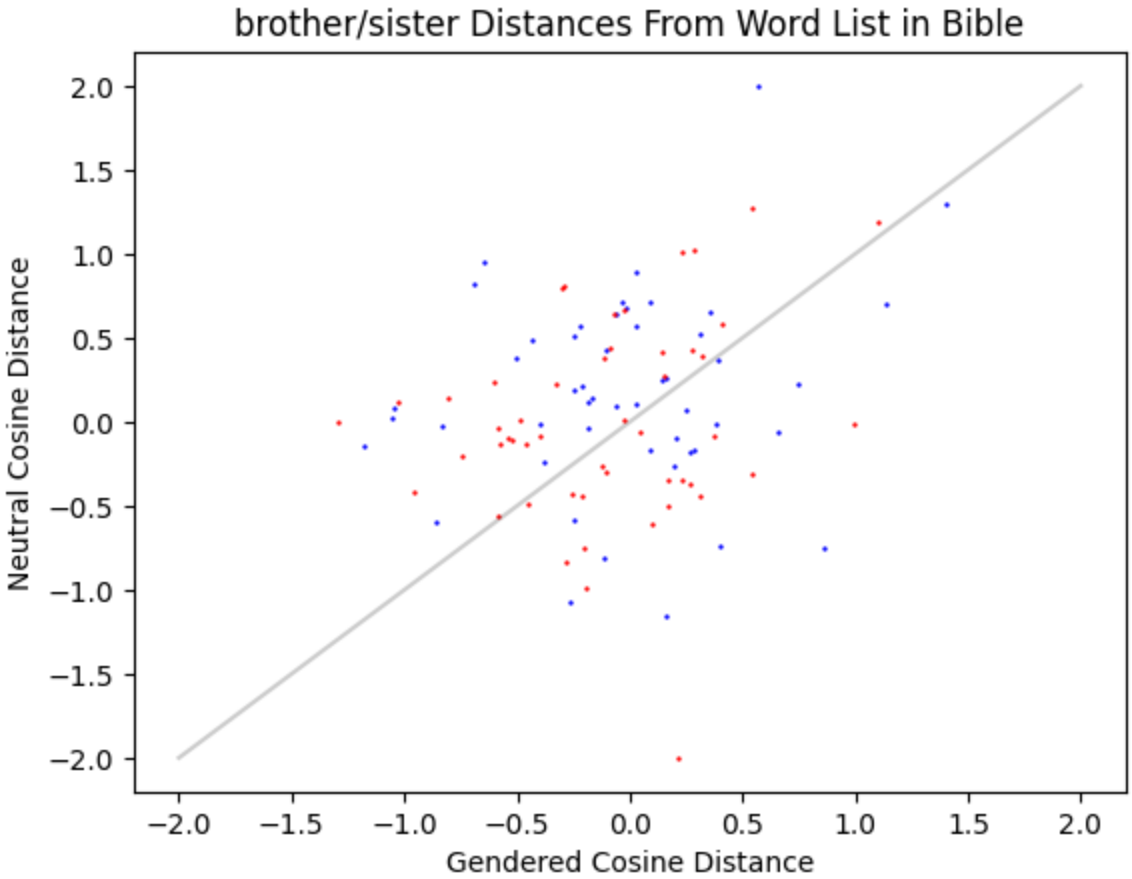

he/she Distances From Word List in Bible
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

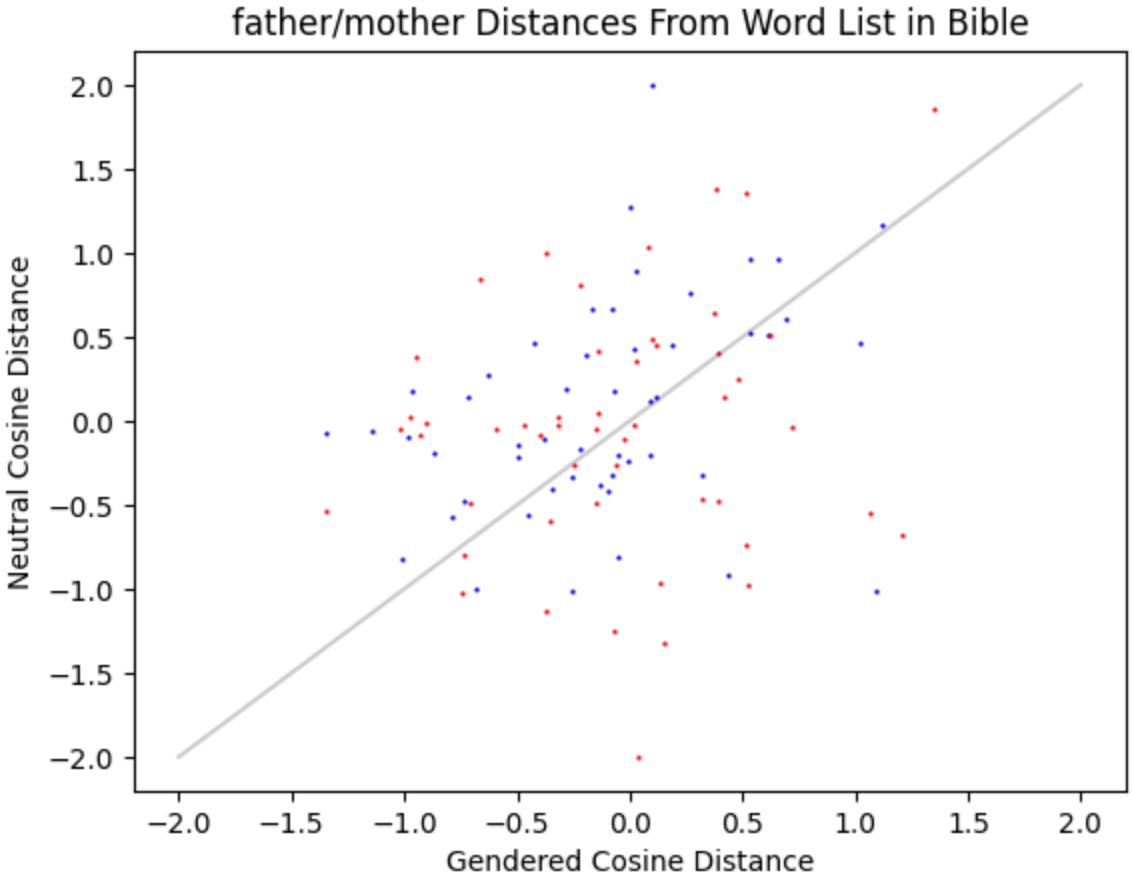

they/them Distances From Word List in Bible
Neutral Cosine Distance
Gendered Cosine Distance
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5

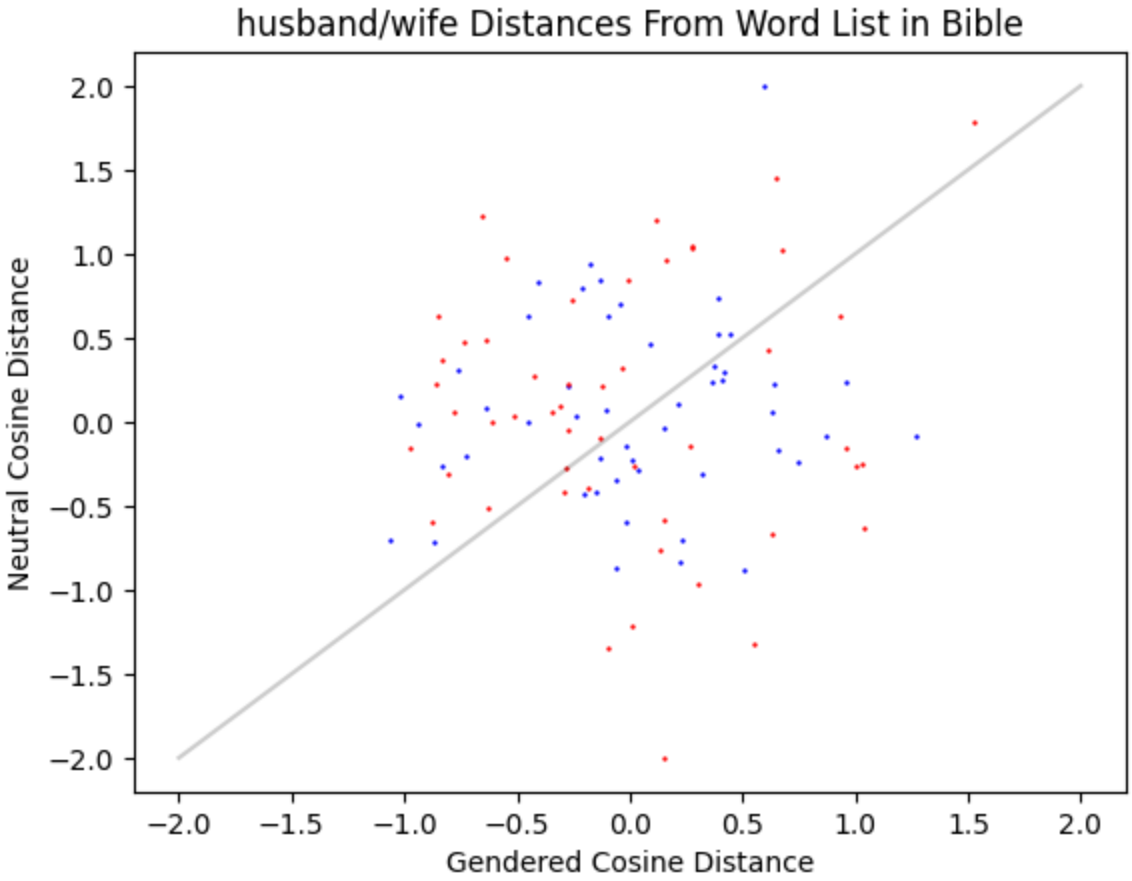

male/female Distances From Word List in Bible
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0


man/woman Distances From Word List in Bible
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

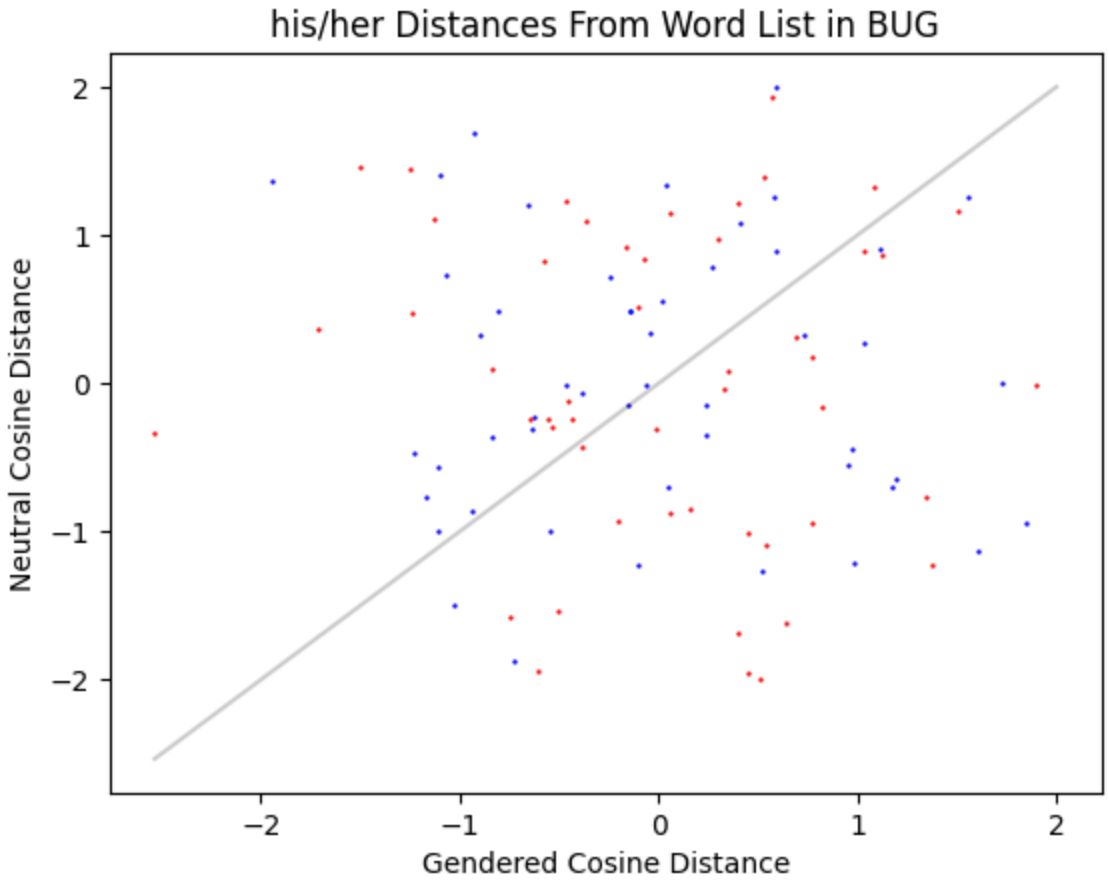

men/women Distances From Word List in Bible
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

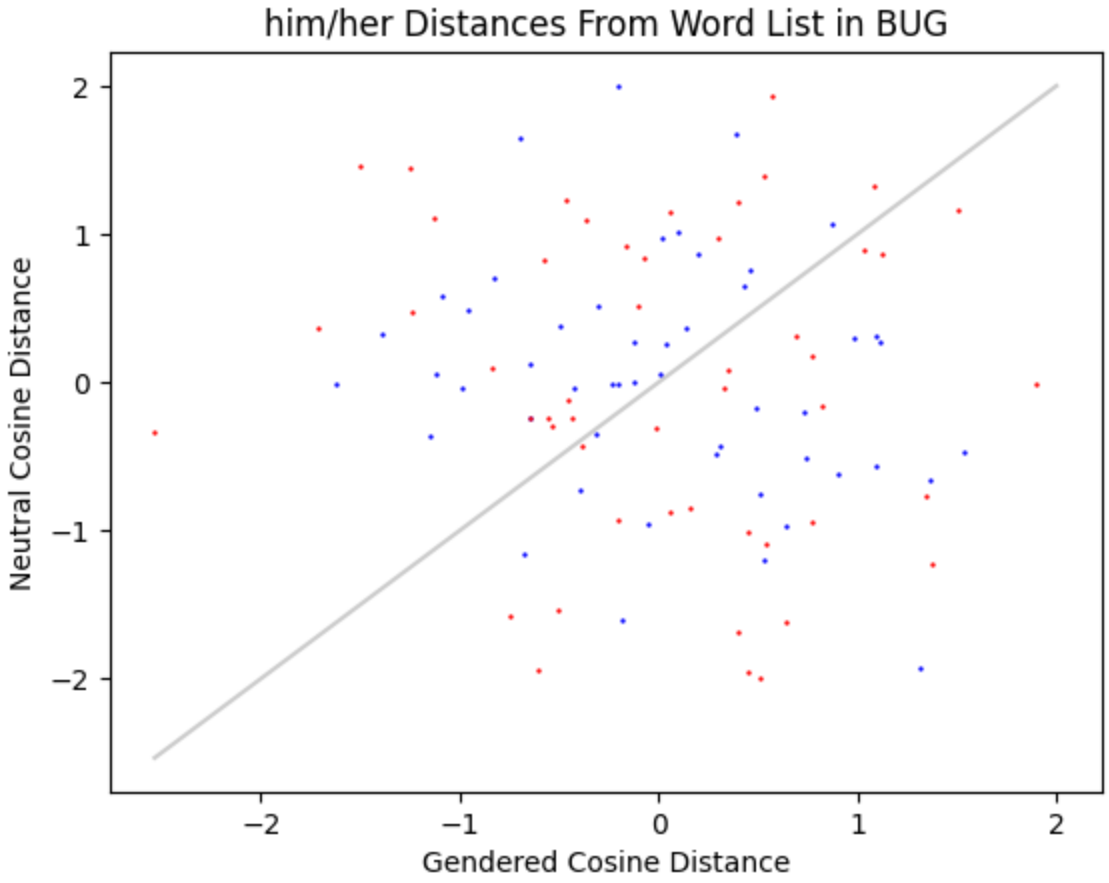

brother/sister Distances From Word List in Bible
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

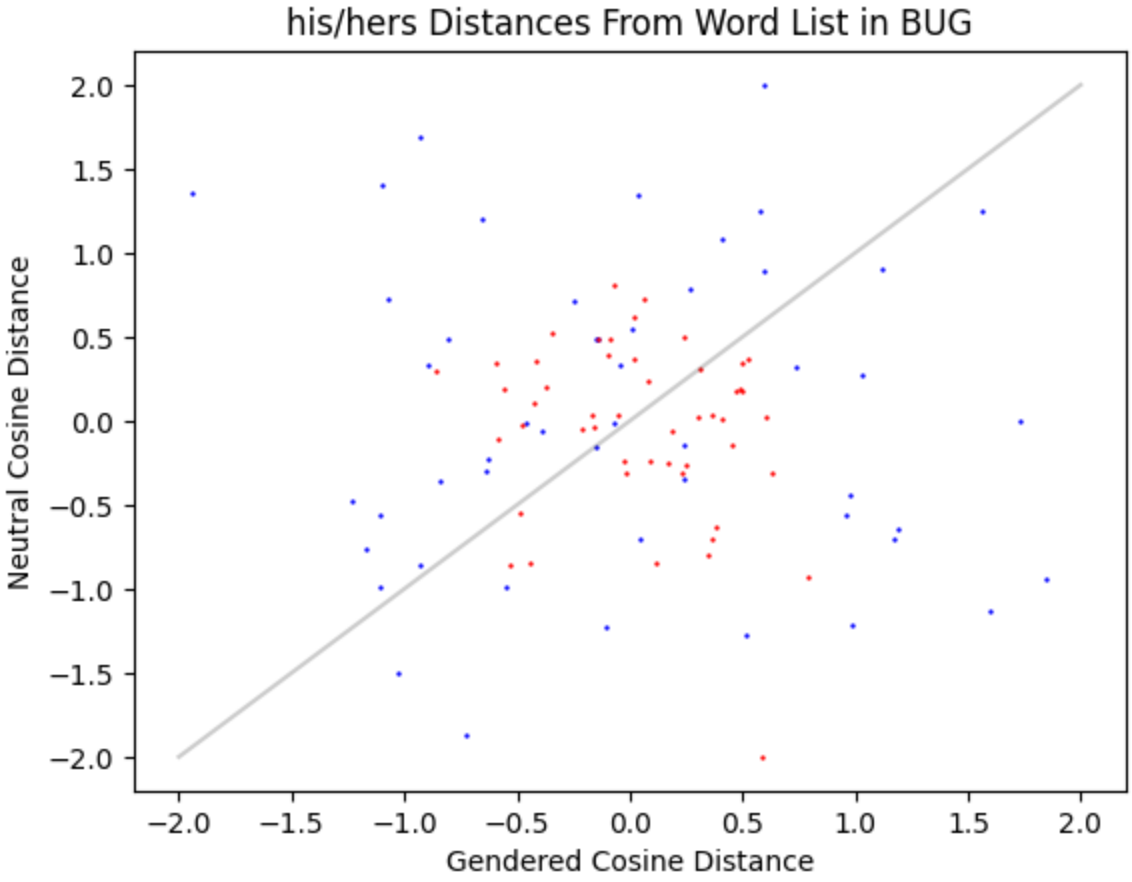


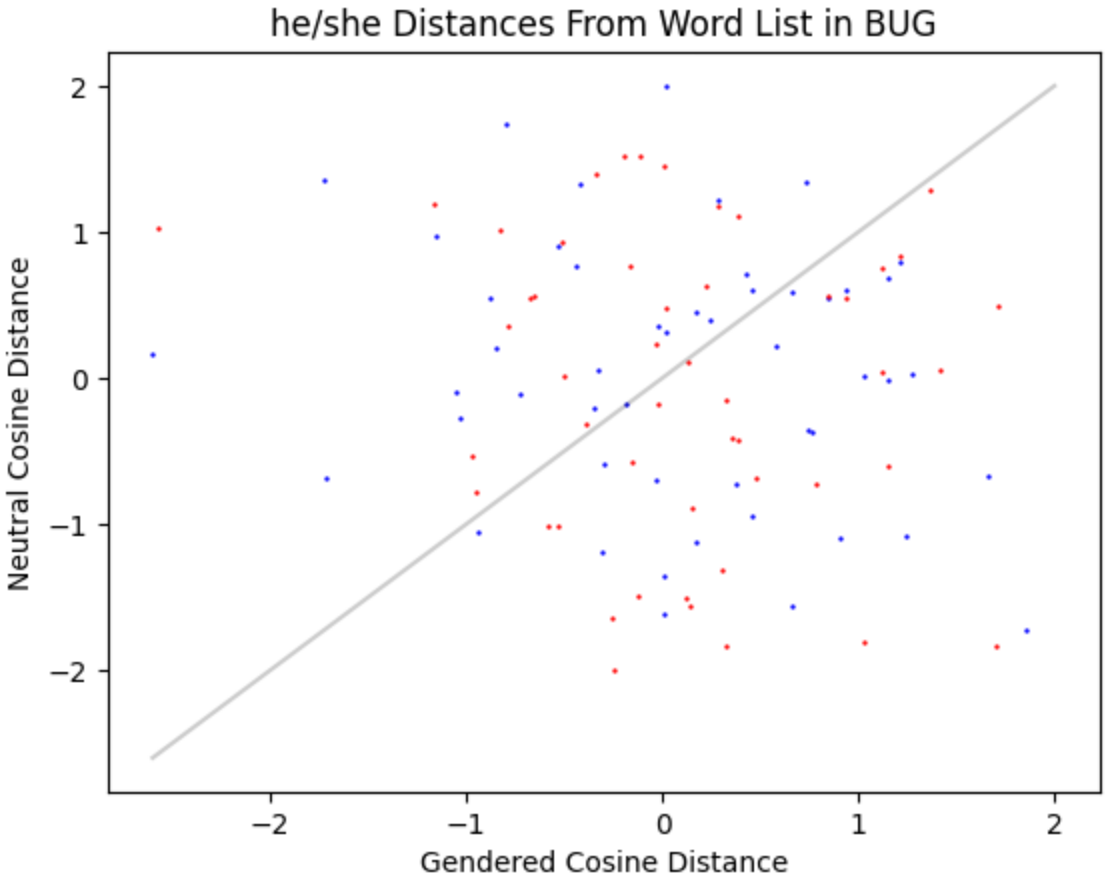


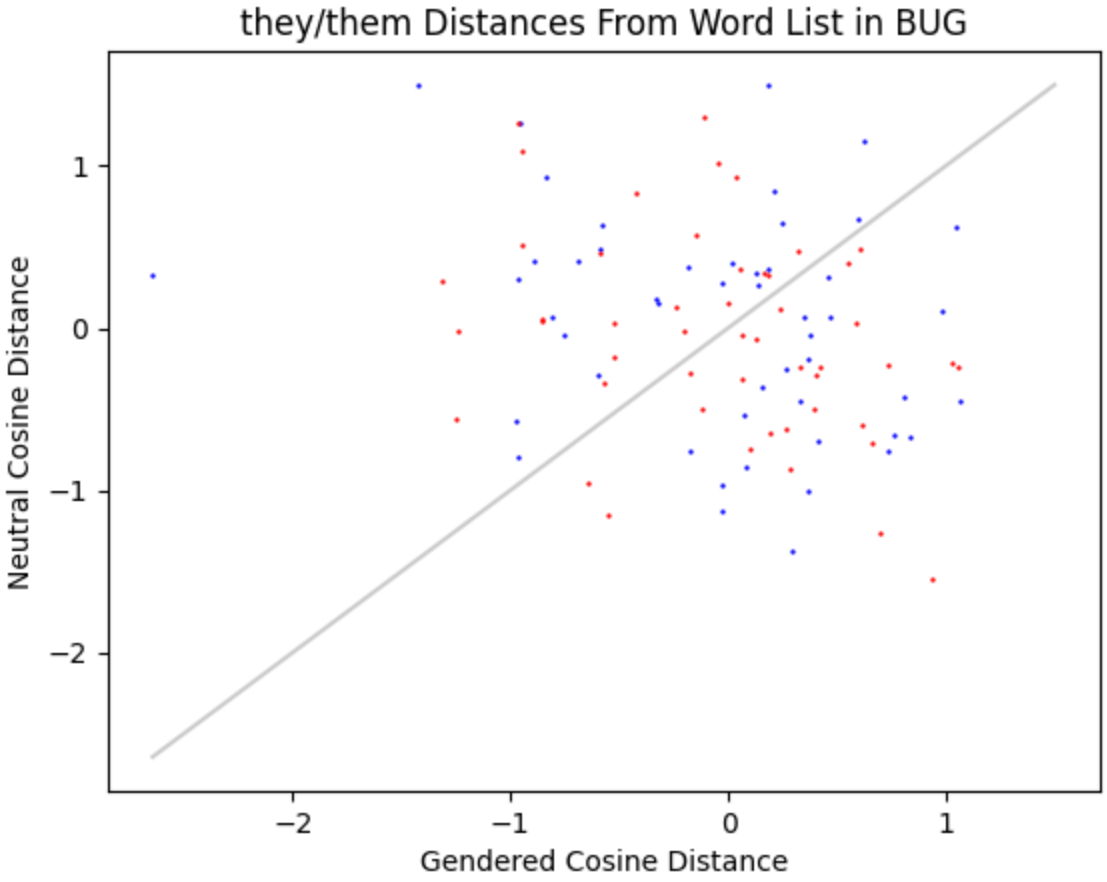
In [ ]:
```
a.plotter(genderPairs, spotlightWords, bugNEmbeds, bugGEmbeds, titles[1])
```

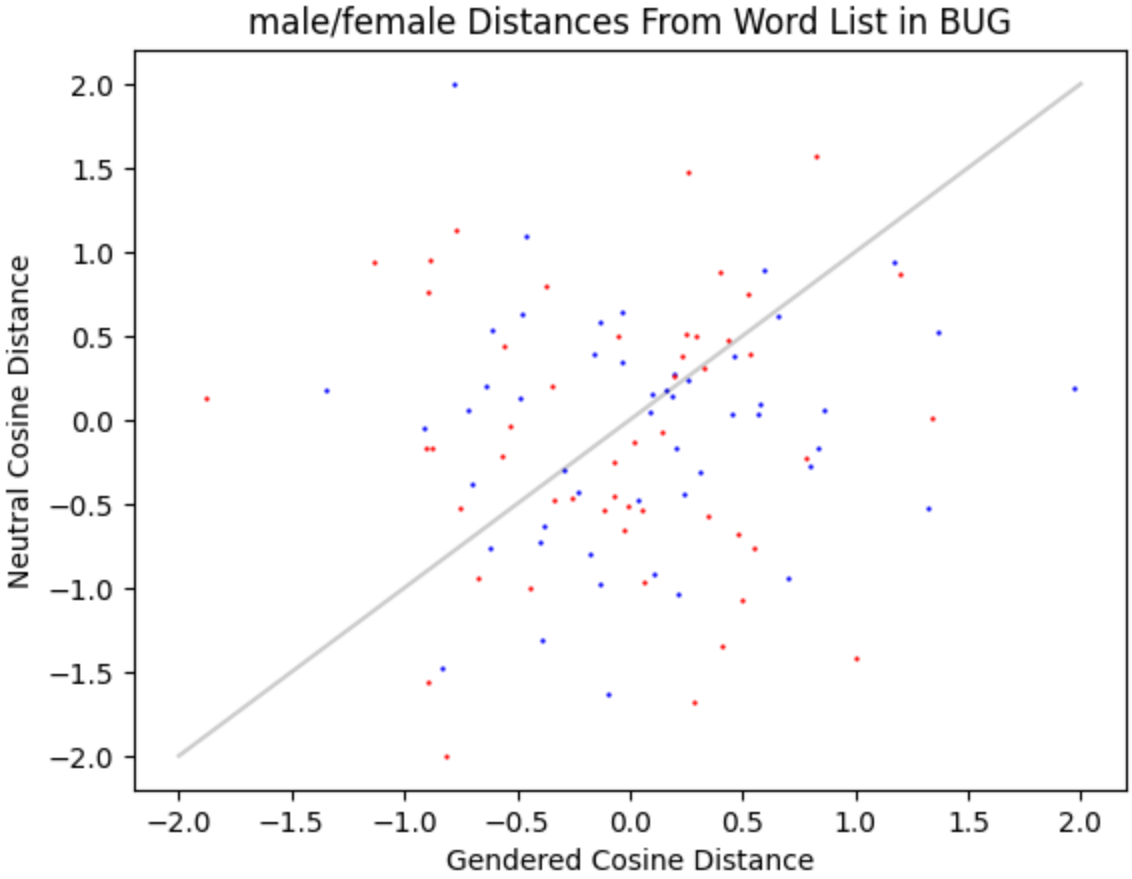

his/her Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−2
−1
0
1
2

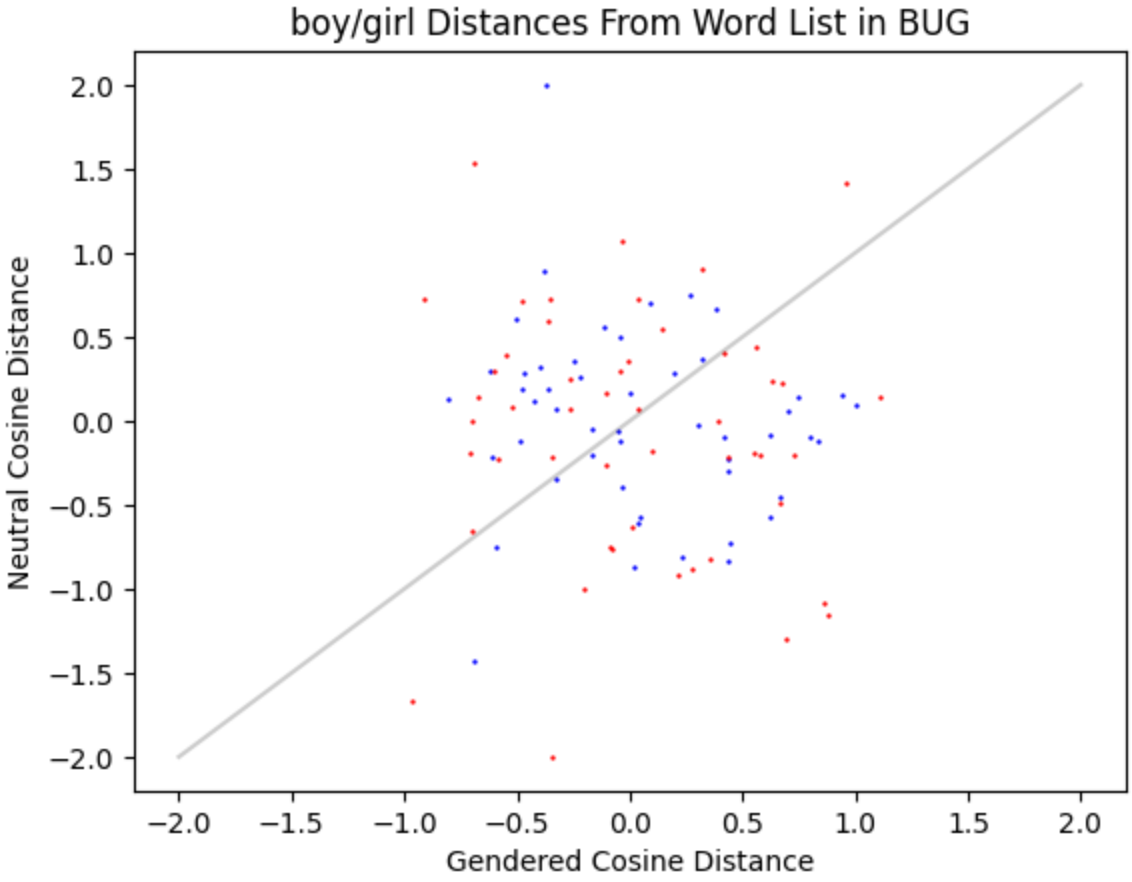

him/her Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−2
−1
0
1
2

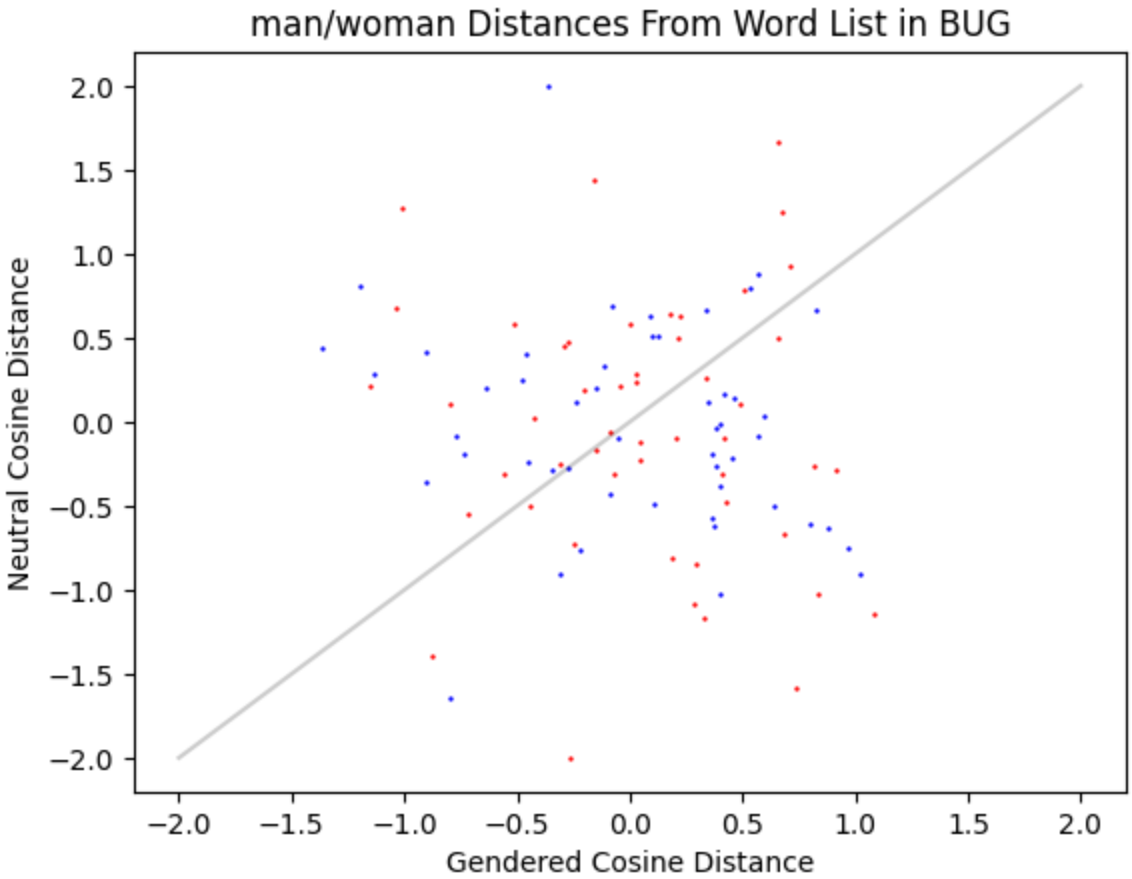

his/hers Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

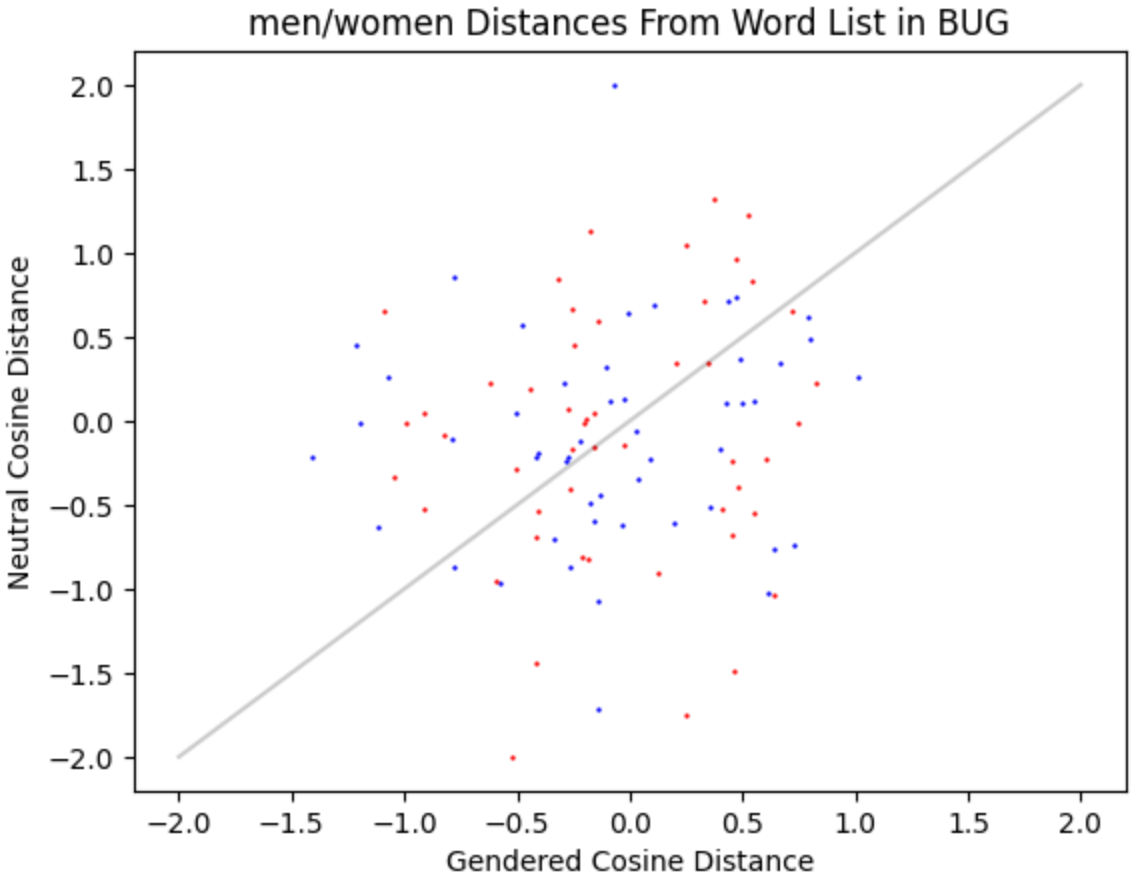

he/she Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−2
−1
0
1
2

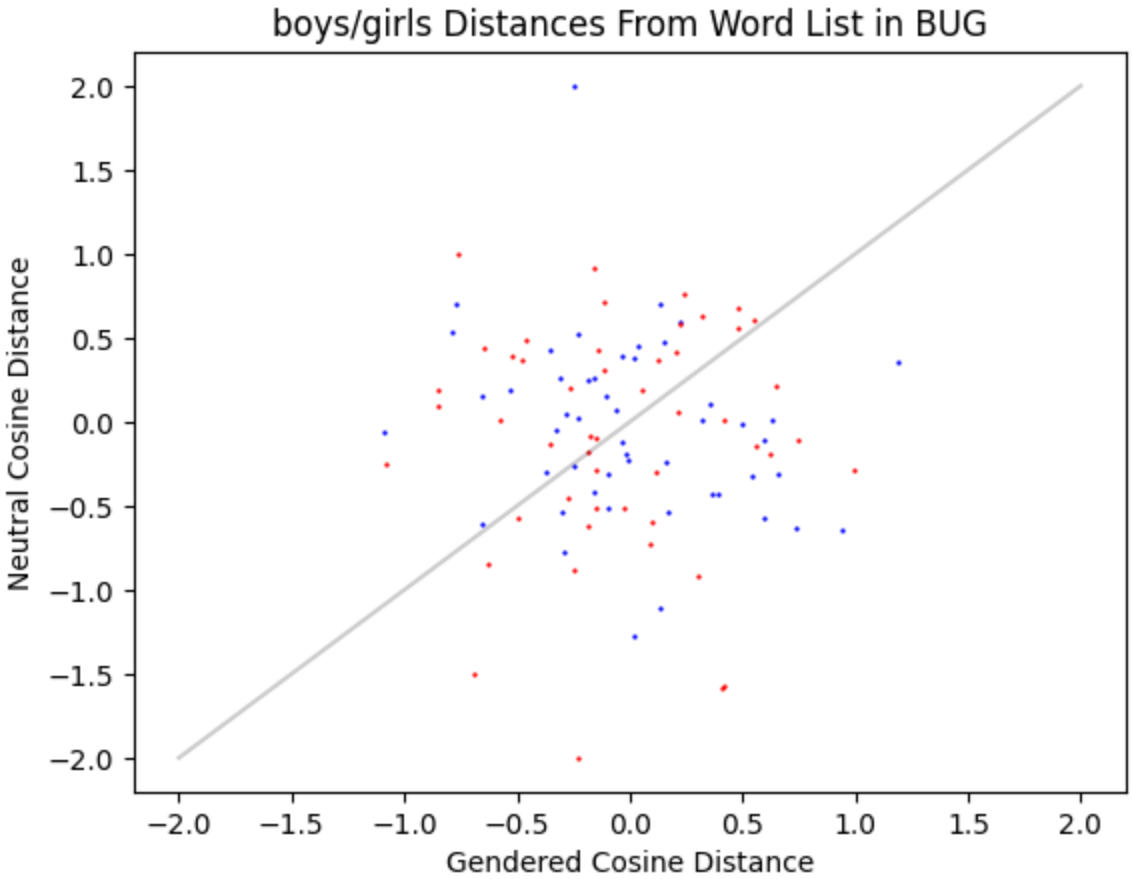

they/them Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
1
0
−1
−2
−2
−1
0
1

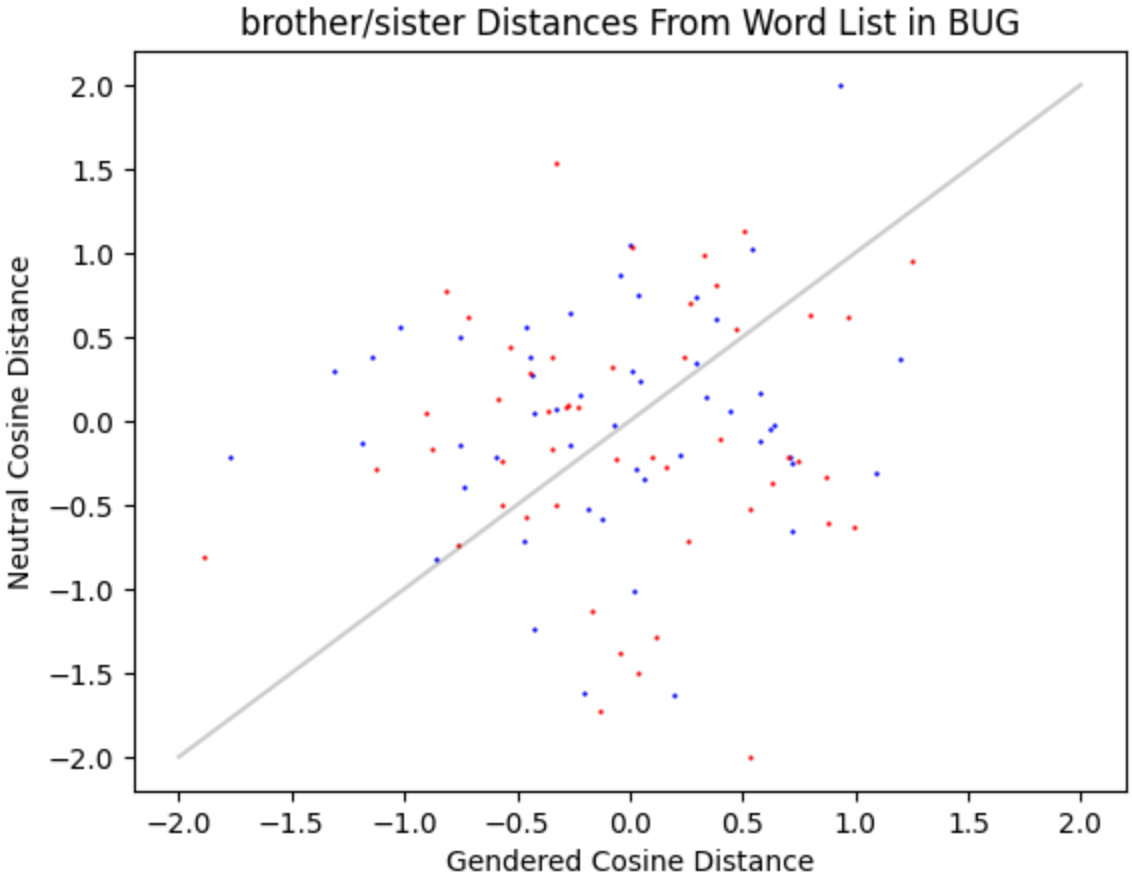

male/female Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

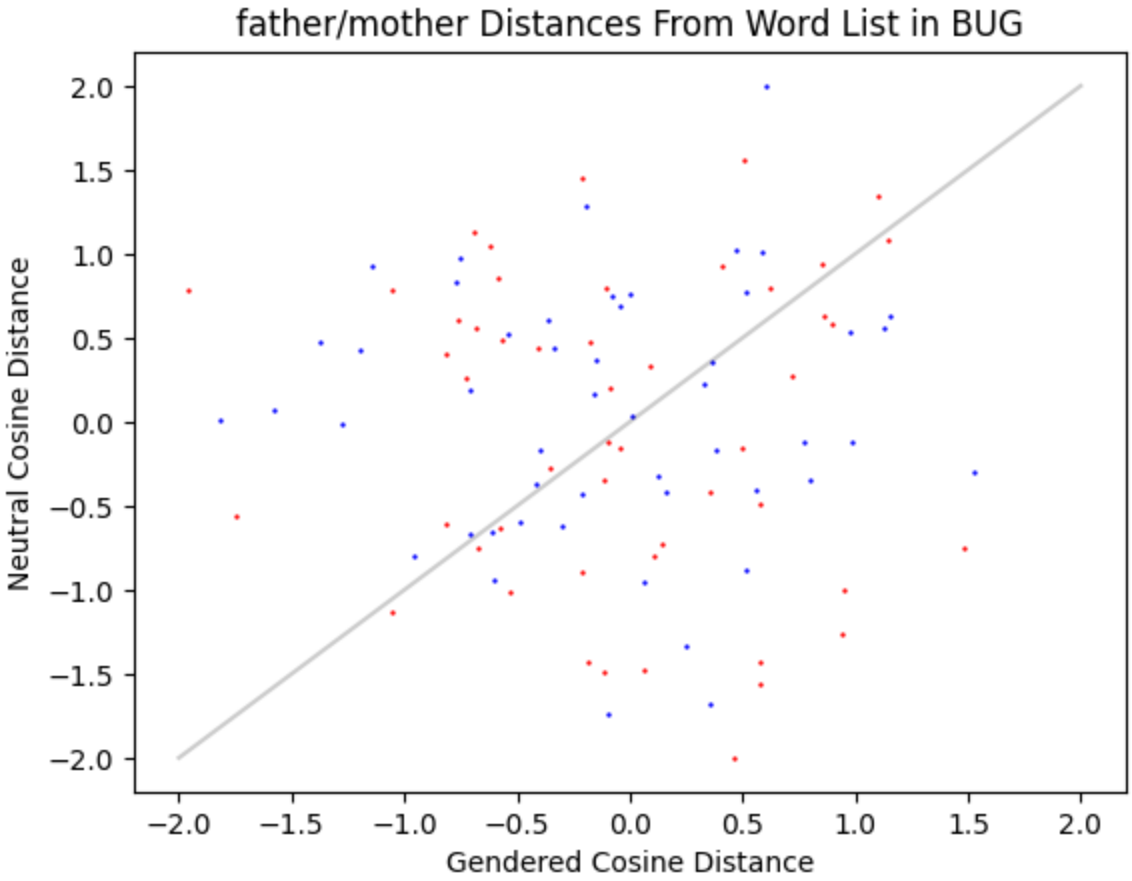

boy/girl Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

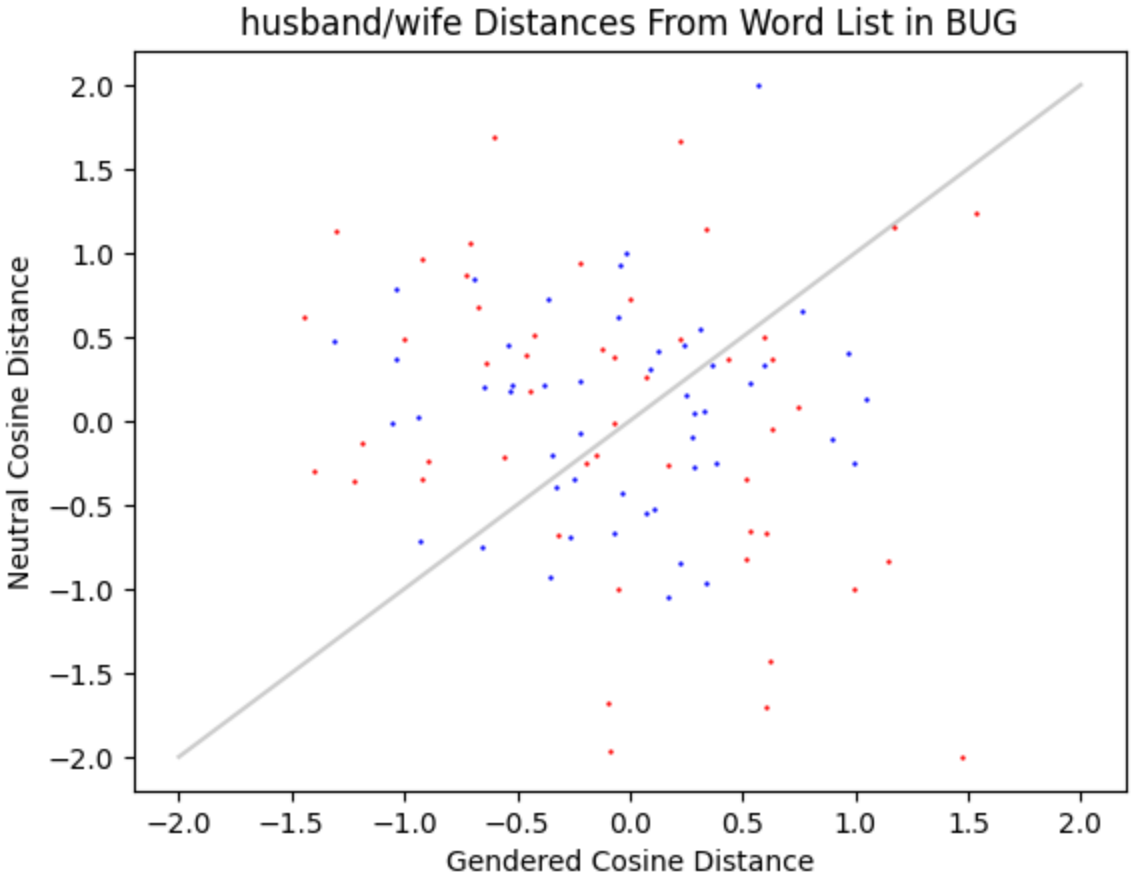

man/woman Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

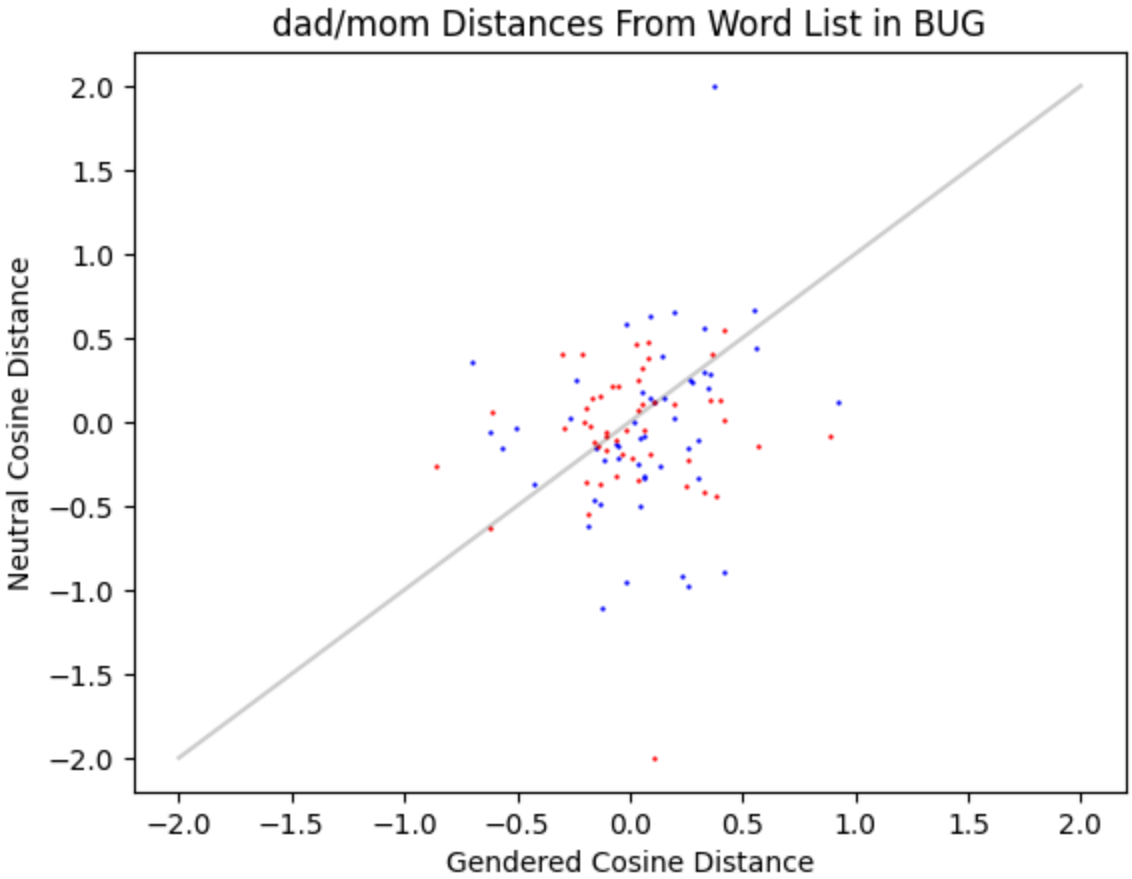

men/women Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

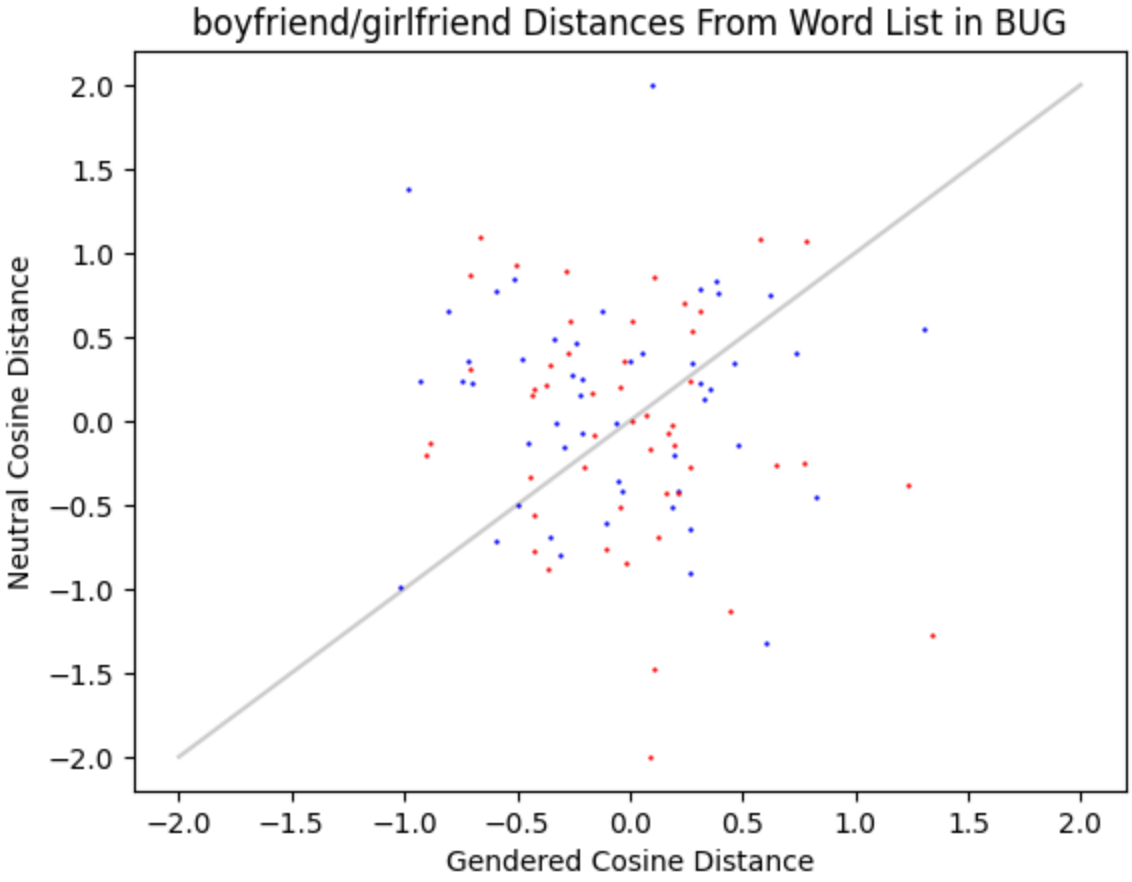

boys/girls Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

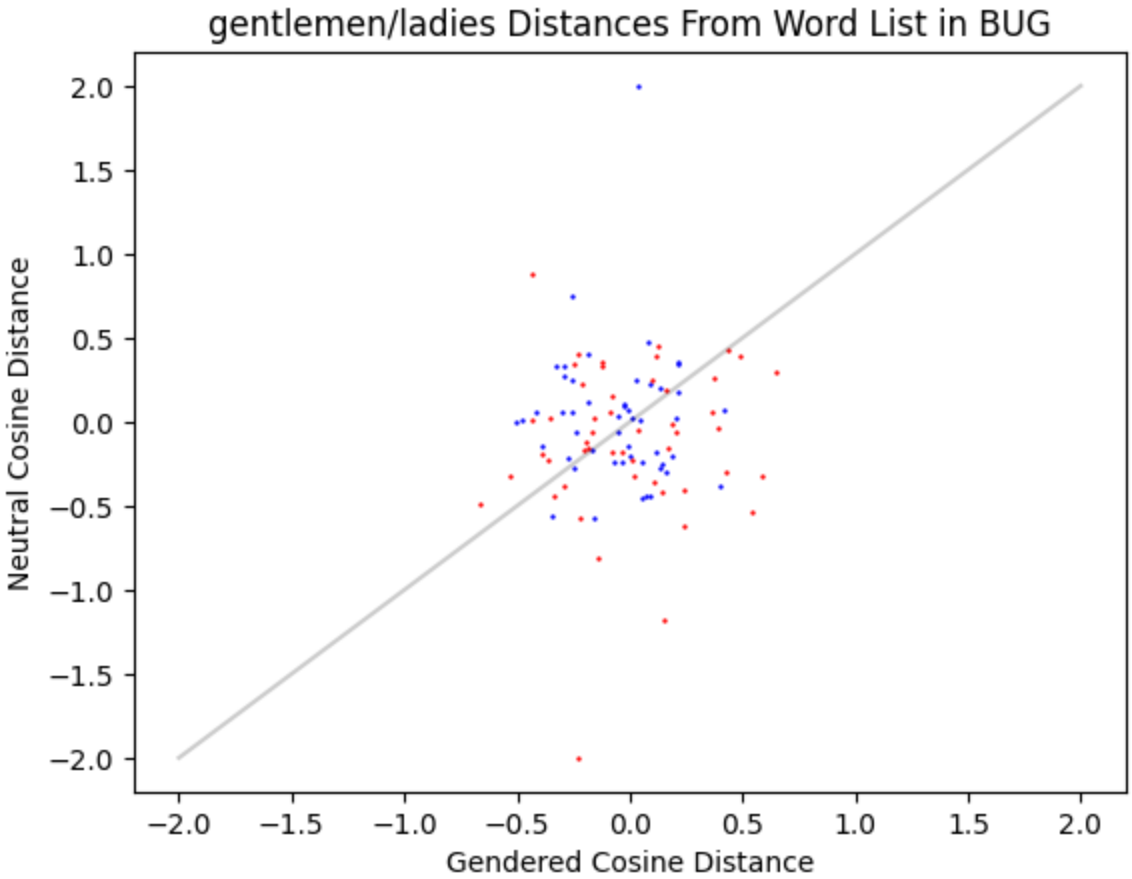

brother/sister Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0


father/mother Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

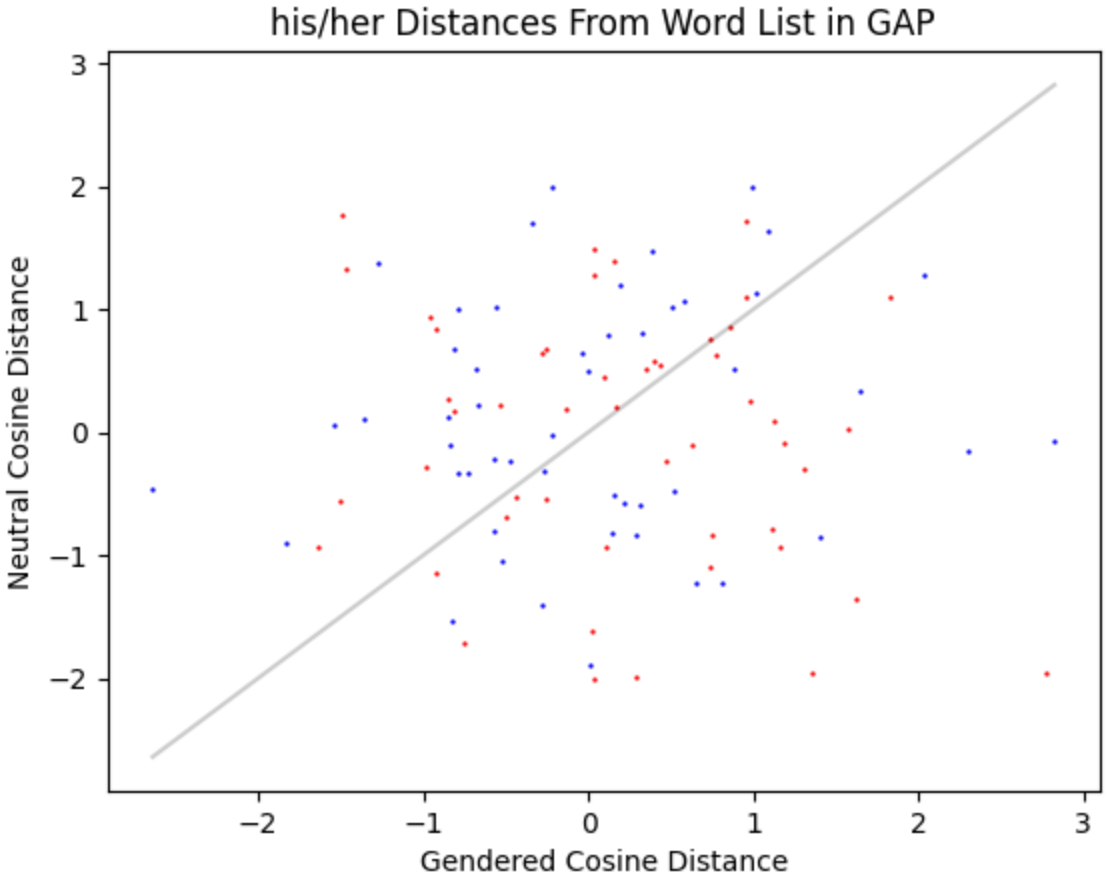

husband/wife Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

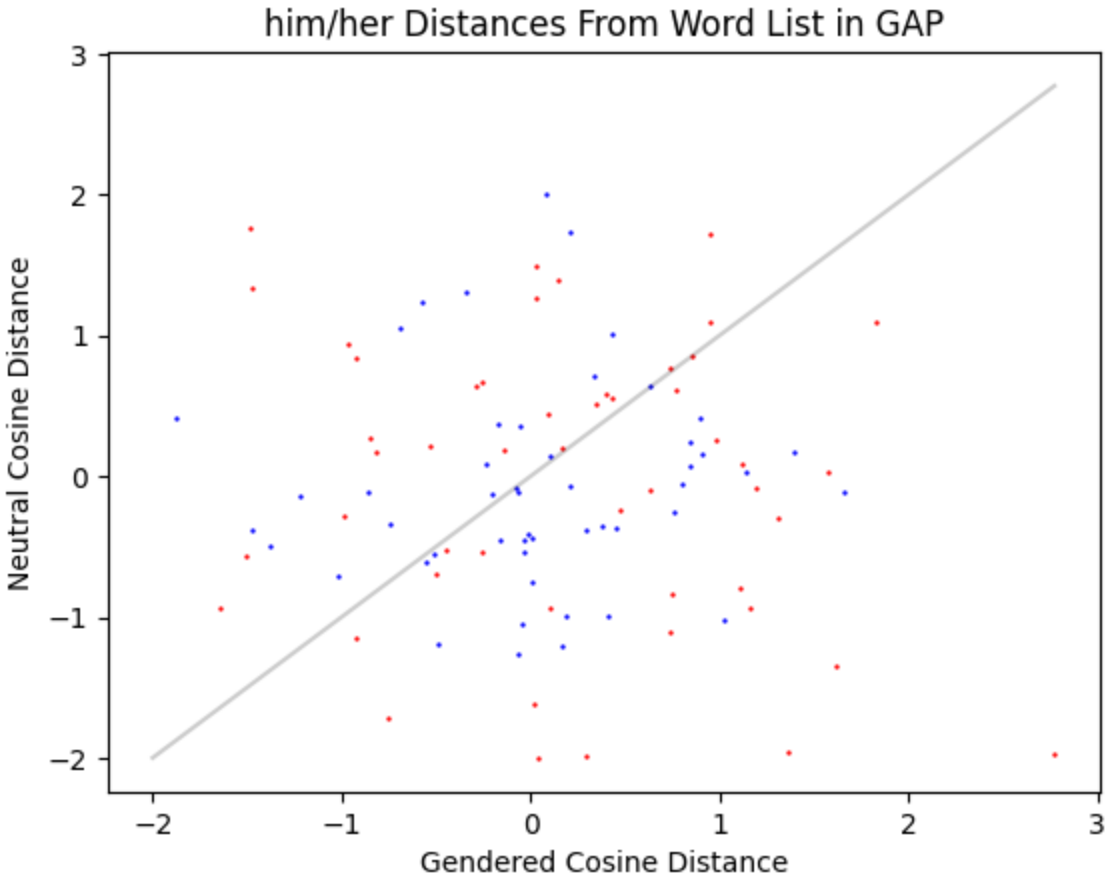

dad/mom Distances From Word List in BUG
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

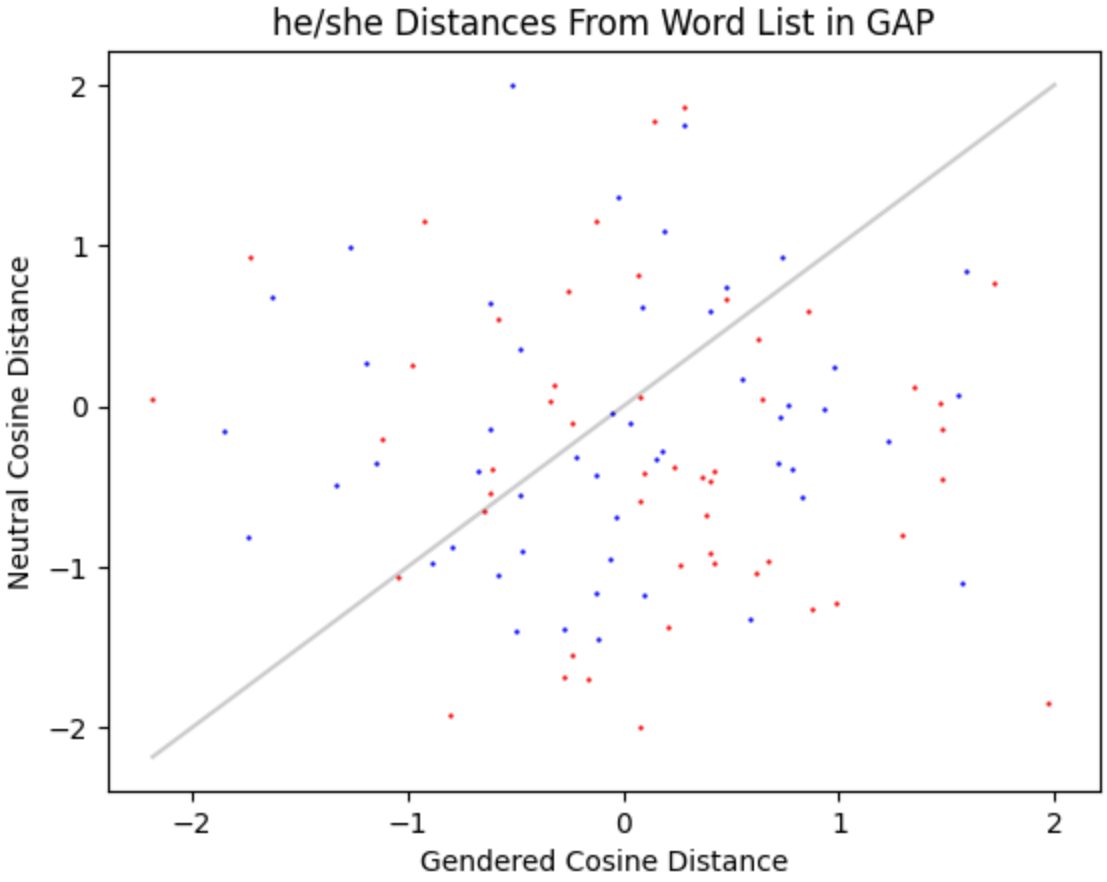


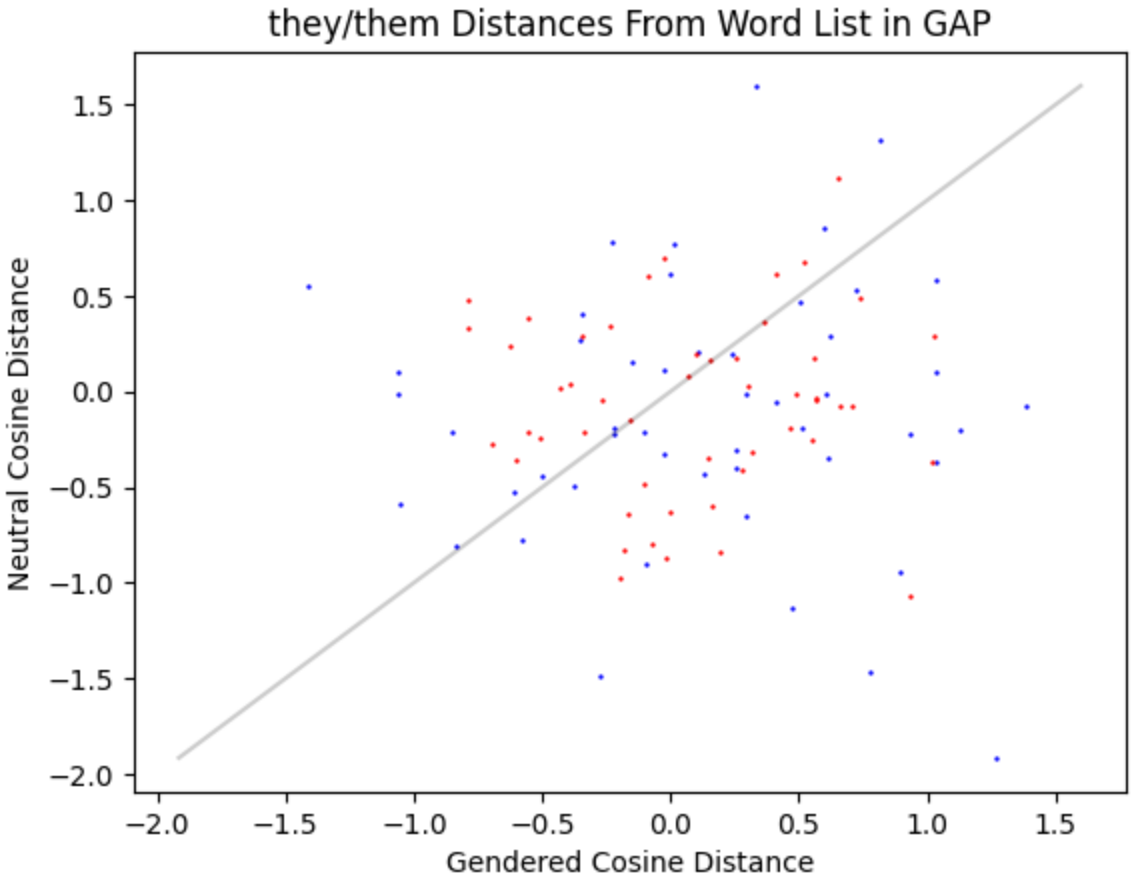


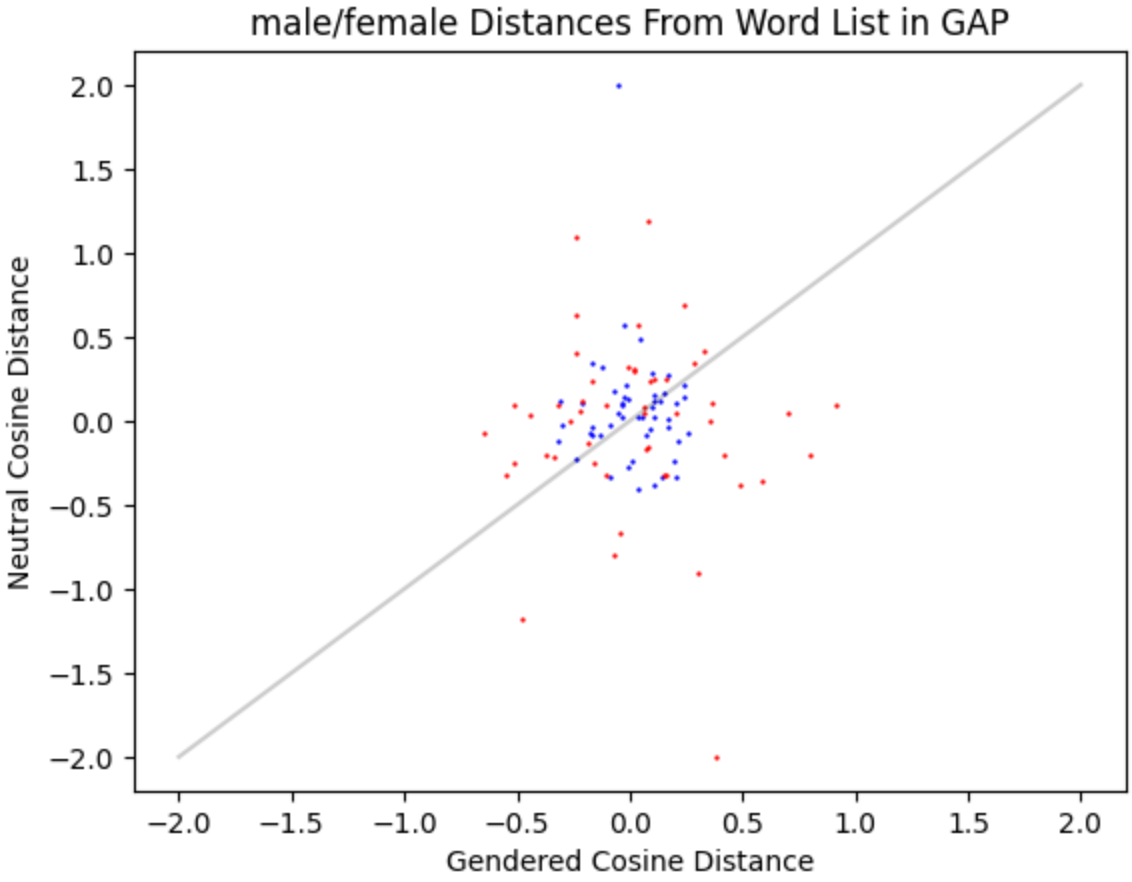
In [ ]:
```
a.plotter(genderPairs, spotlightWords, gapNEmbeds, gapGEmbeds, titles[2])
```

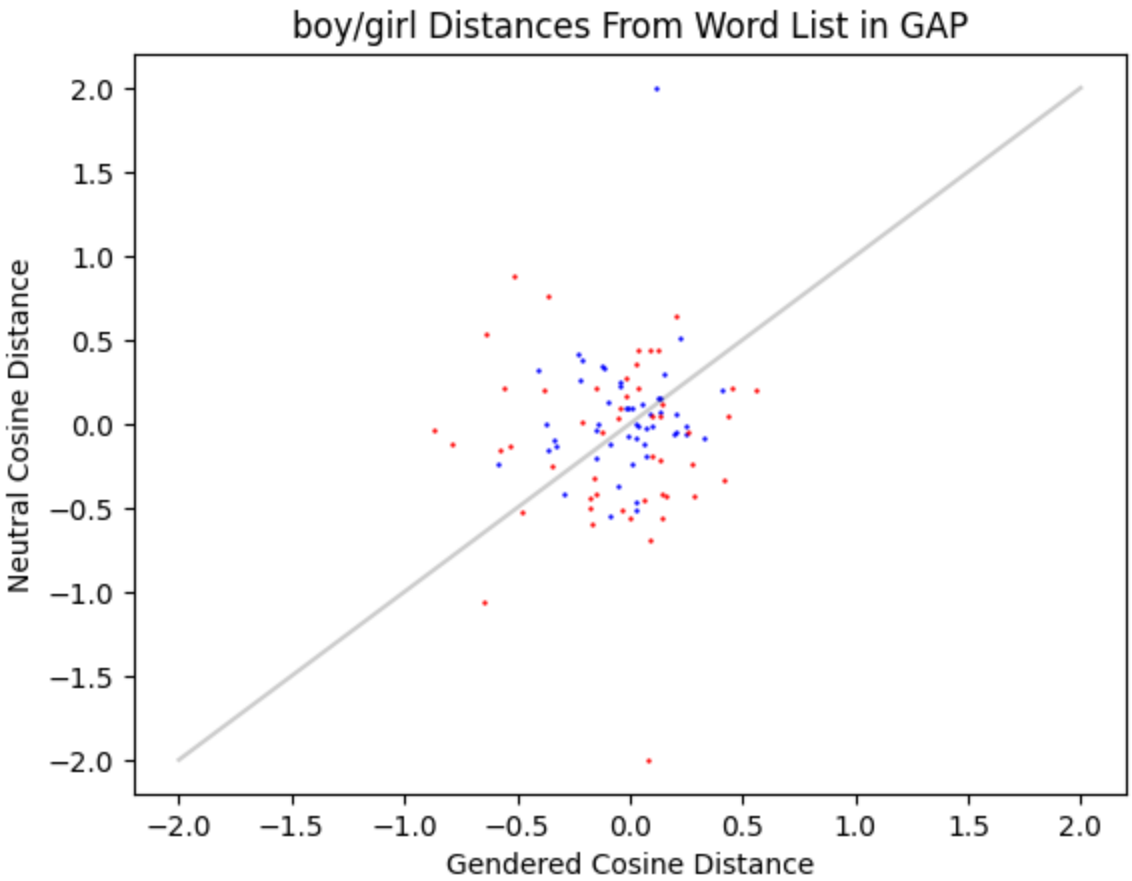

his/her Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
3
2
1
0
−1
−2
−2
−1
0
1
2
3

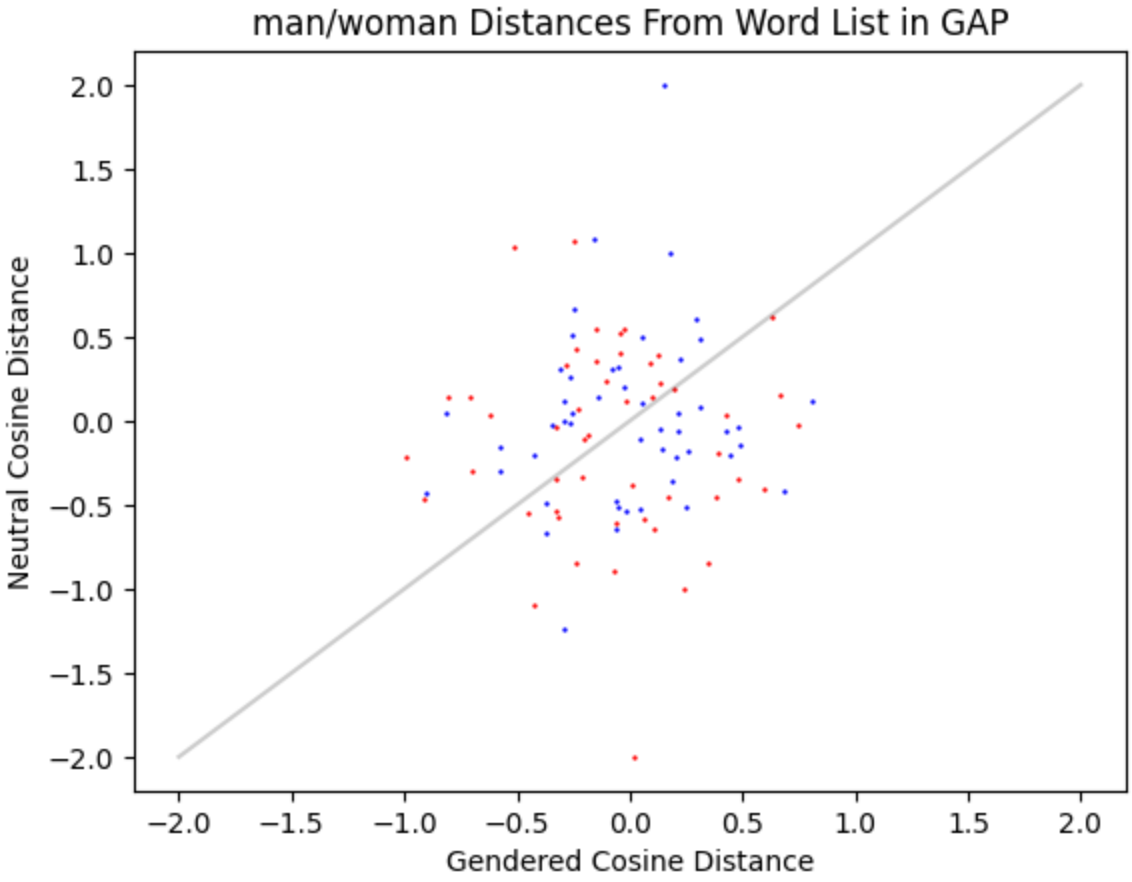

him/her Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
3
2
1
0
−1
−2
−2
−1
0
1
2
3

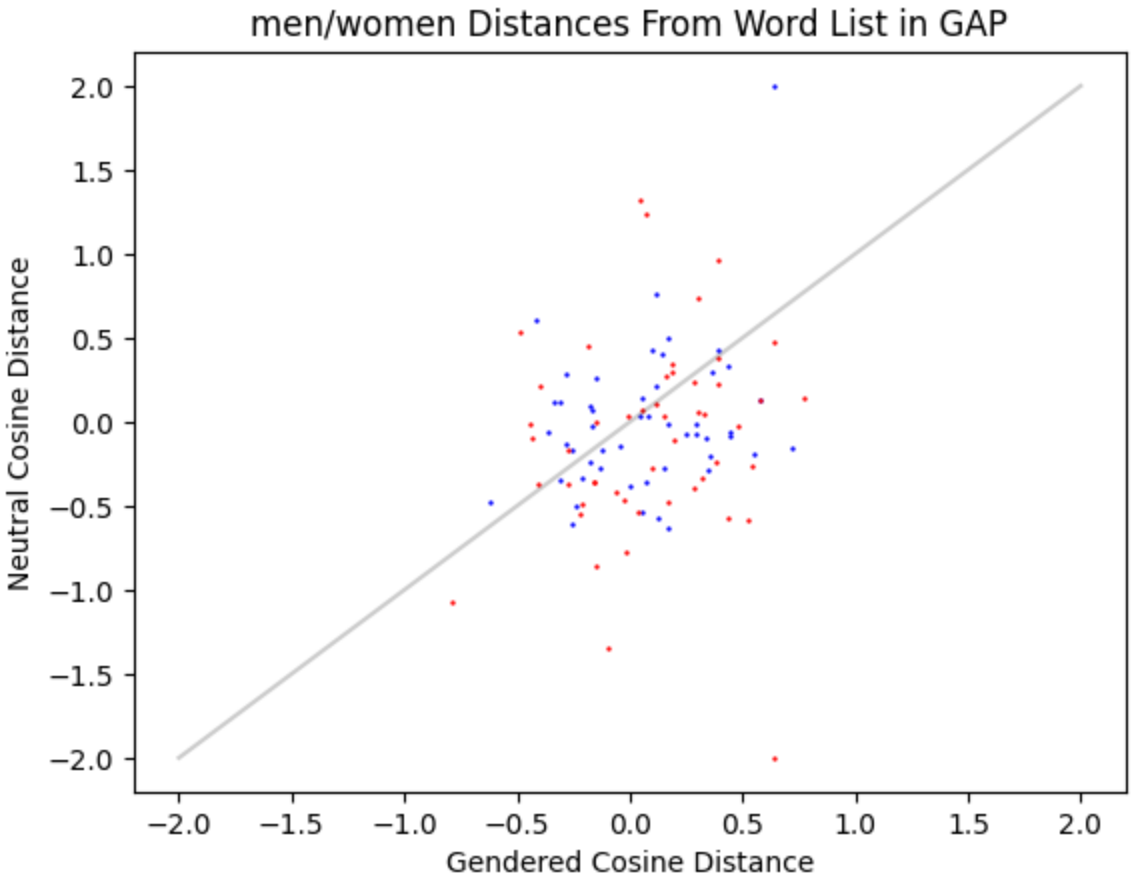

he/she Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−2
−1
0
1
2

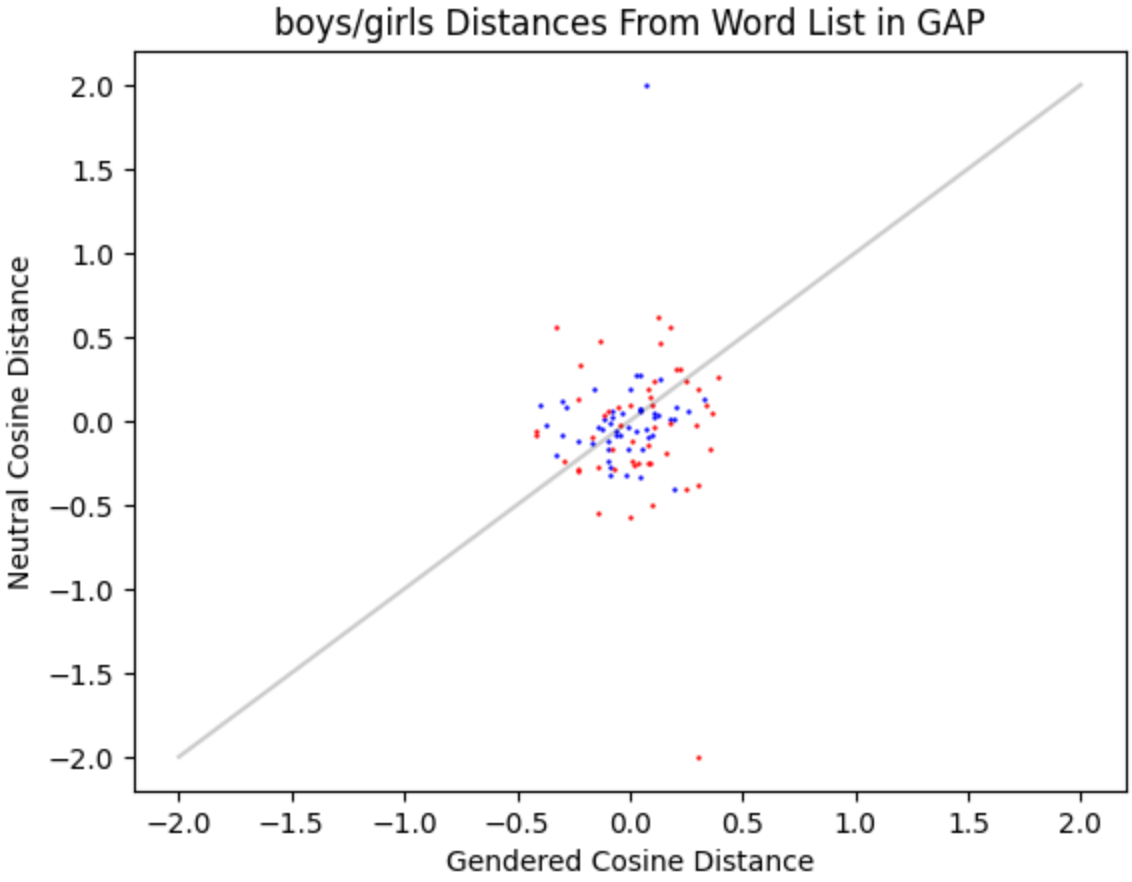

they/them Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5

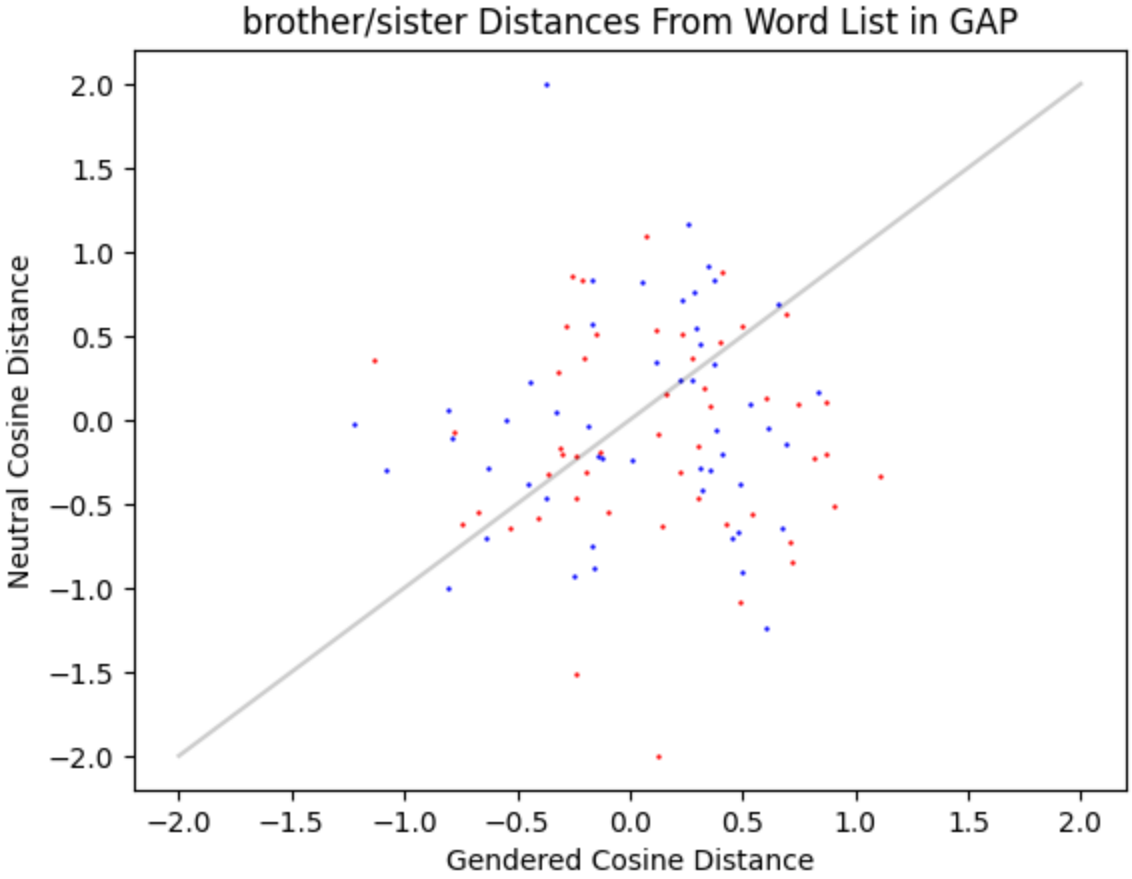

male/female Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

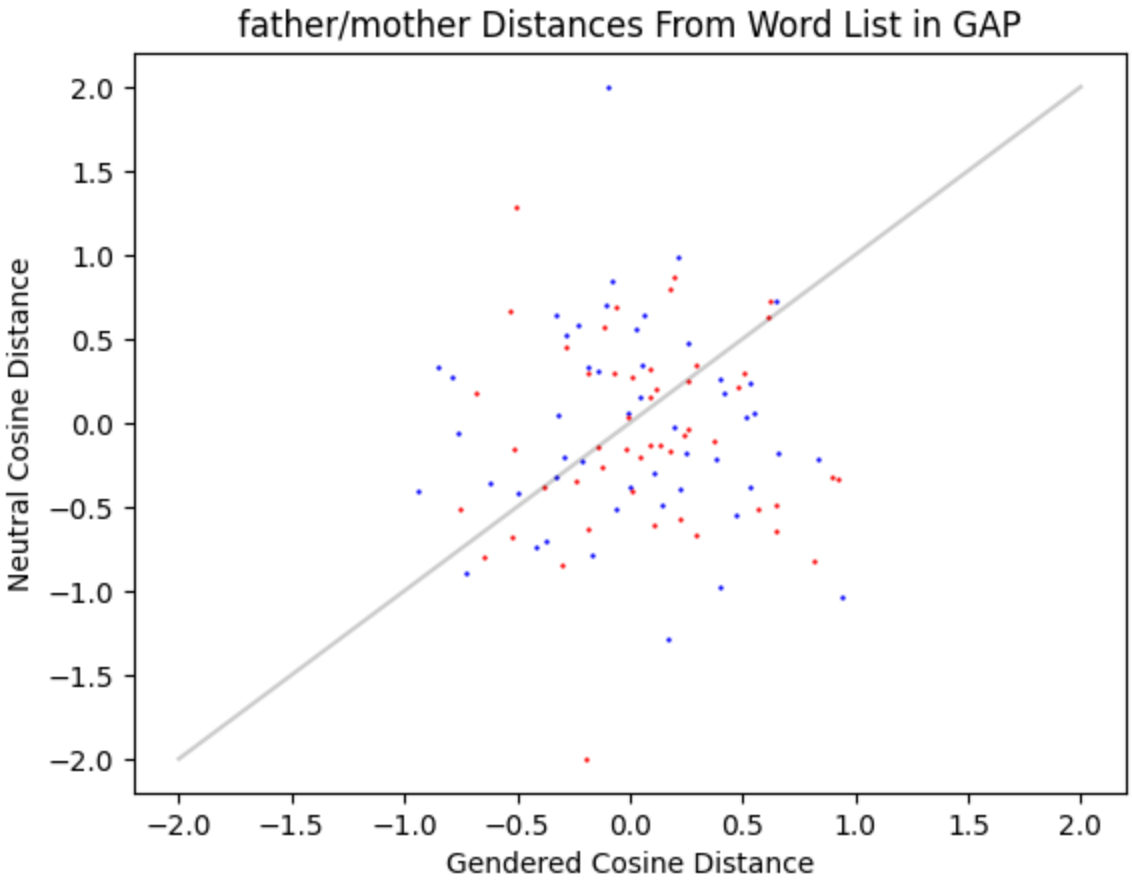

boy/girl Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

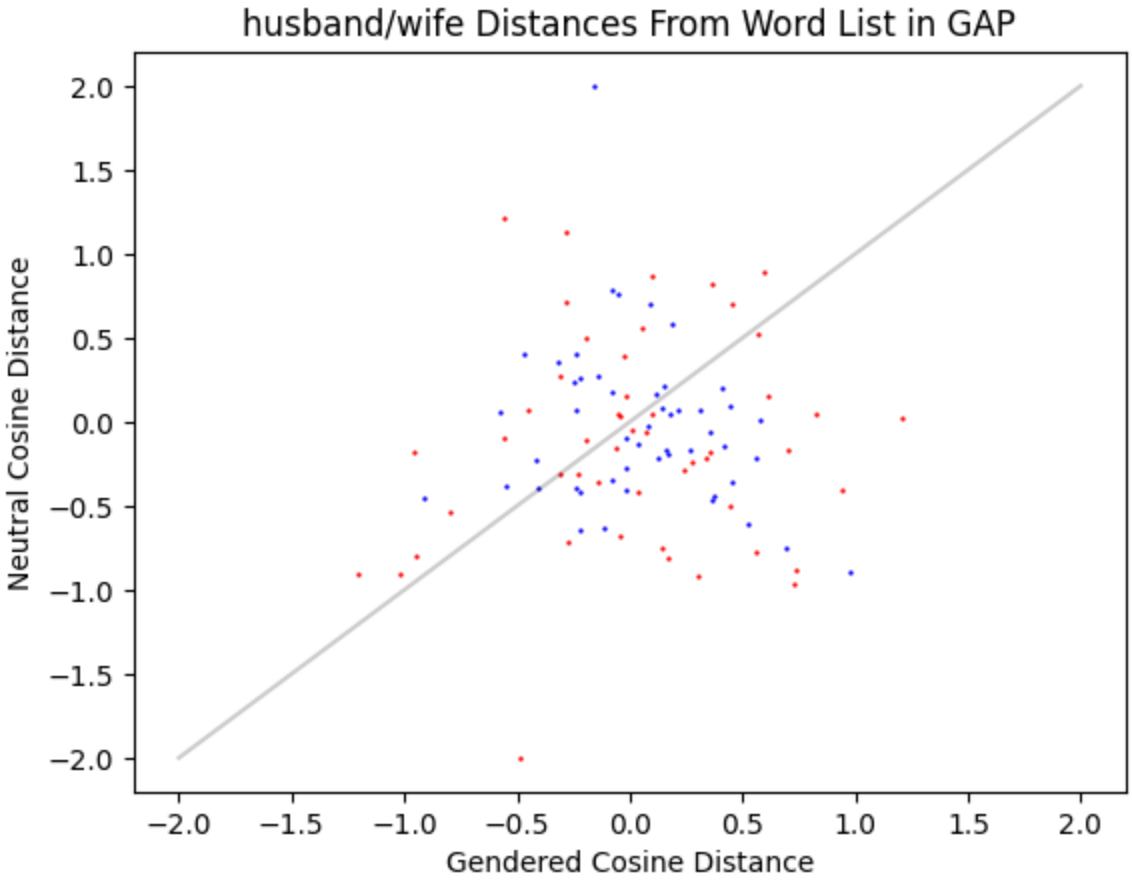

man/woman Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

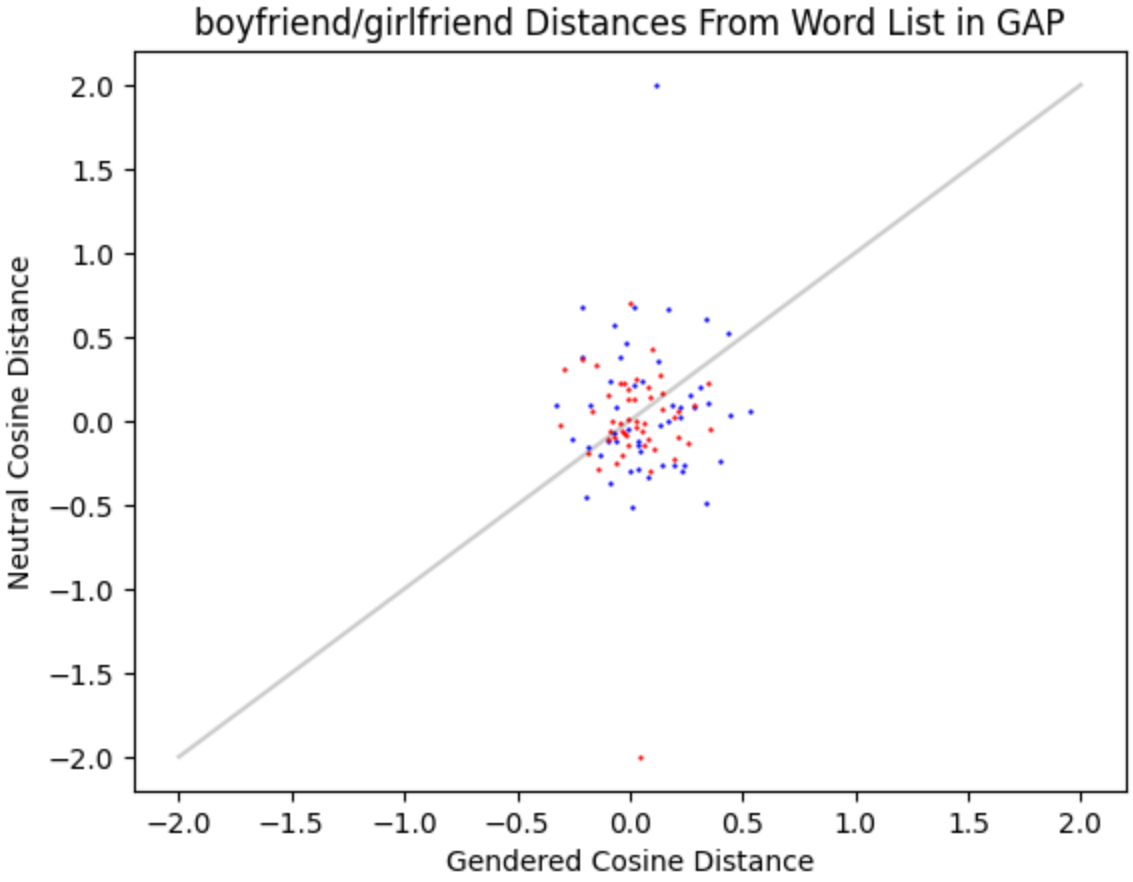

men/women Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0


boys/girls Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

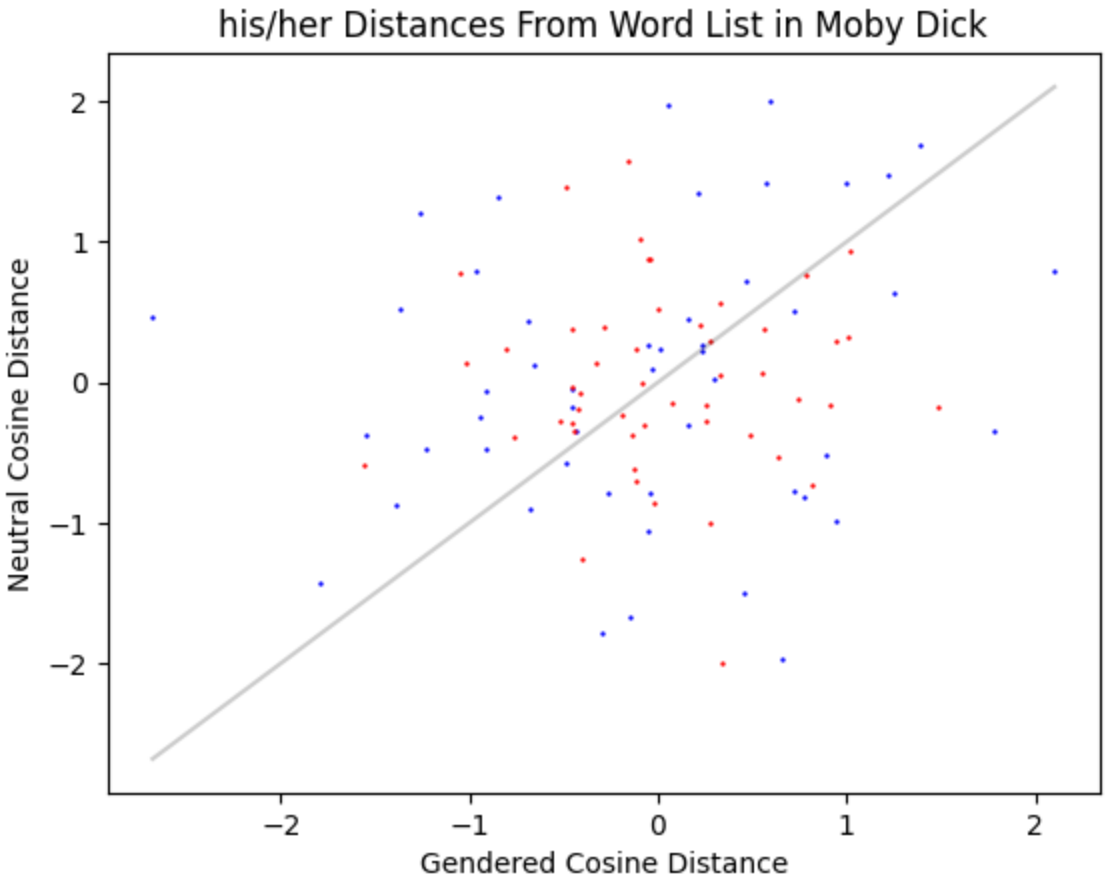

brother/sister Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

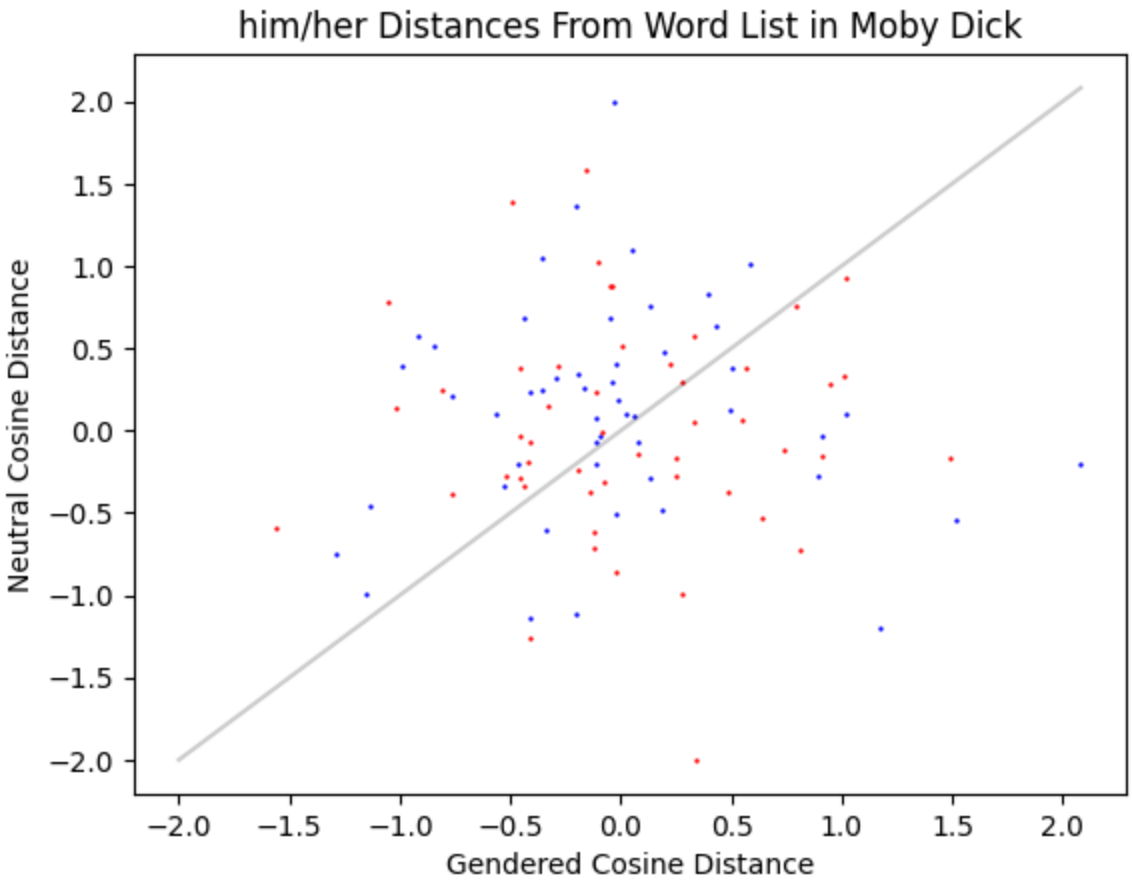

father/mother Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

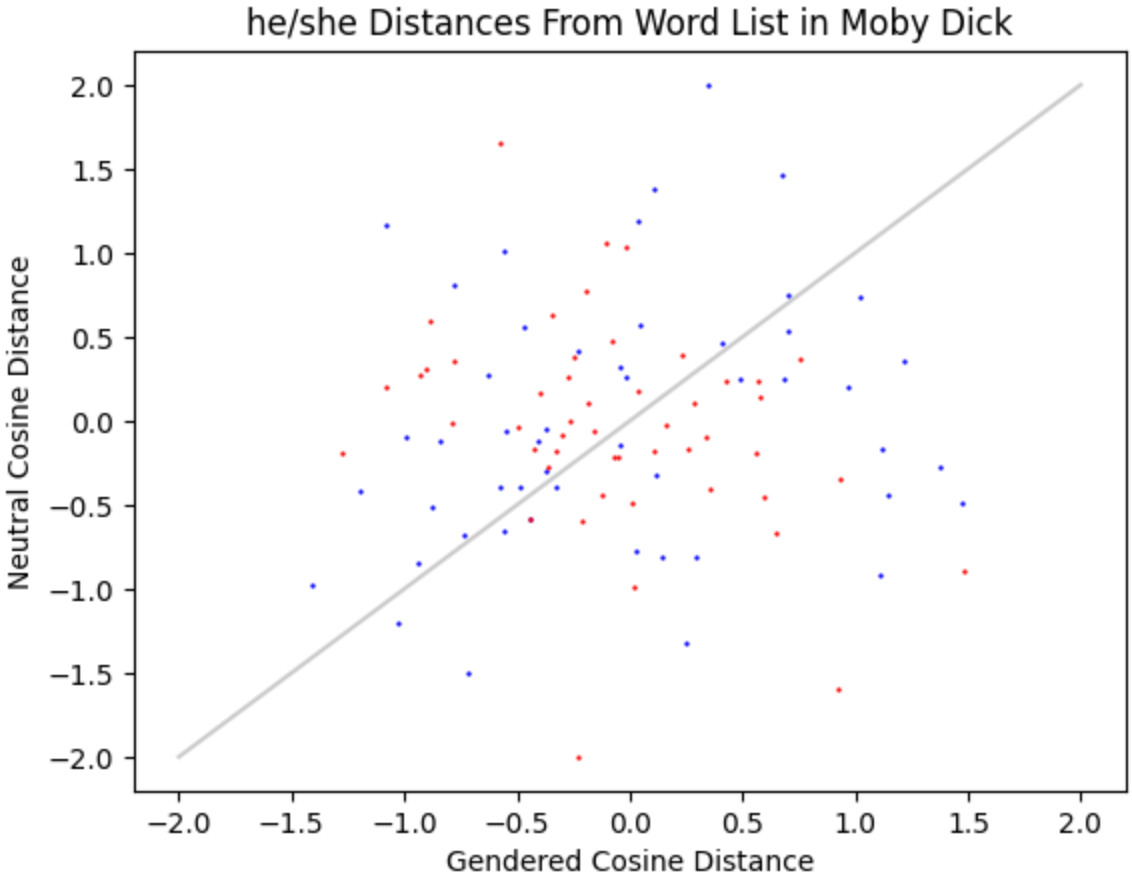

husband/wife Distances From Word List in GAP
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

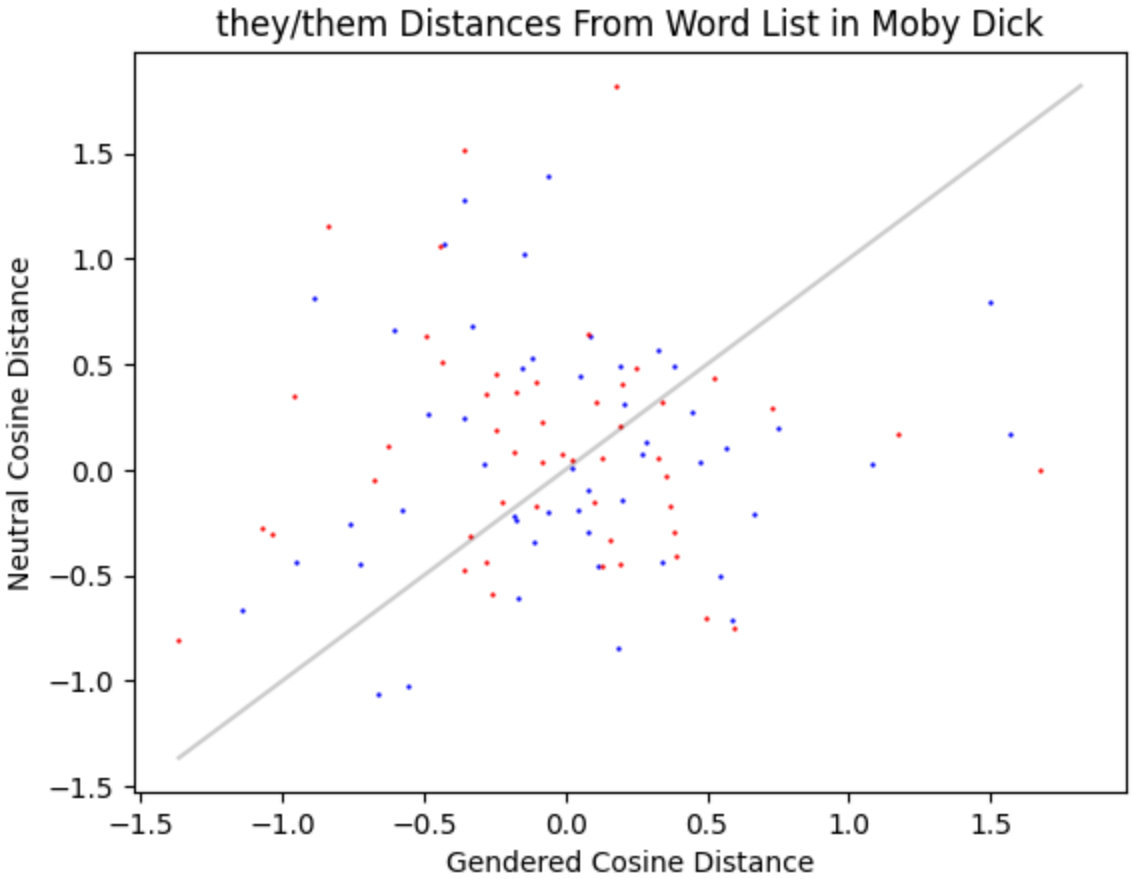


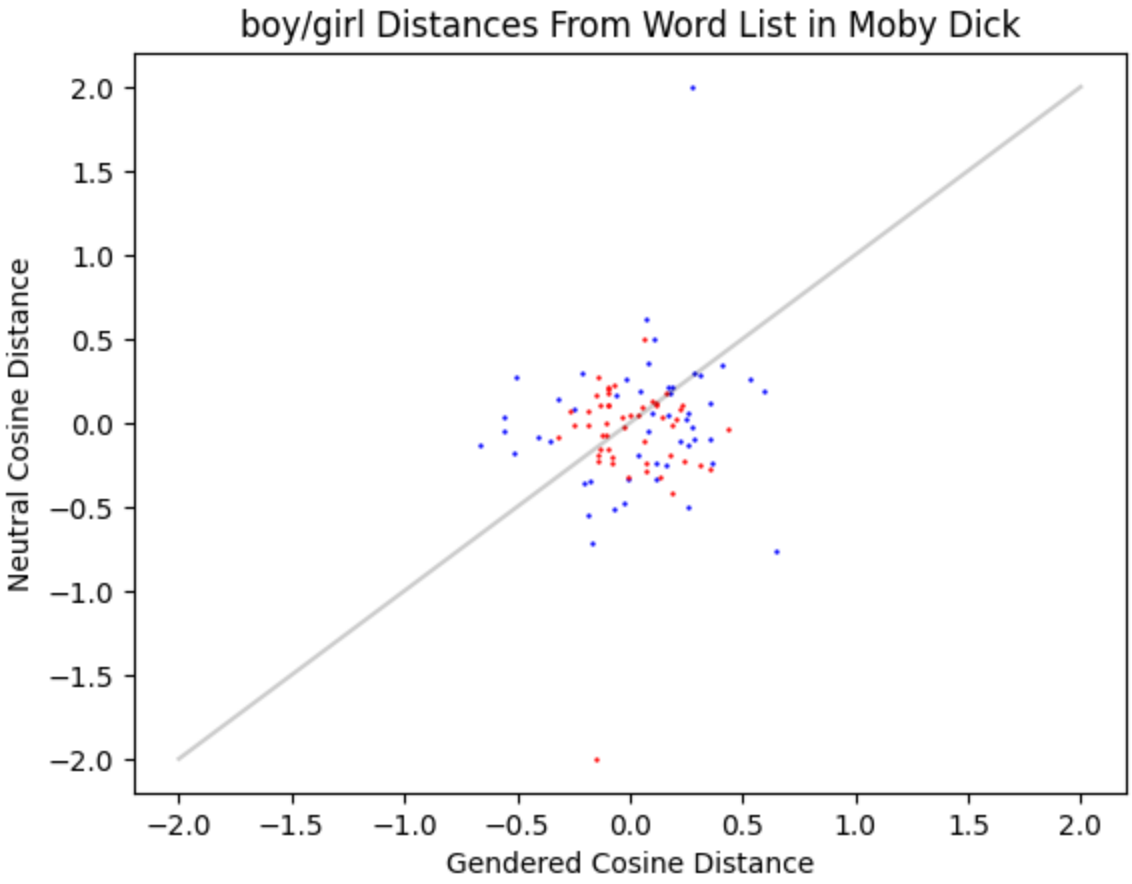
In [ ]:
```
a.plotter(genderPairs, spotlightWords, mobyNEmbeds, mobyGEmbeds, titles[3])
```

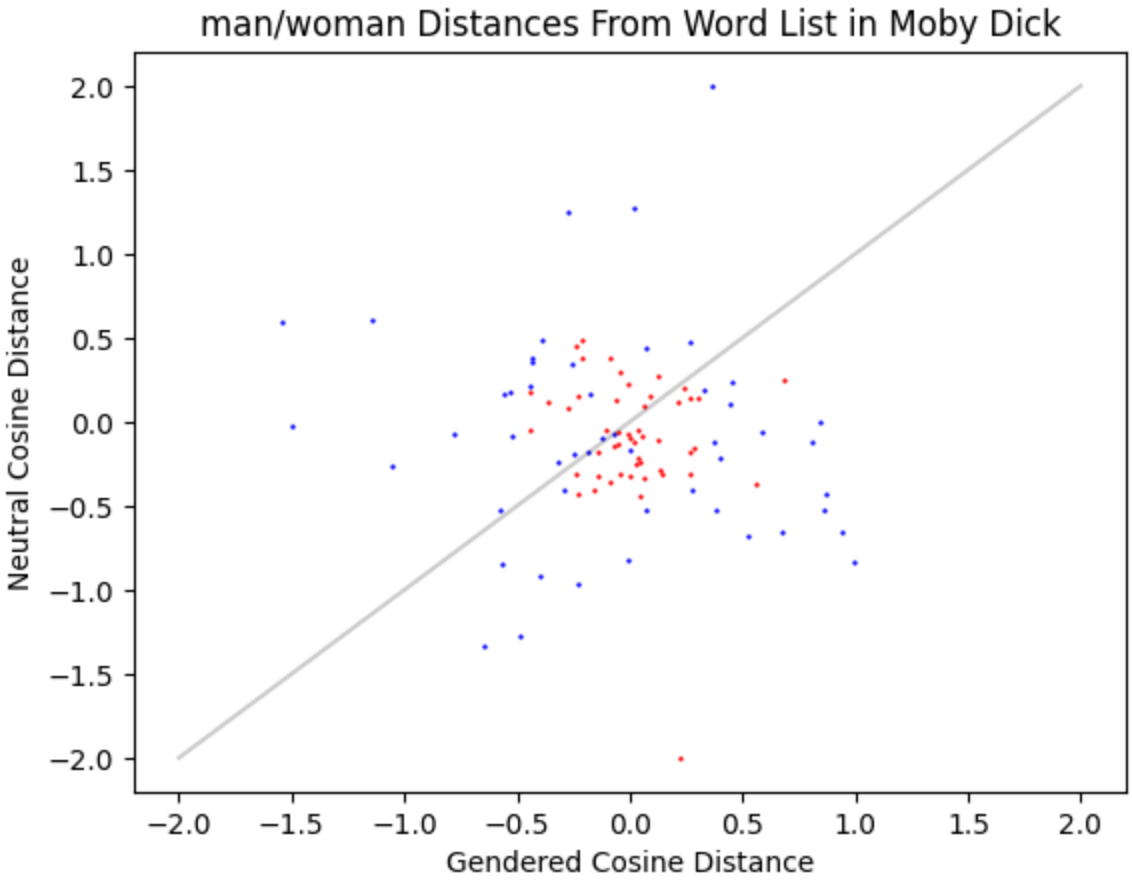

his/her Distances From Word List in Moby Dick
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−2
−1
0
1
2

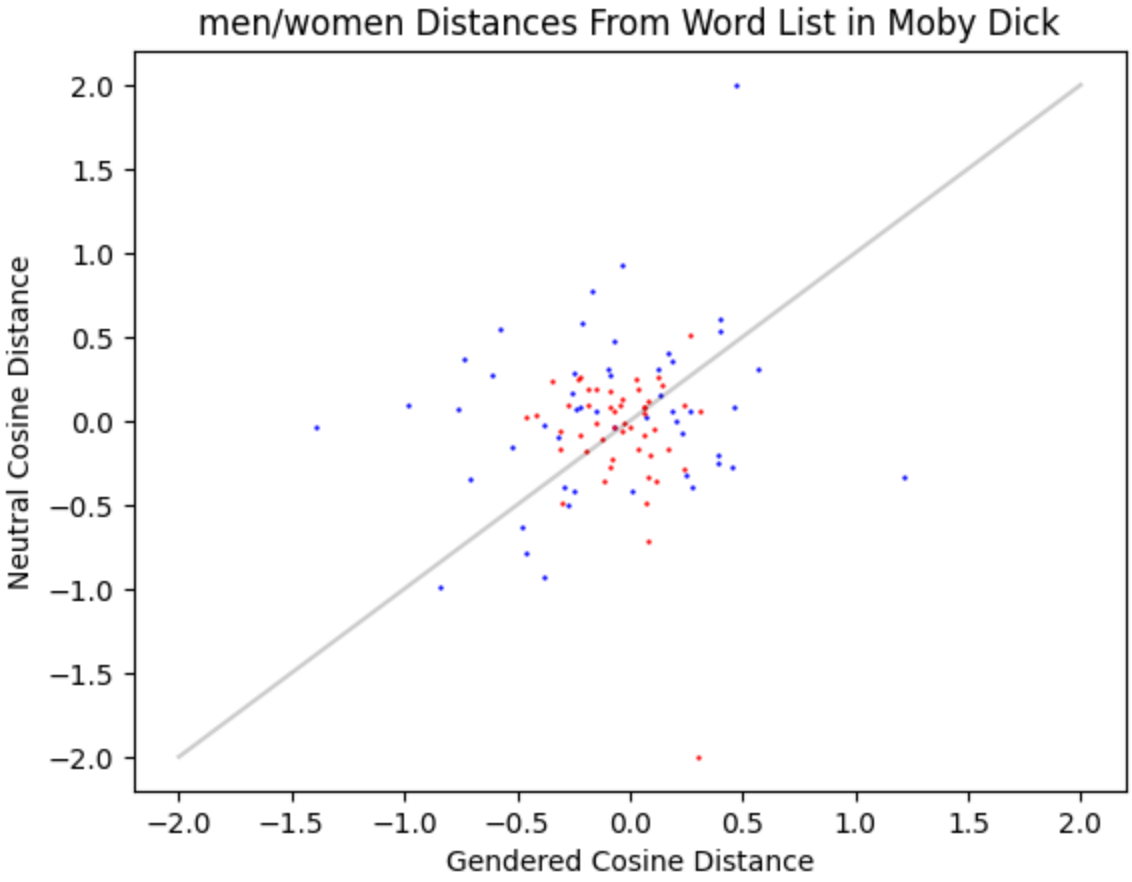

him/her Distances From Word List in Moby Dick
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

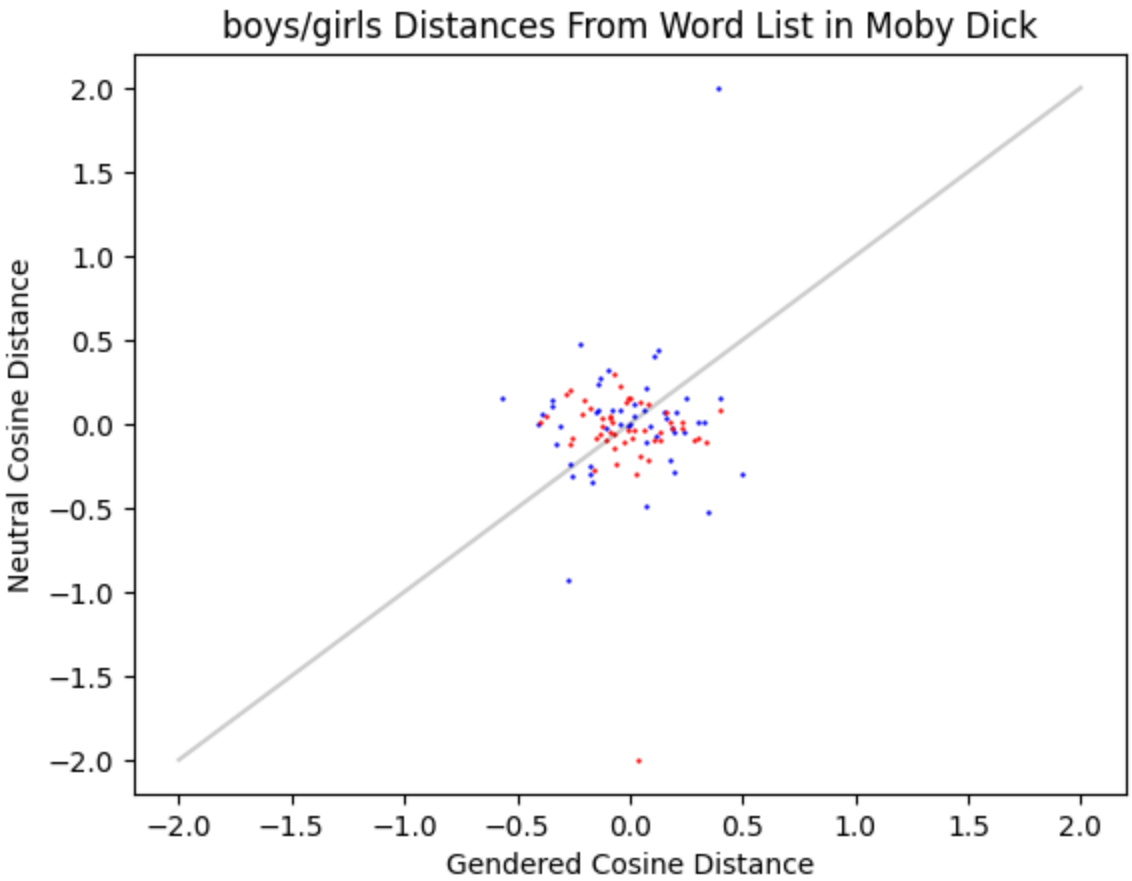

he/she Distances From Word List in Moby Dick
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

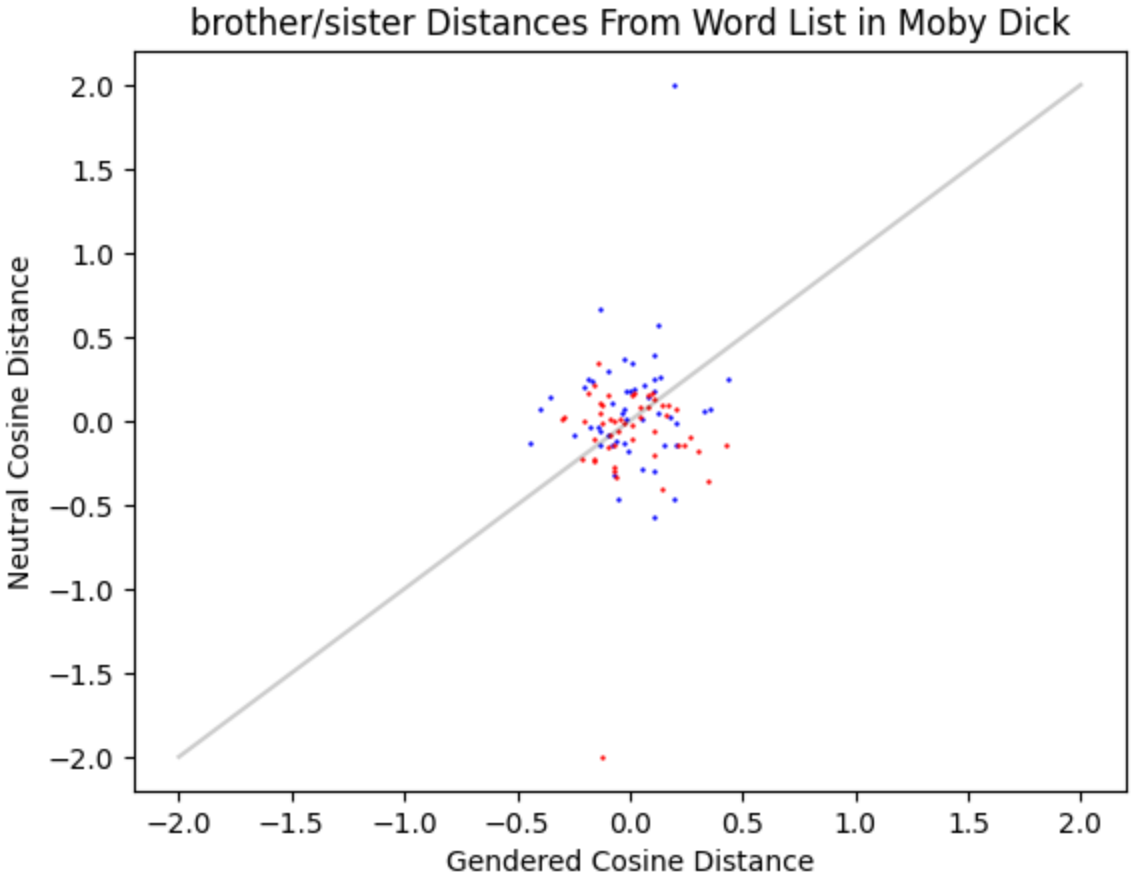

they/them Distances From Word List in Moby Dick
Neutral Cosine Distance
Gendered Cosine Distance
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5

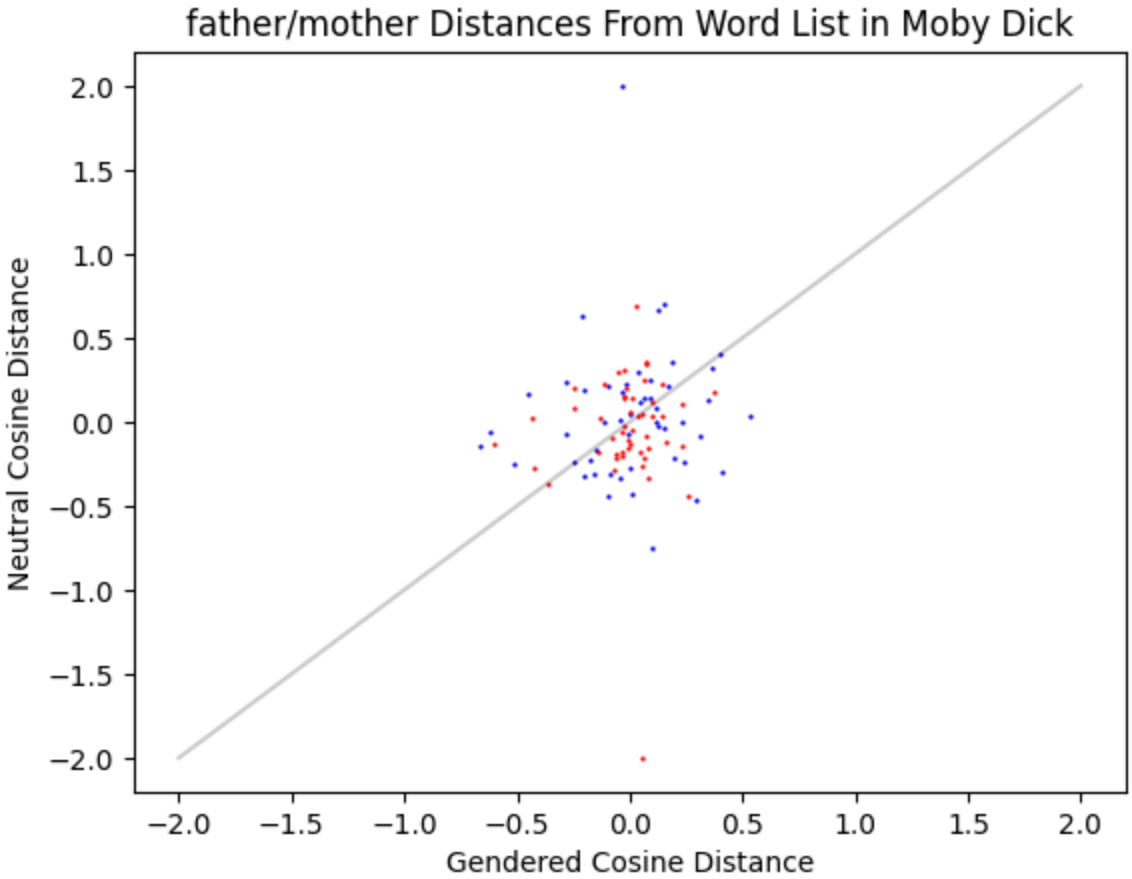

boy/girl Distances From Word List in Moby Dick
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

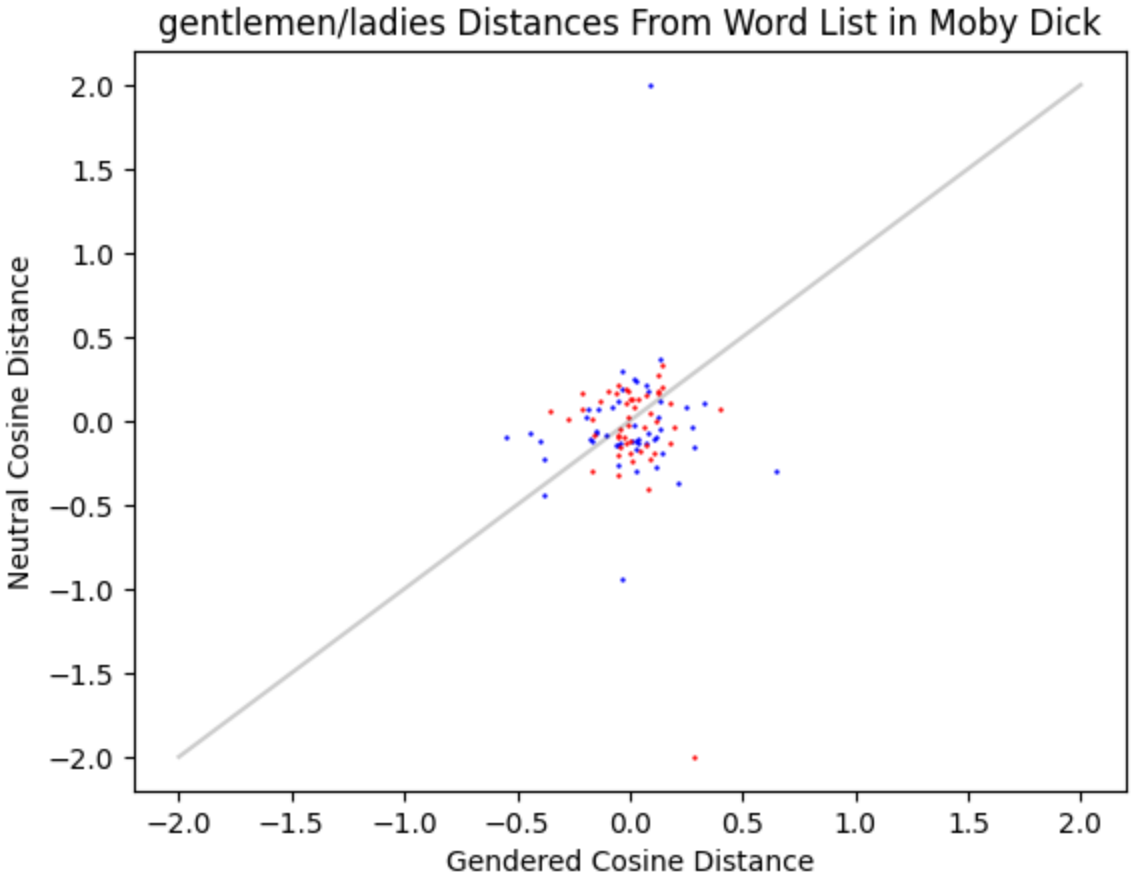

man/woman Distances From Word List in Moby Dick
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0


men/women Distances From Word List in Moby Dick
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0


boys/girls Distances From Word List in Moby Dick
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0


brother/sister Distances From Word List in Moby Dick
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0


father/mother Distances From Word List in Moby Dick
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0



In [ ]:
```
"""for i, (gen, neu) in enumerate(list(zip(genderEmbeds, neutralEmbeds))):
    avg = 0
    count = 0
    for word in spotlightWords:
        if word in gen.keys() and word in neu.keys():
            count += 1
            top3gen = set(a.closestWordsNorm(gen, gen[word], 110))
            top3neu = set(a.closestWordsNorm(neu, neu[word], 110))

            top3set = top3gen.union(top3neu)

            diff = round((len(top3set) - len(top3gen))/100, 3)
            avg += diff
    avg = round(avg / count, 3)
    print(f'Top 3 rank change for {titles[i]}: {avg}')"""

#Doesn't work right

for i, (gen, neu, title) in enumerate(list(zip(genderEmbeds, neutralEmbeds,
    print(f'{title} Cosine Differences between Neutral and Gendered Embeddir
    diff = a.closestWordsDistances(spotlightWords, gen, neu, 10)
    print(diff)
```

```
Bible Cosine Differences between Neutral and Gendered Embeddings
0.177
BUG Cosine Differences between Neutral and Gendered Embeddings
-0.052
GAP Cosine Differences between Neutral and Gendered Embeddings
-0.012
Moby Dick Cosine Differences between Neutral and Gendered Embeddings
0.078
```