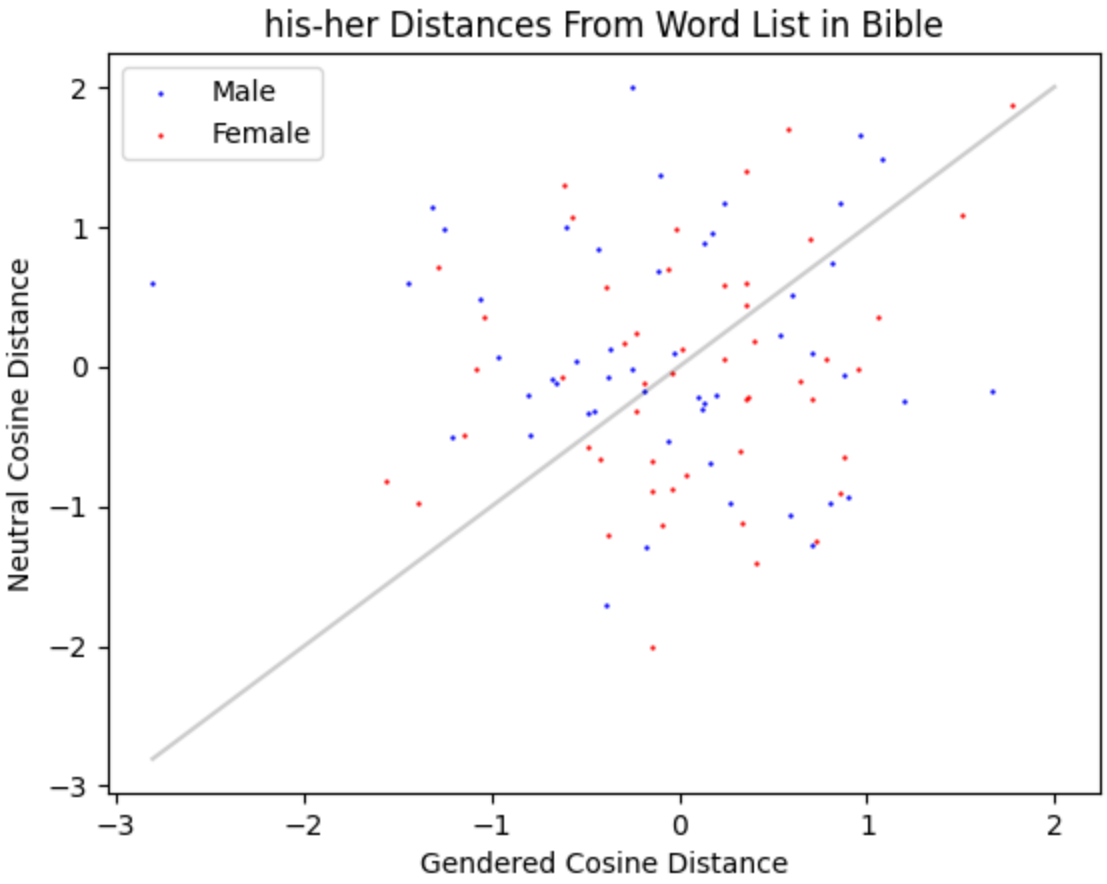
In [ ]:
```
import analyze as a
```

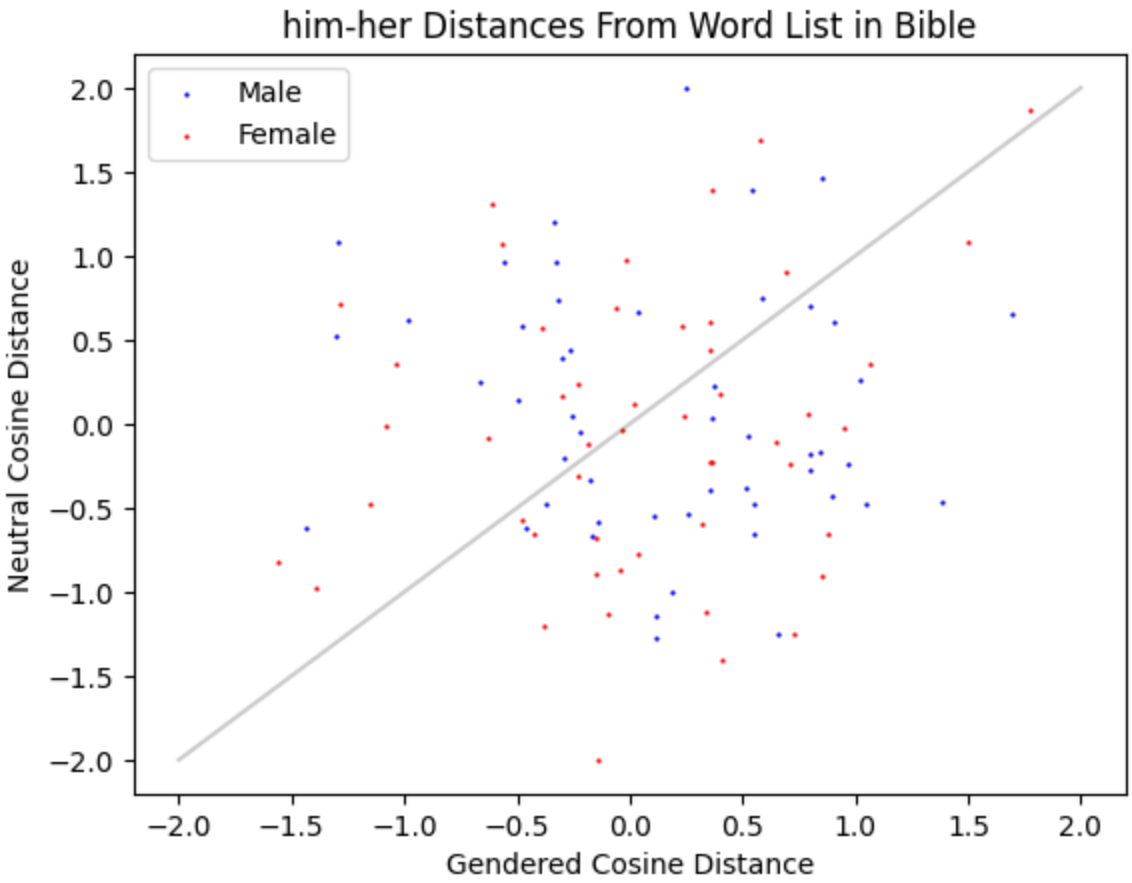
In [ ]:
```
titles = ["Bible", "BUG", "GAP", "Moby Dick"]

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')
```

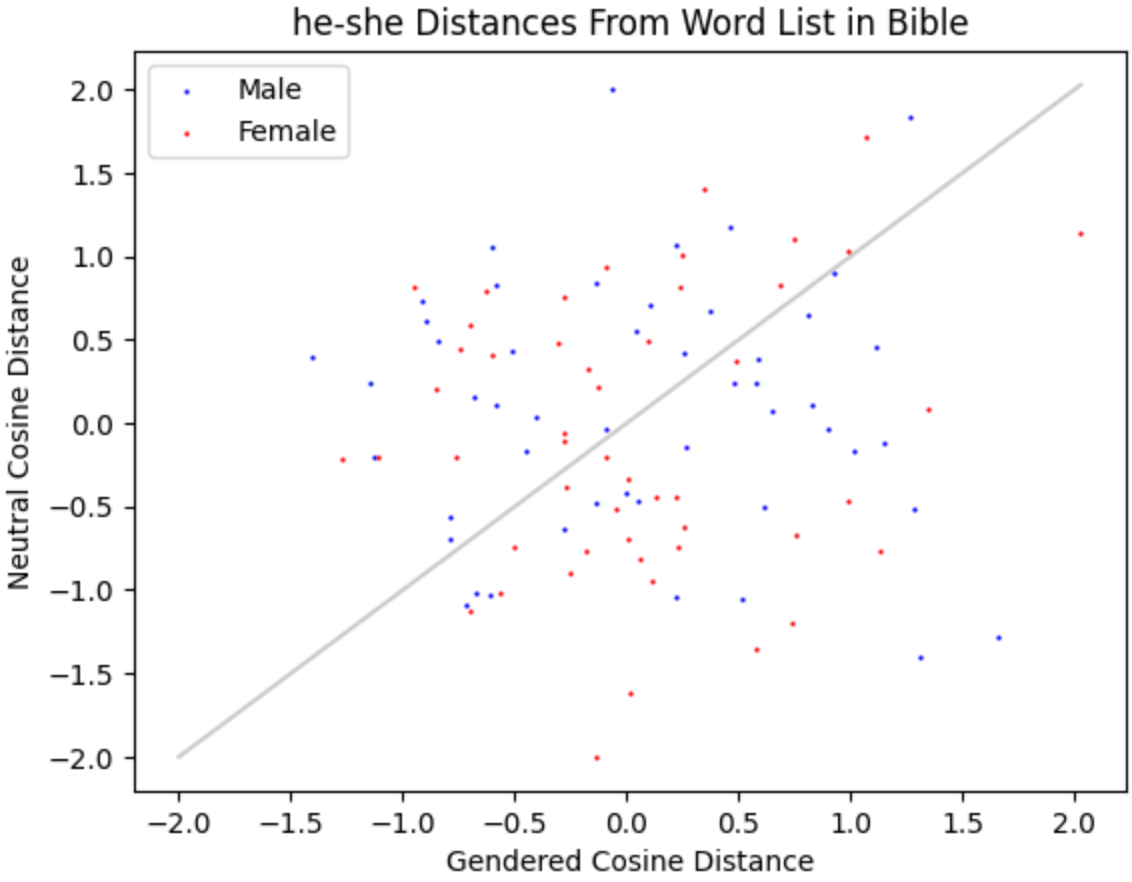
In [ ]:
```
"""for i, title in enumerate(titles):
    print("_____")
    a.plotter(genderPairs, spotlightWords, neutralEmbeds[i], genderEmbeds[i], title
#delete quotes for all graphs - takes up a lot of space
```

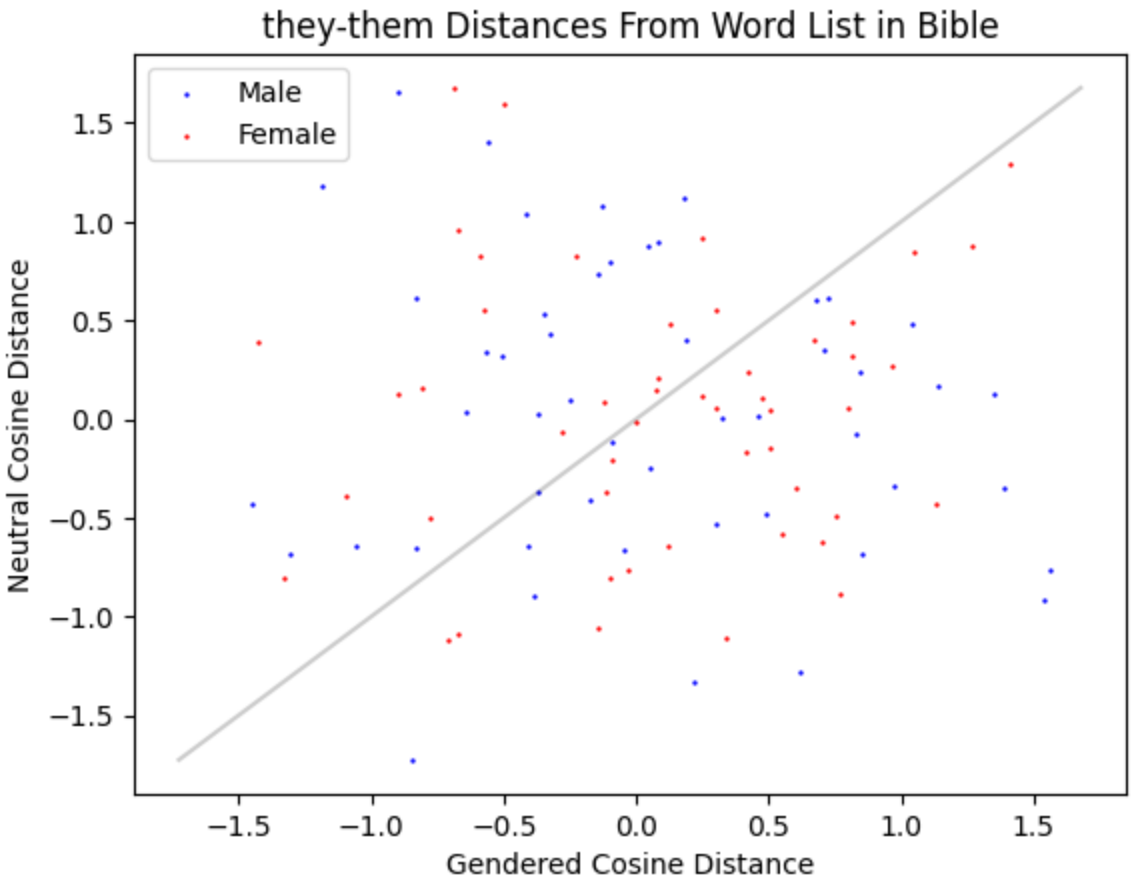
Out[ ]:
```
'for i, title in enumerate(titles):\n    print("_____
__")\n    a.plotter(genderPairs, spotlightWords, neutralEmbeds[i], genderEmbeds
[i], title)'
```

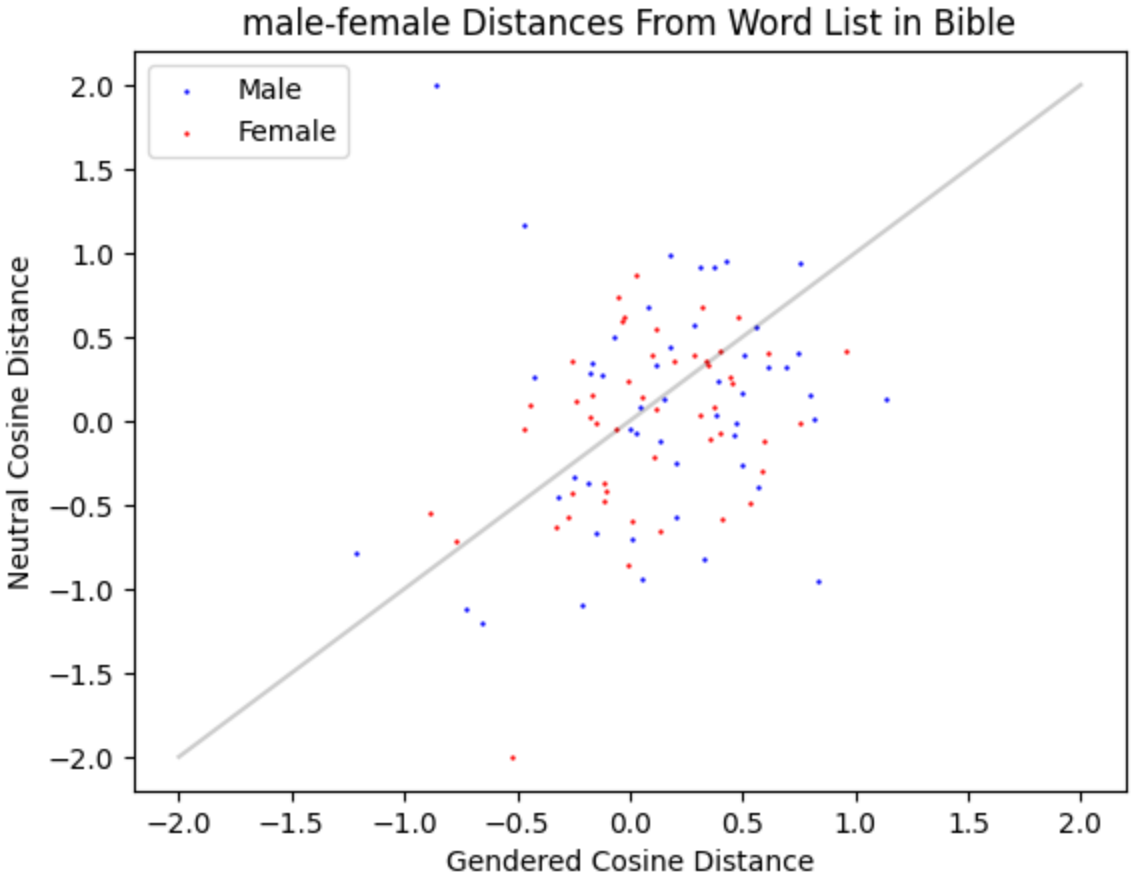
In [ ]:
```
a.plotter(genderPairs, spotlightWords, bibleNEmbeds, bibleGEmbeds, titles[0])
```

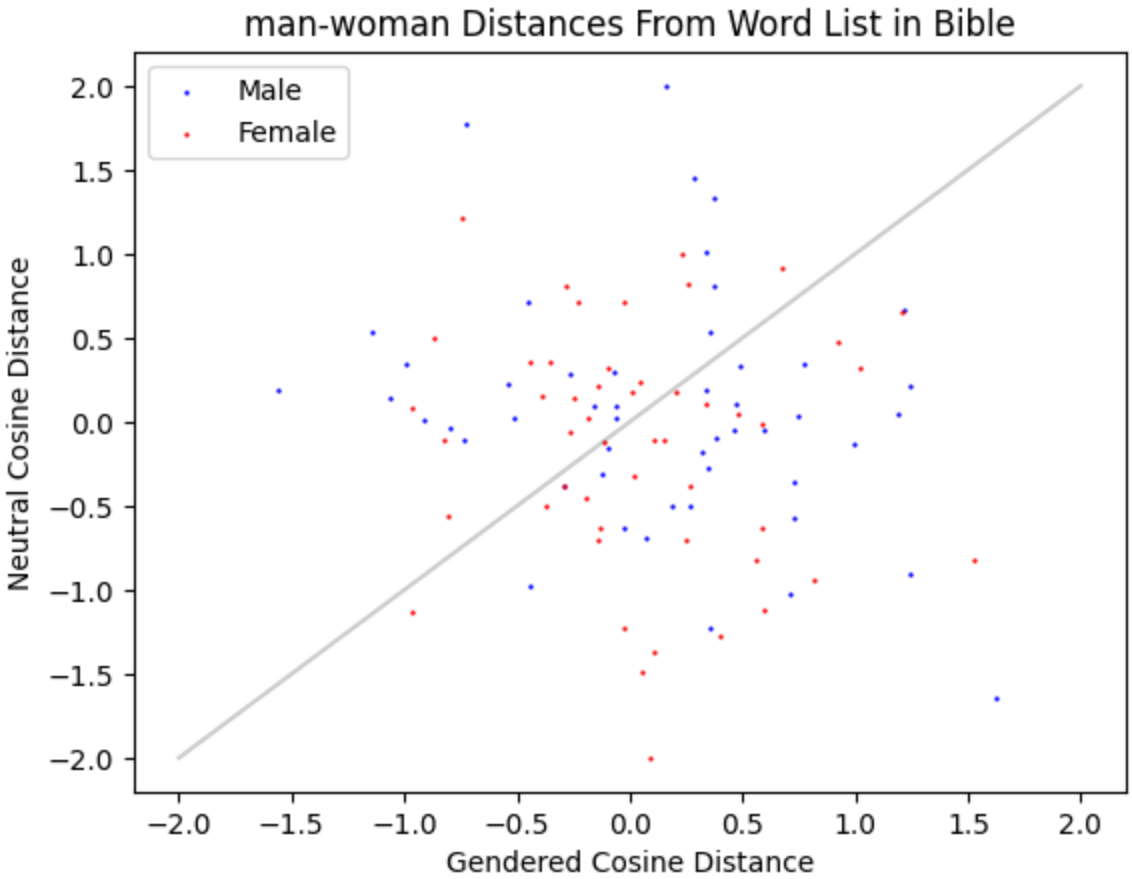

his-her Distances From Word List in Bible
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−3
−3
−2
−1
0
1
2

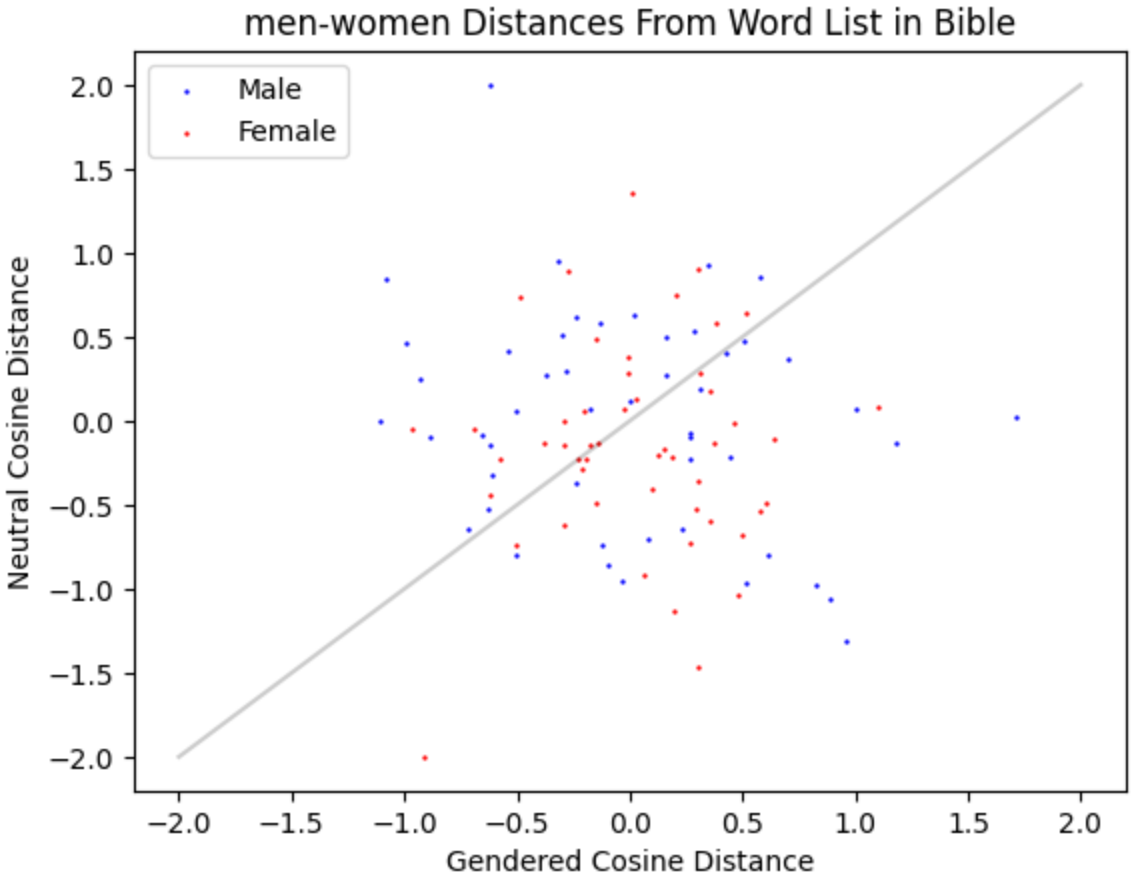

him-her Distances From Word List in Bible
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

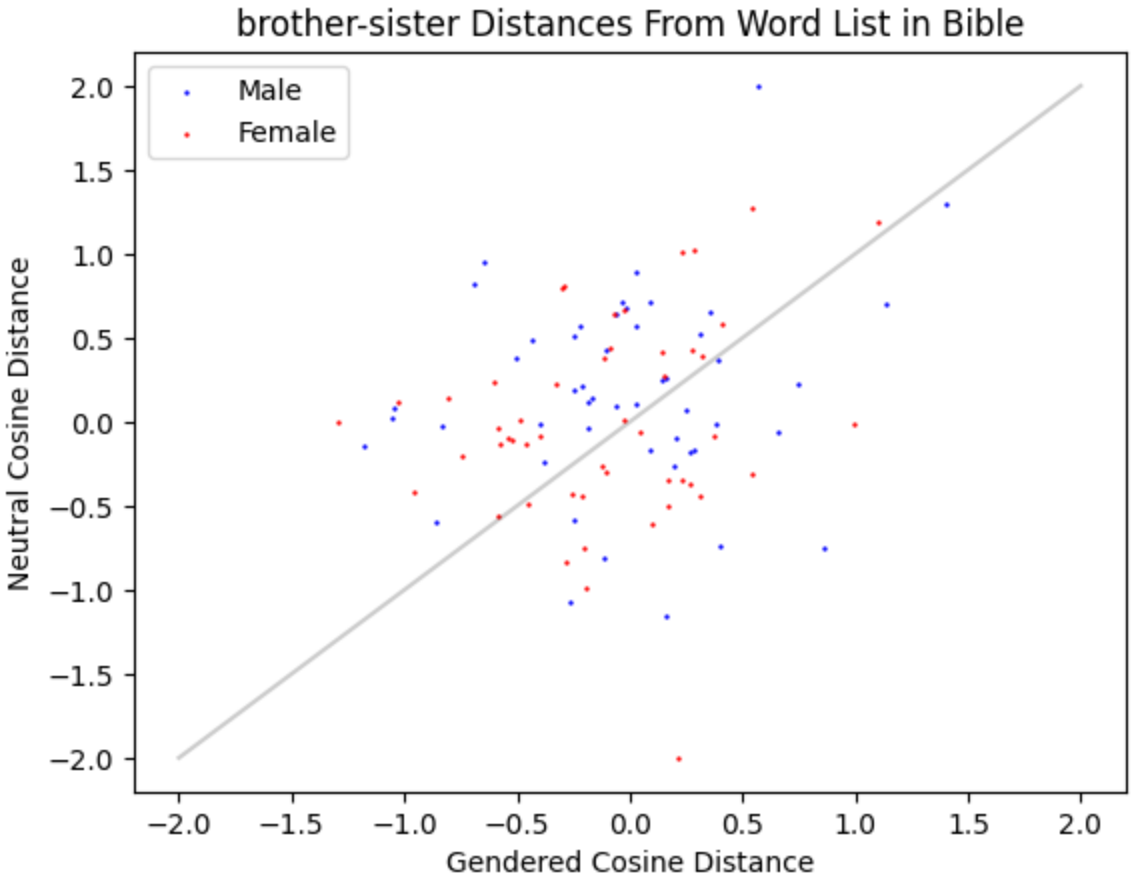

he-she Distances From Word List in Bible
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

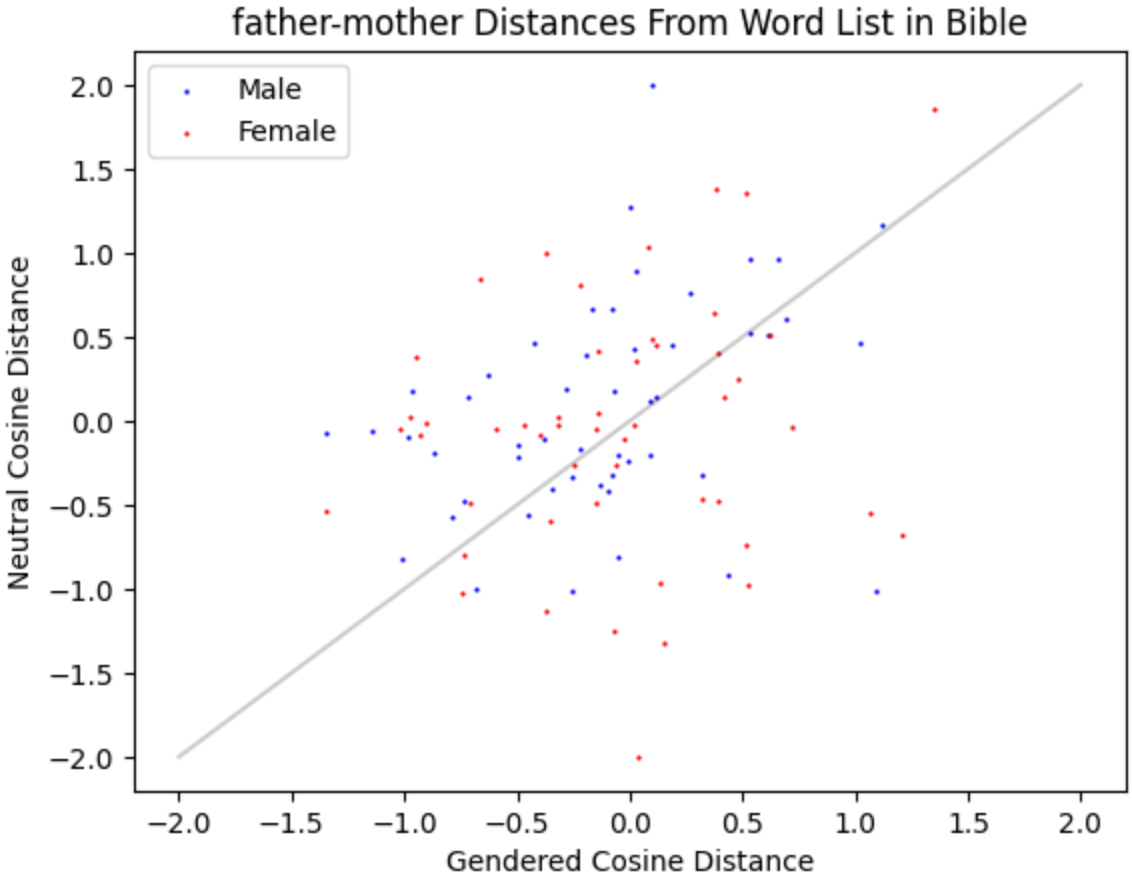

they-them Distances From Word List in Bible
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5

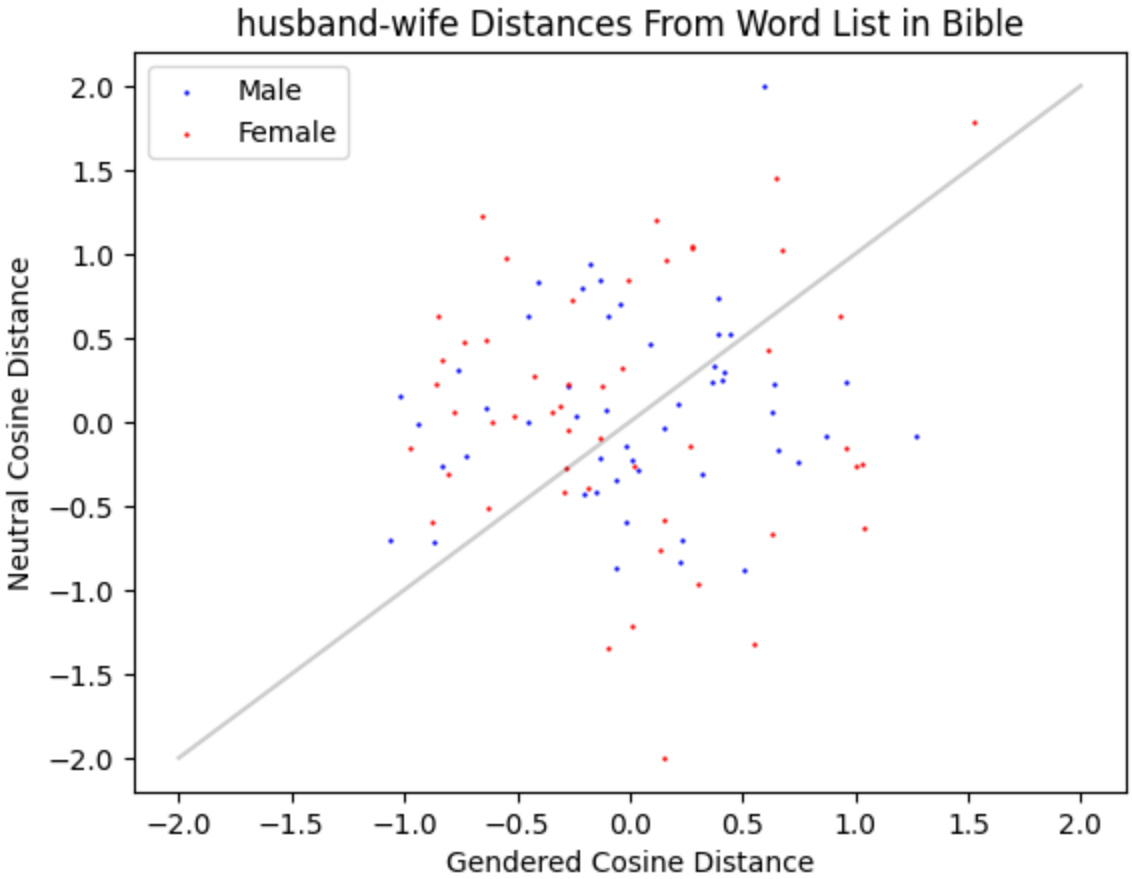

male-female Distances From Word List in Bible
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0


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

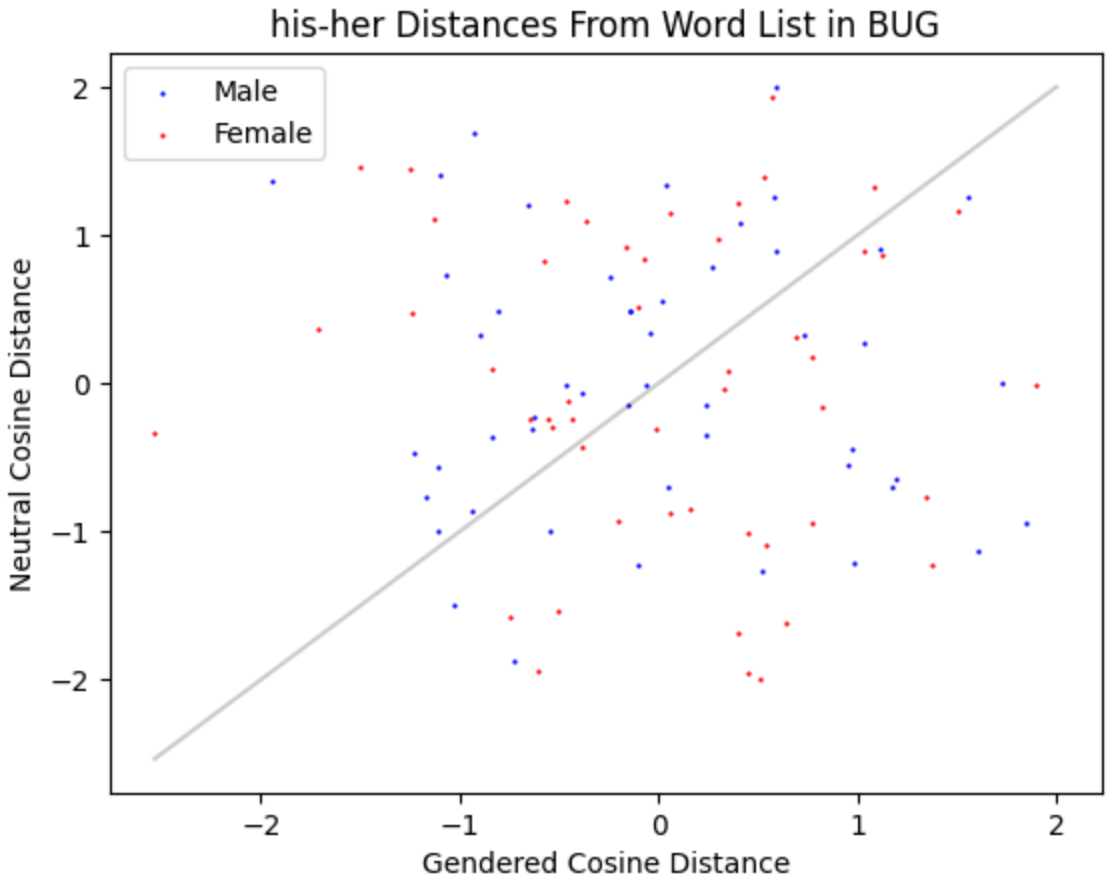

men-women Distances From Word List in Bible
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

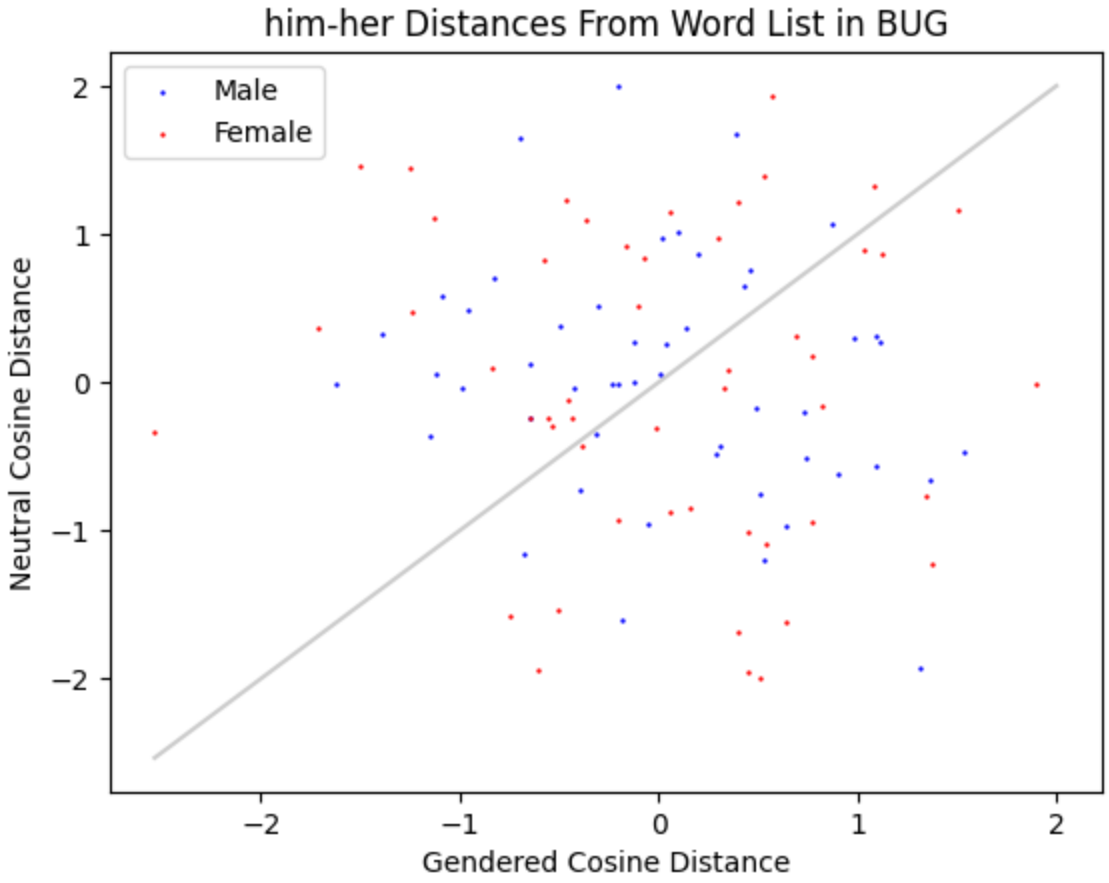

brother-sister Distances From Word List in Bible
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

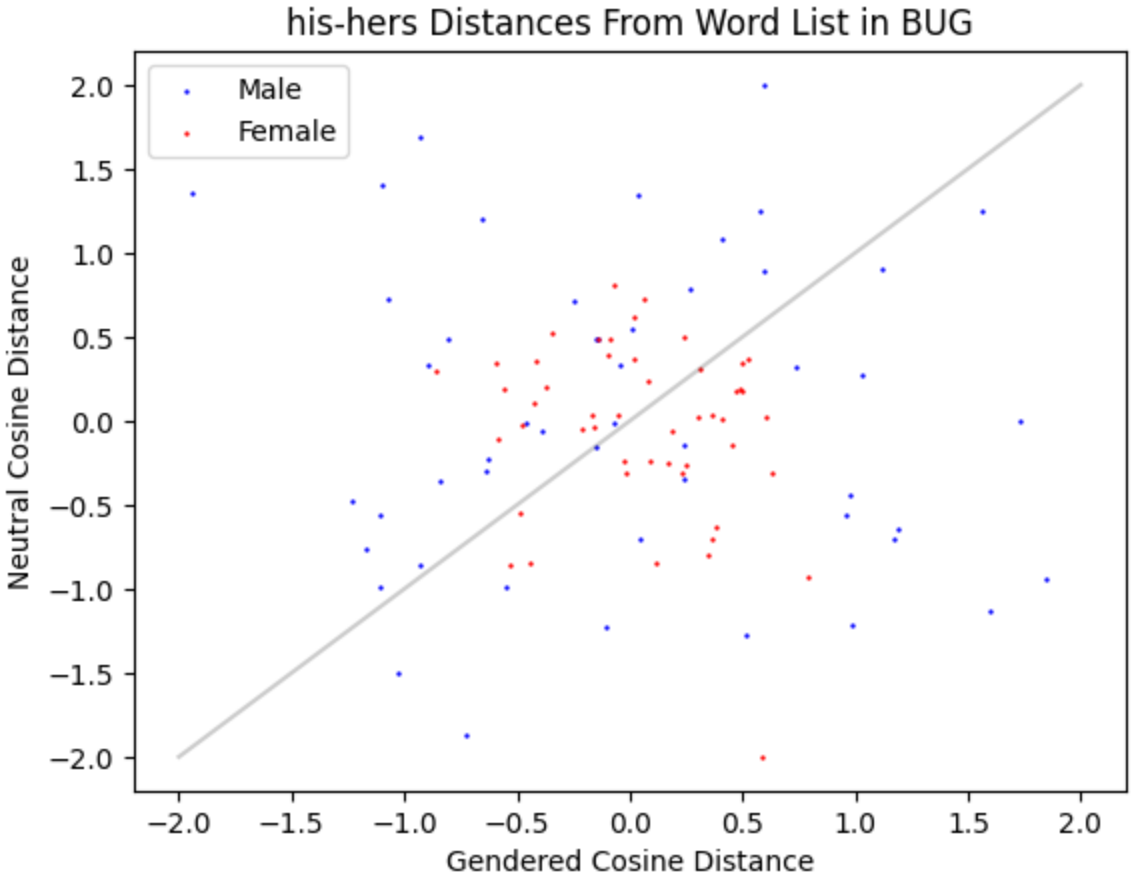


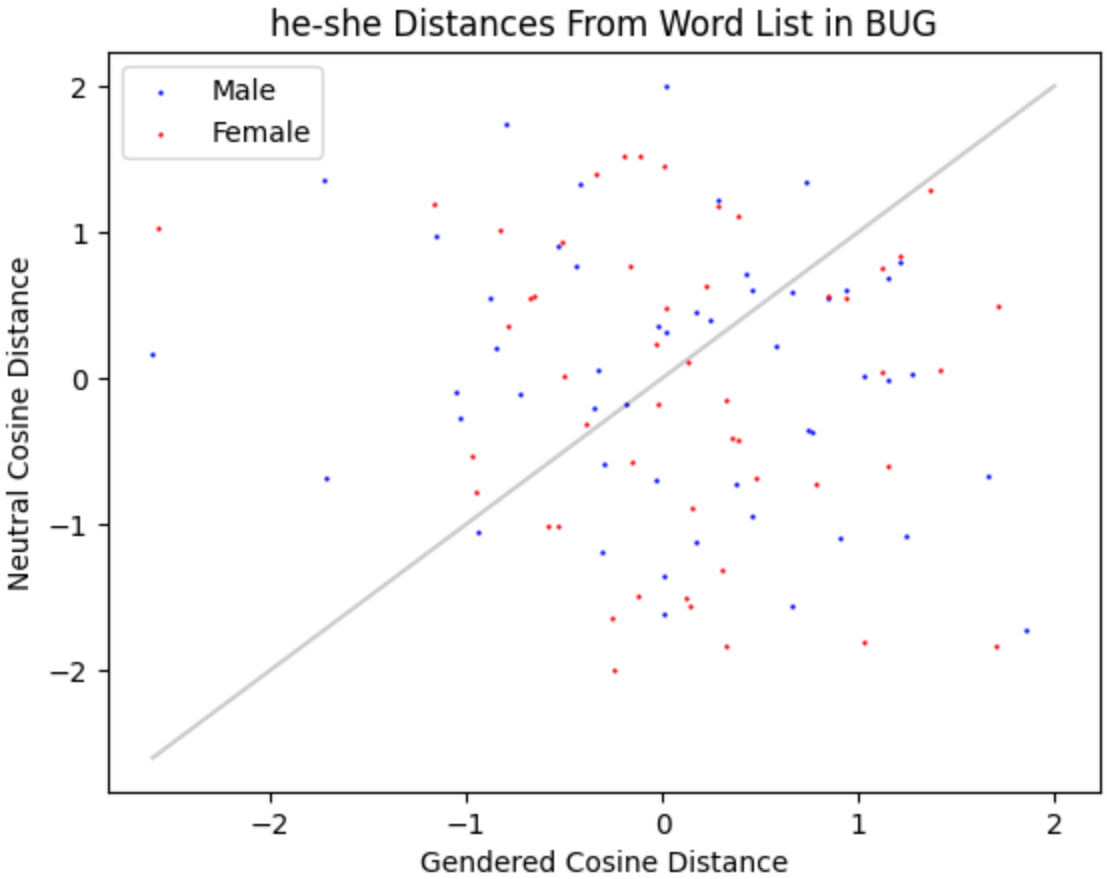


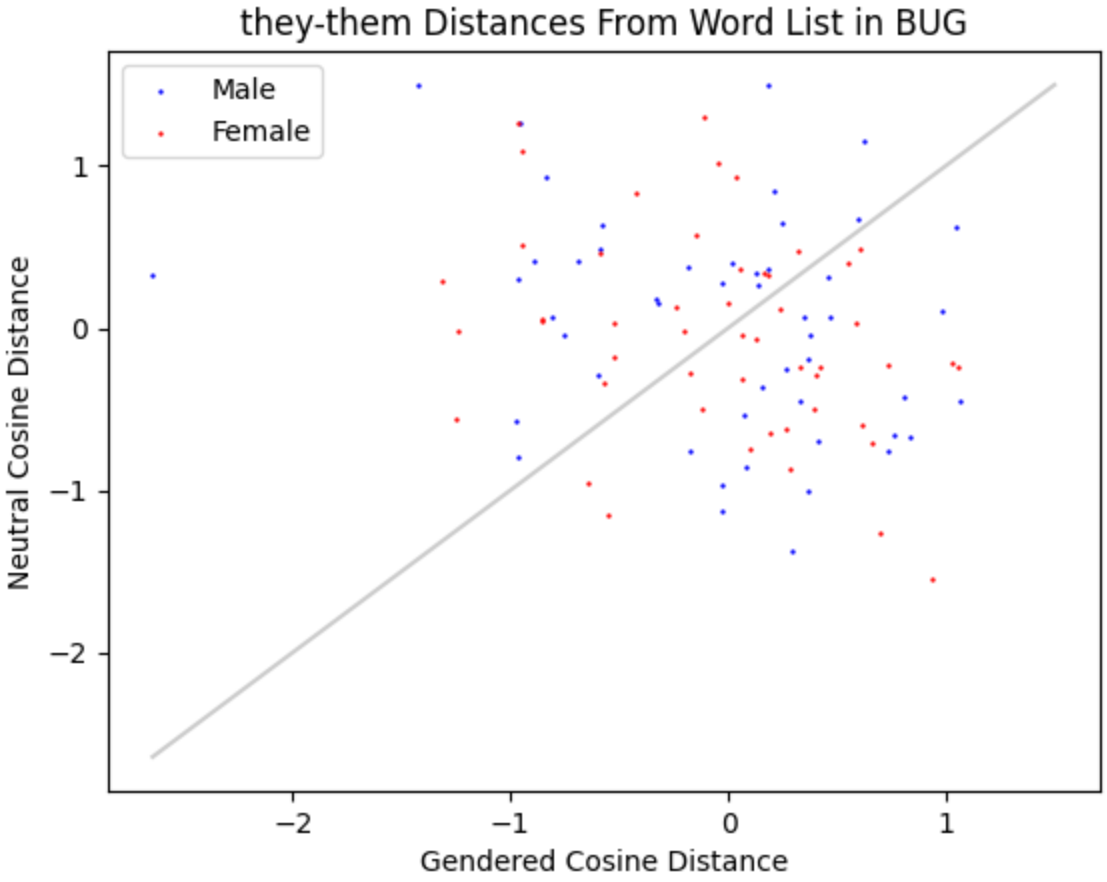
In [ ]:
```
a.plotter(genderPairs, spotlightWords, bugNEmbeds, bugGEmbeds, titles[1])
```

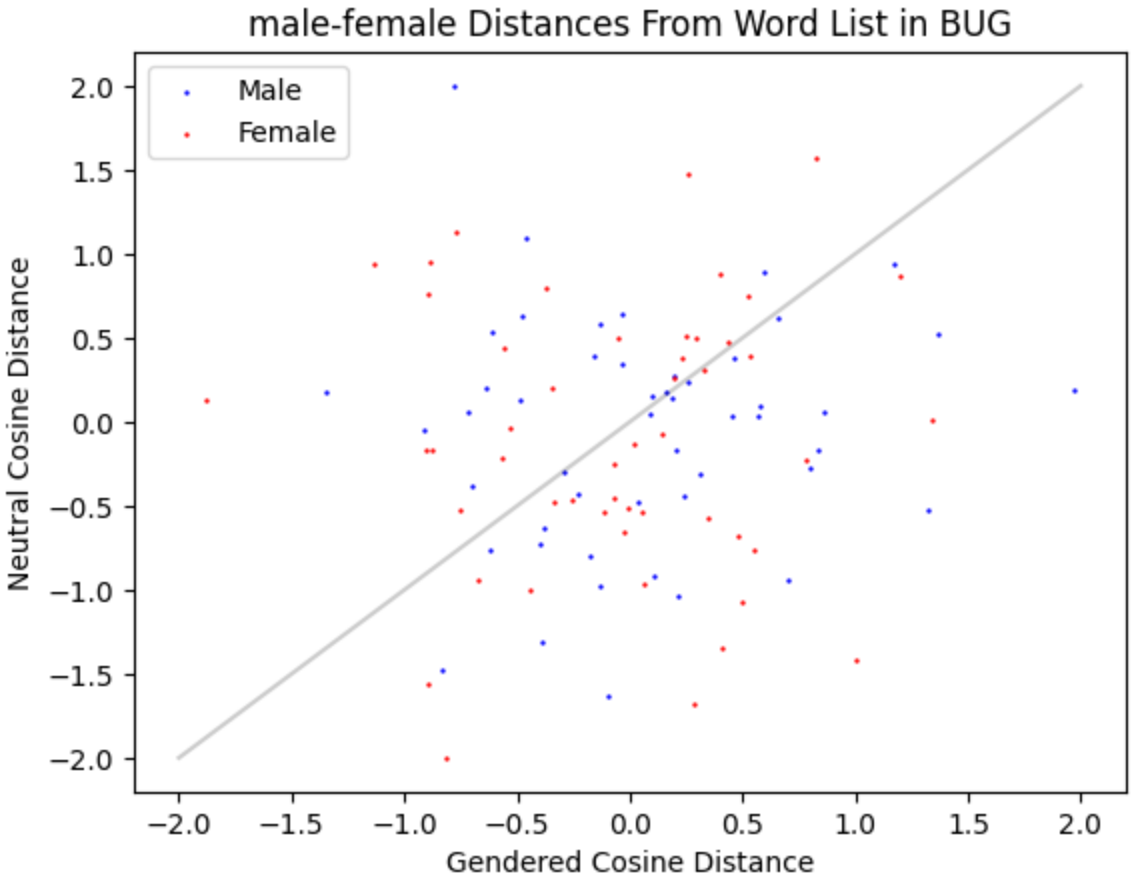

his-her Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−2
−1
0
1
2

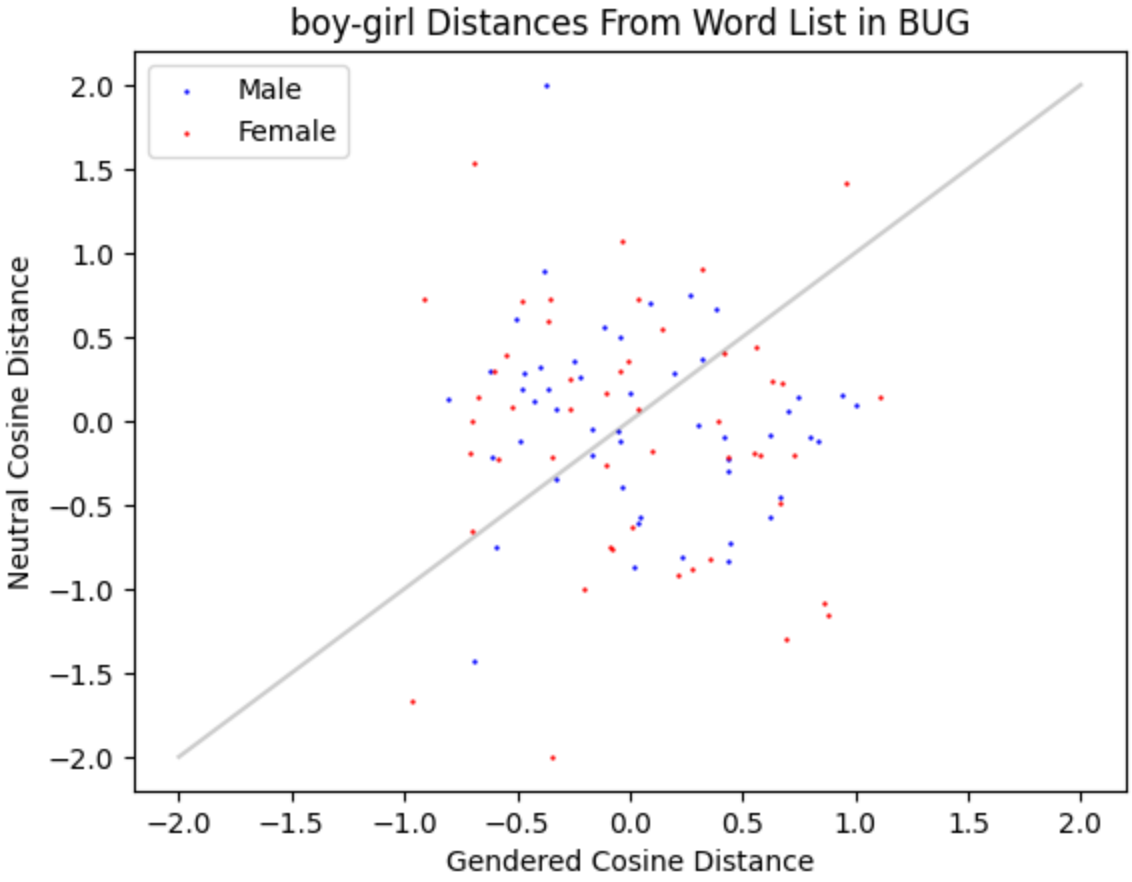

him-her Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−2
−1
0
1
2

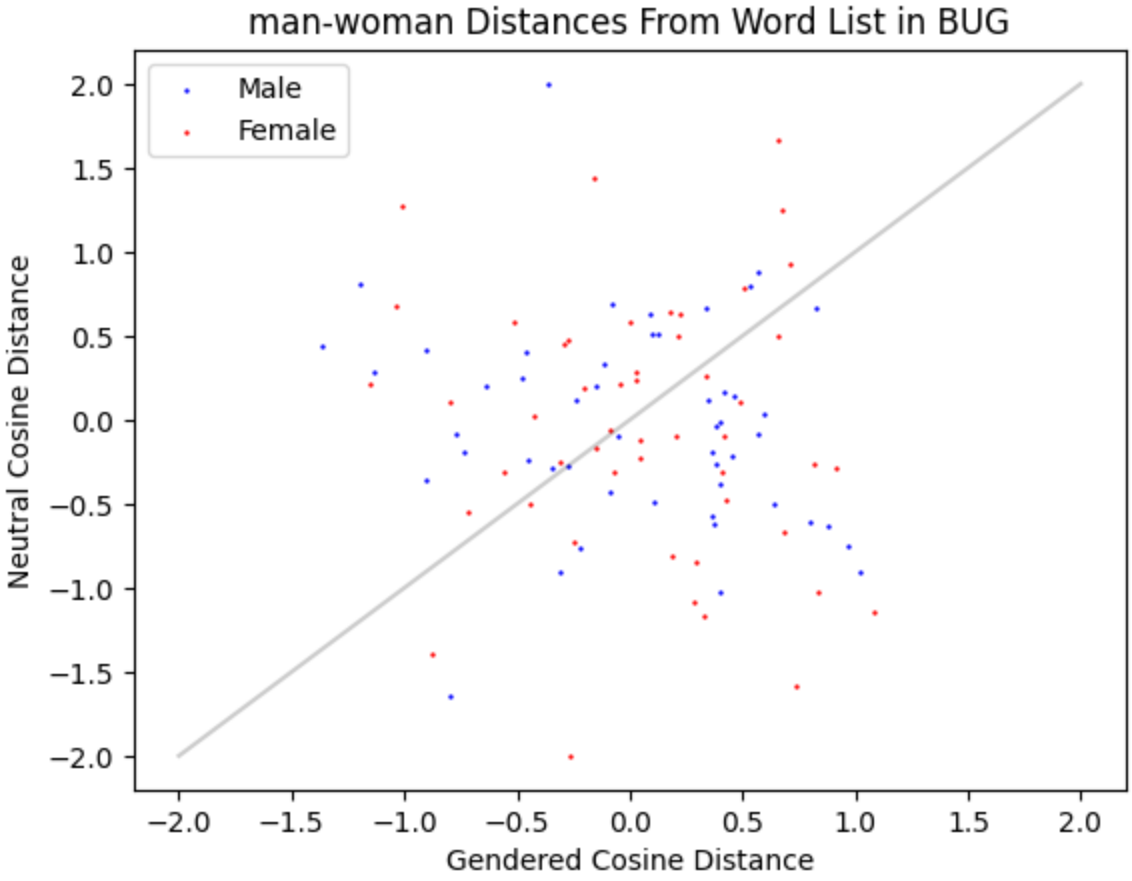

his-hers Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

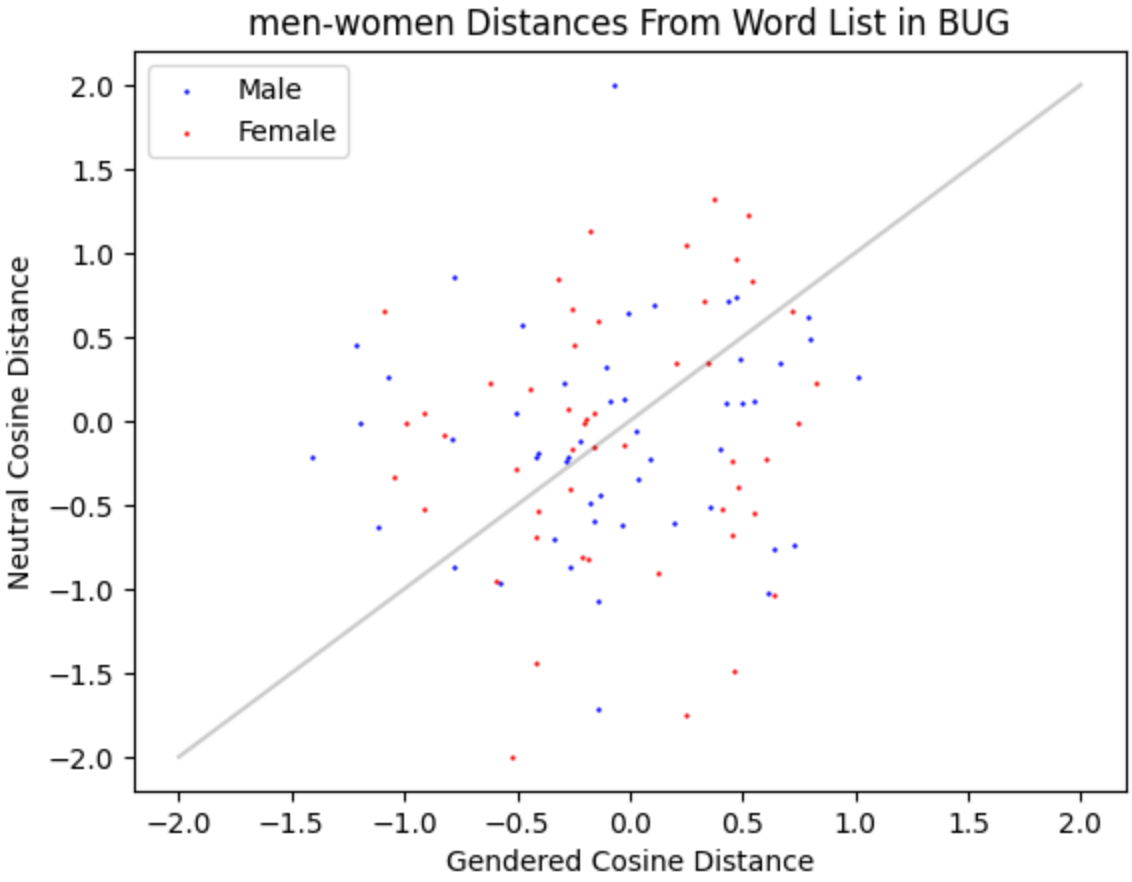

he-she Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−2
−1
0
1
2

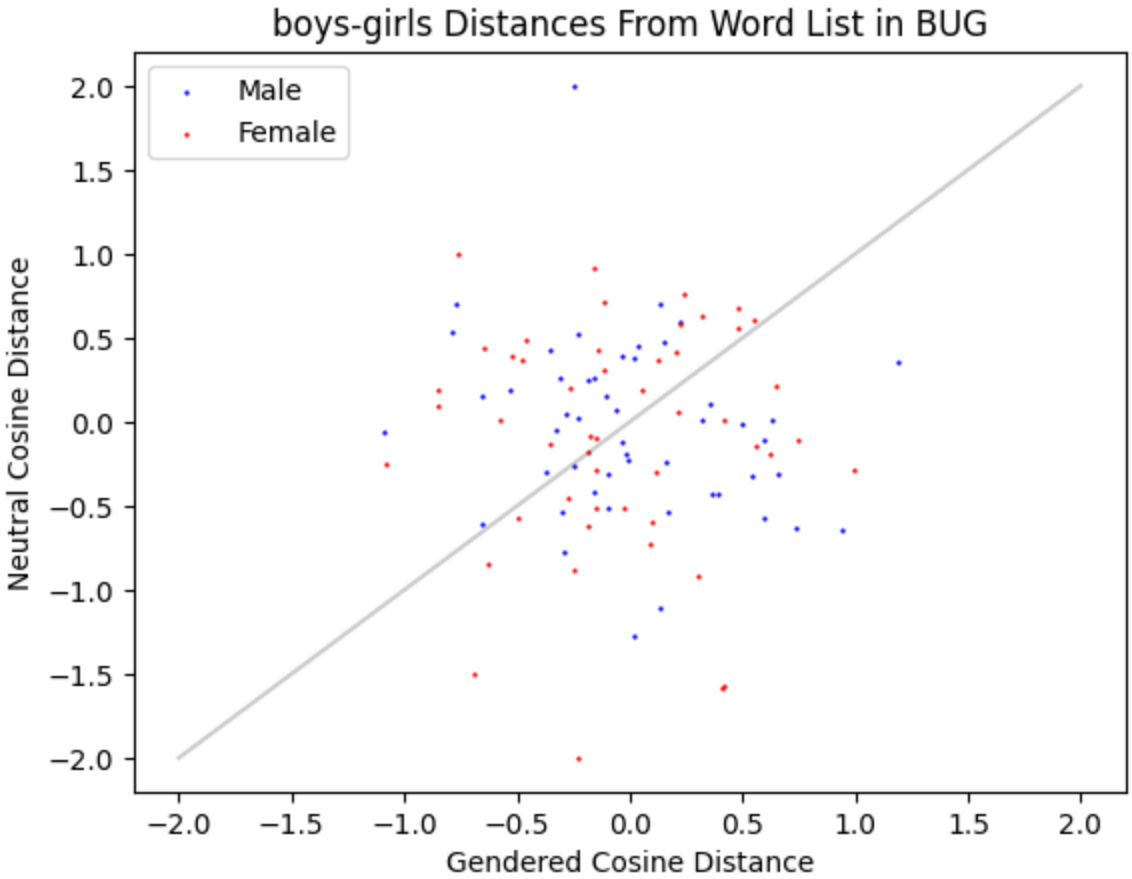

they-them Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
1
0
−1
−2
−2
−1
0
1

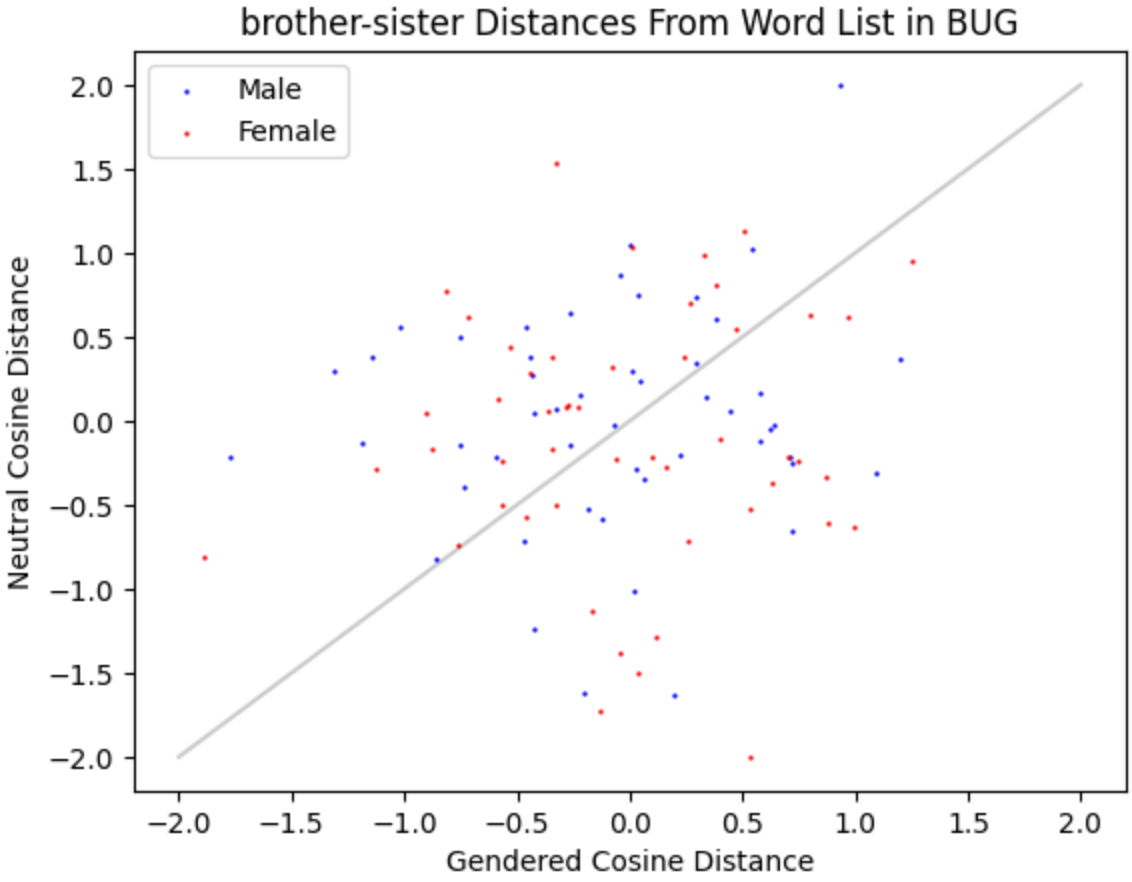

male-female Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

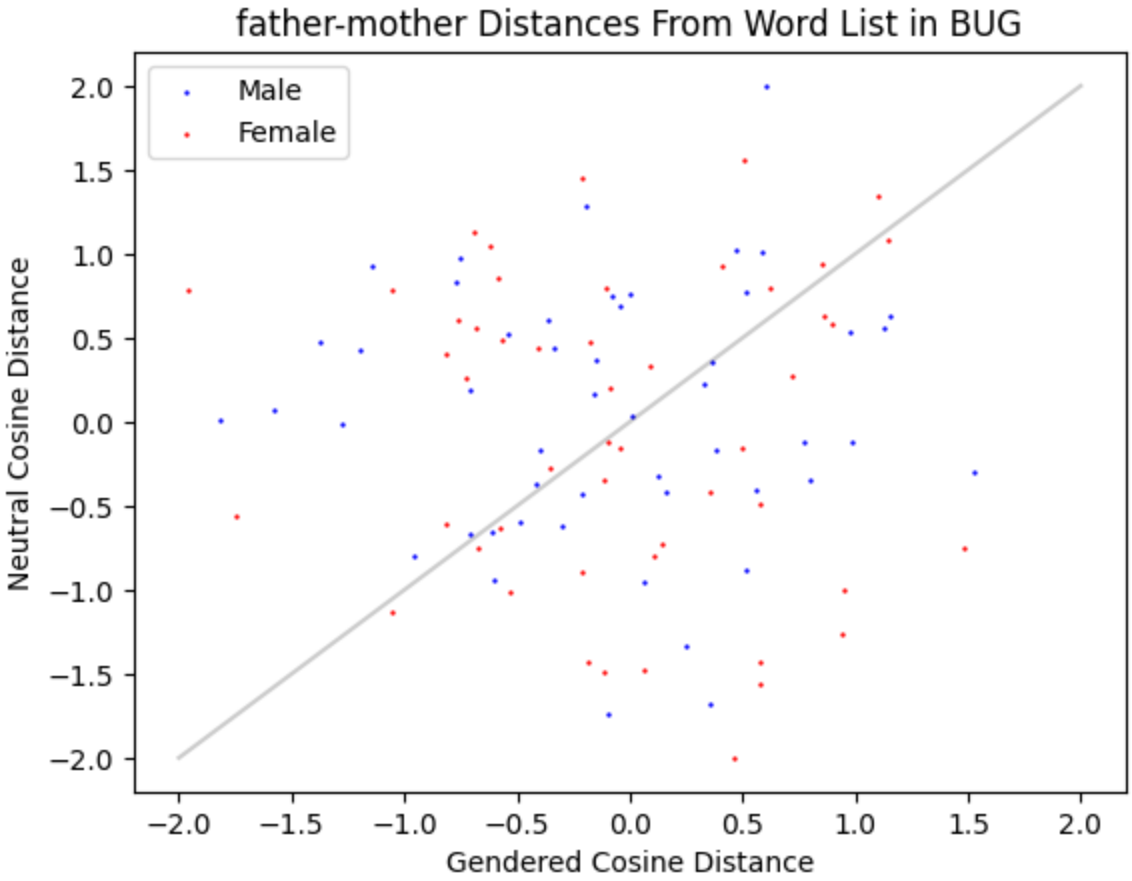

boy-girl Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

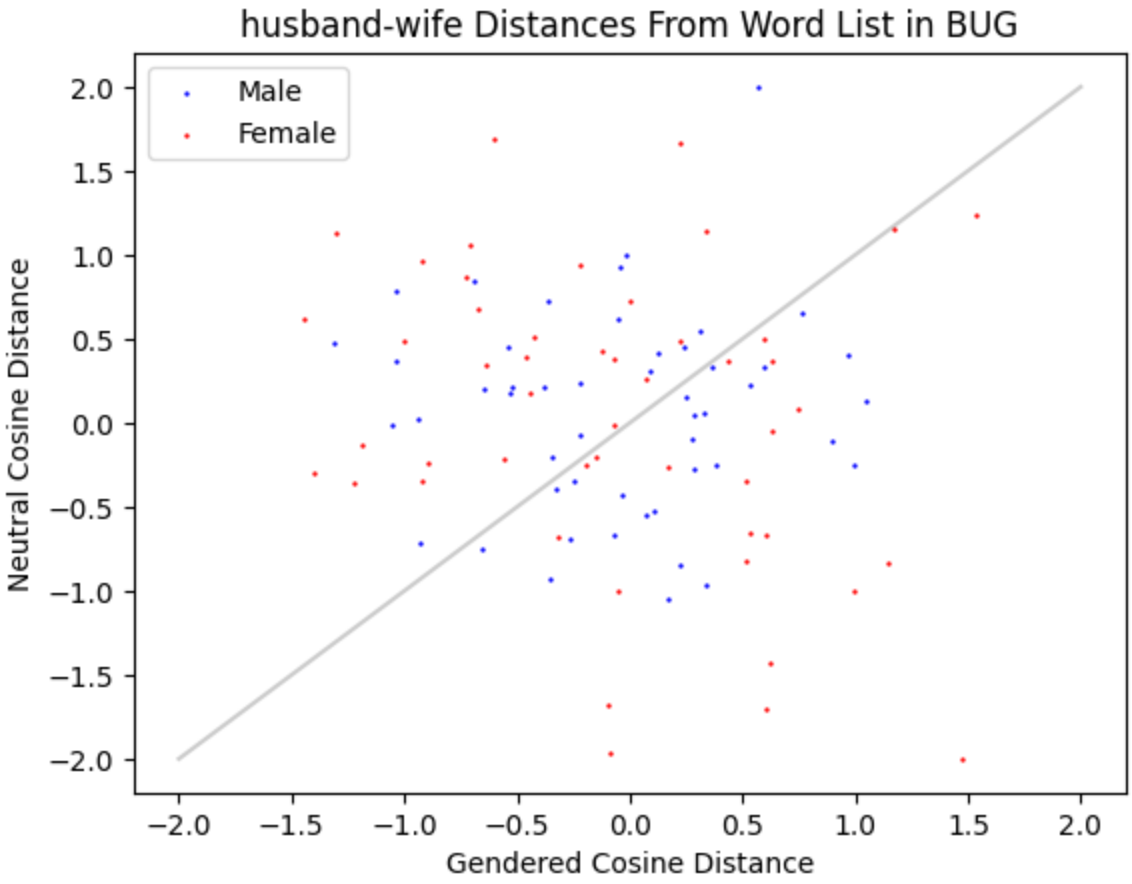

man-woman Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

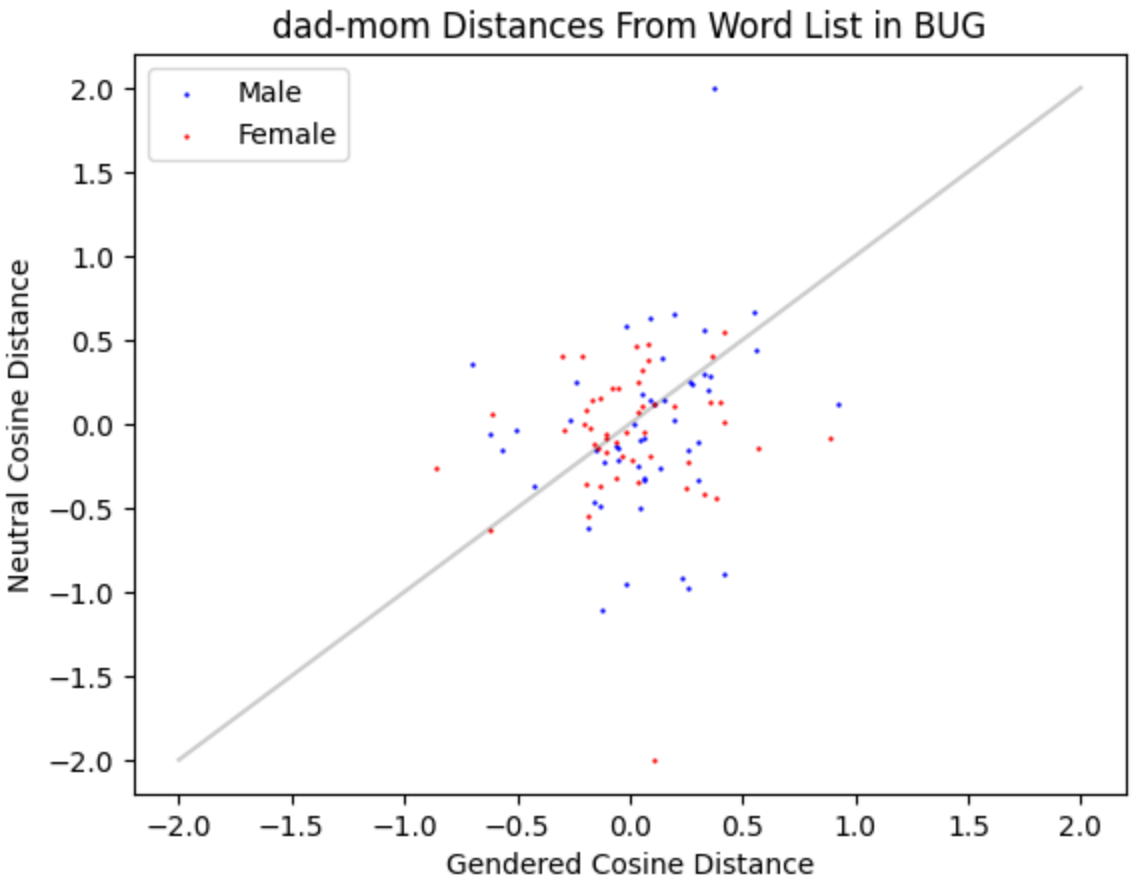

men-women Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

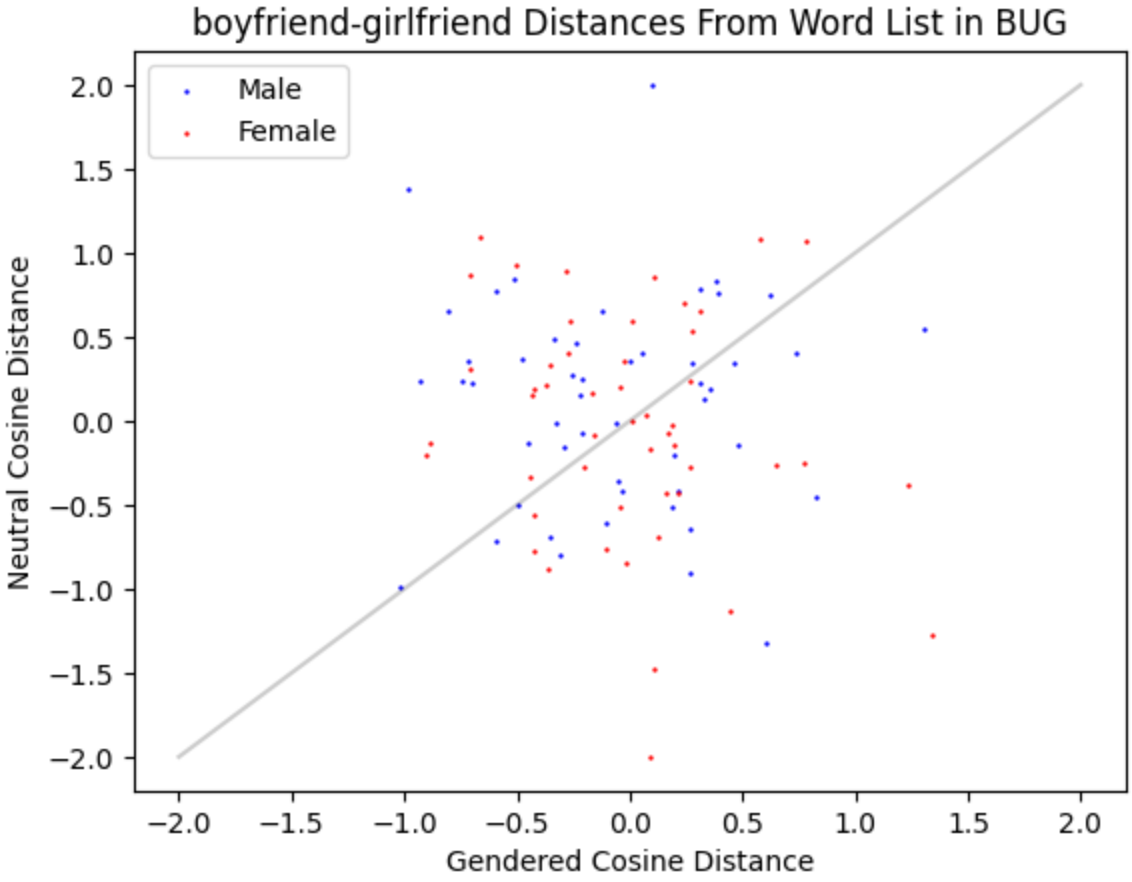

boys-girls Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

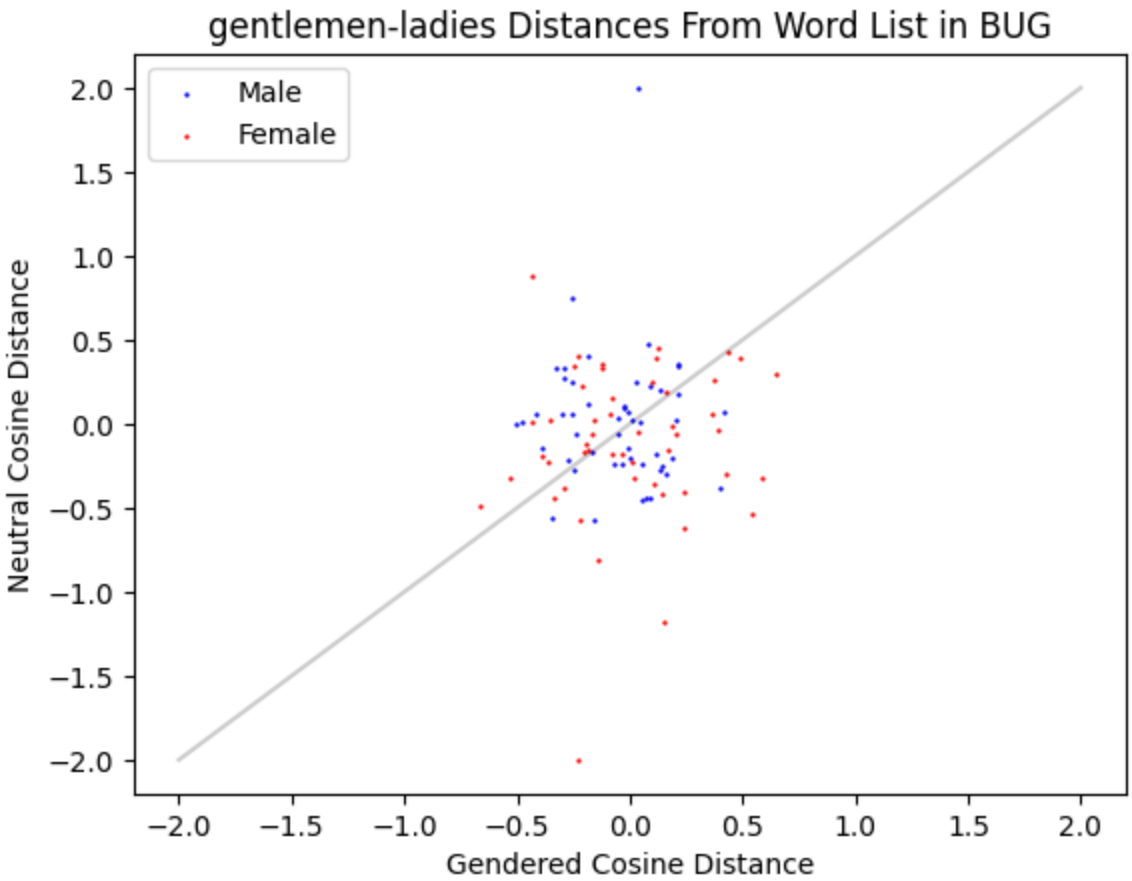

brother-sister Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0


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

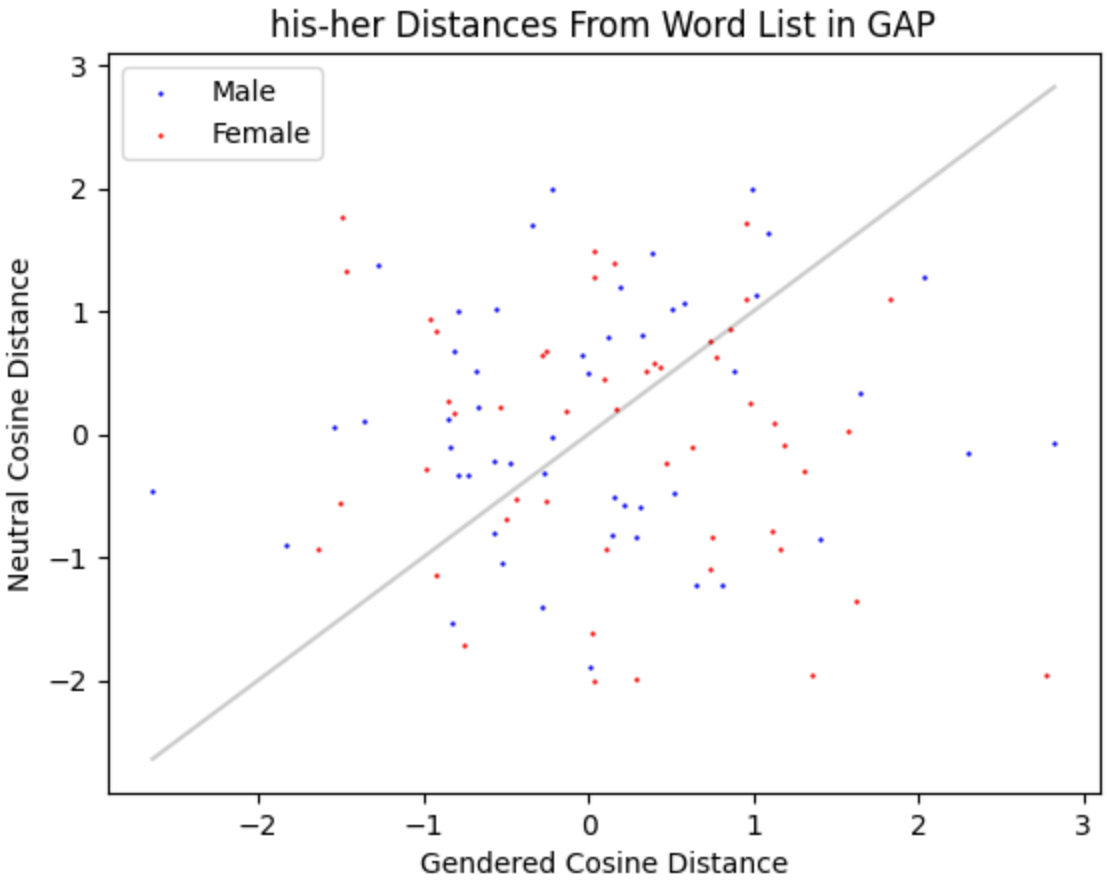

husband-wife Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

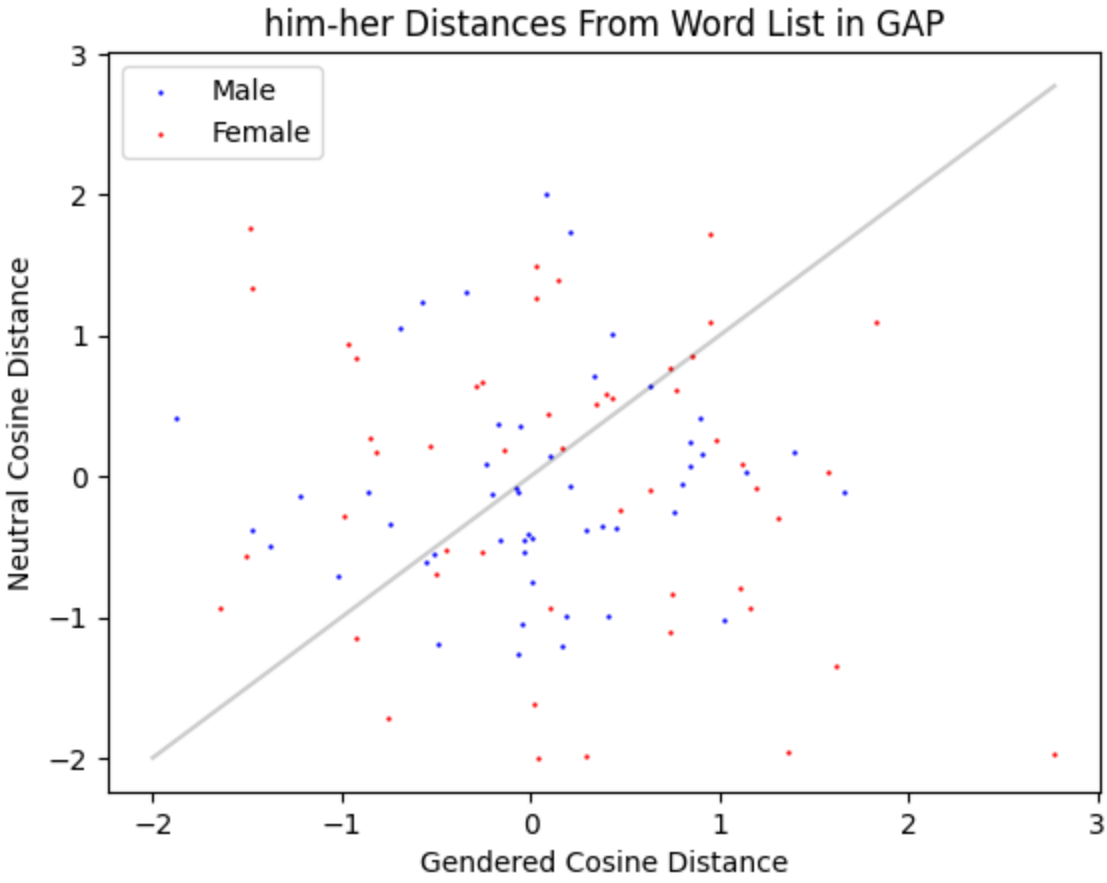

dad-mom Distances From Word List in BUG
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

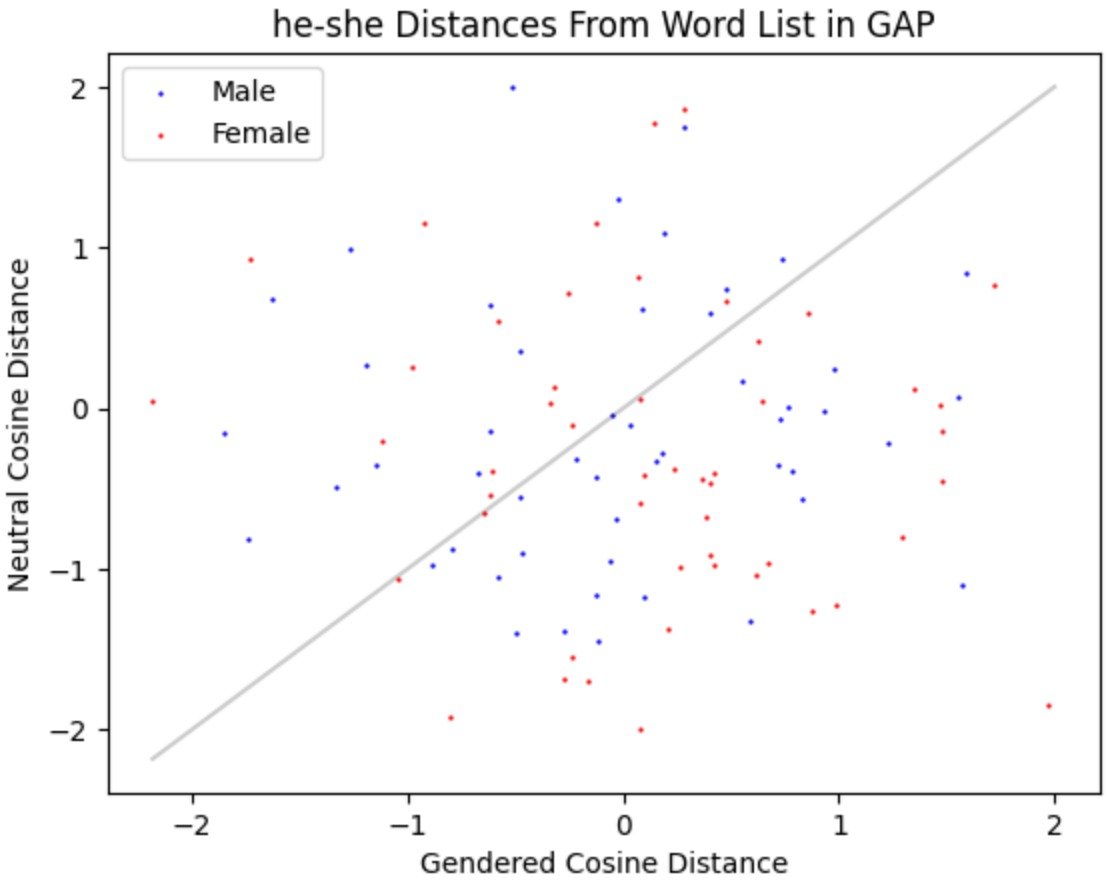


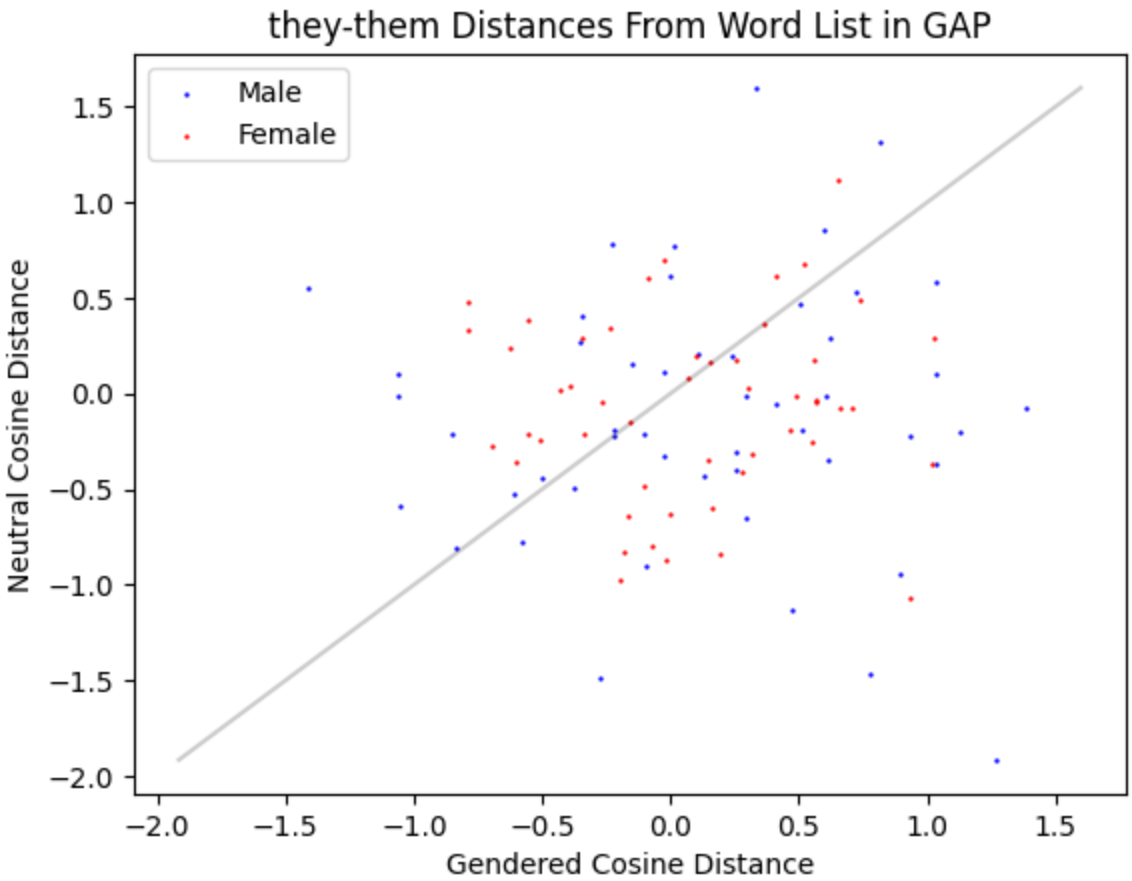


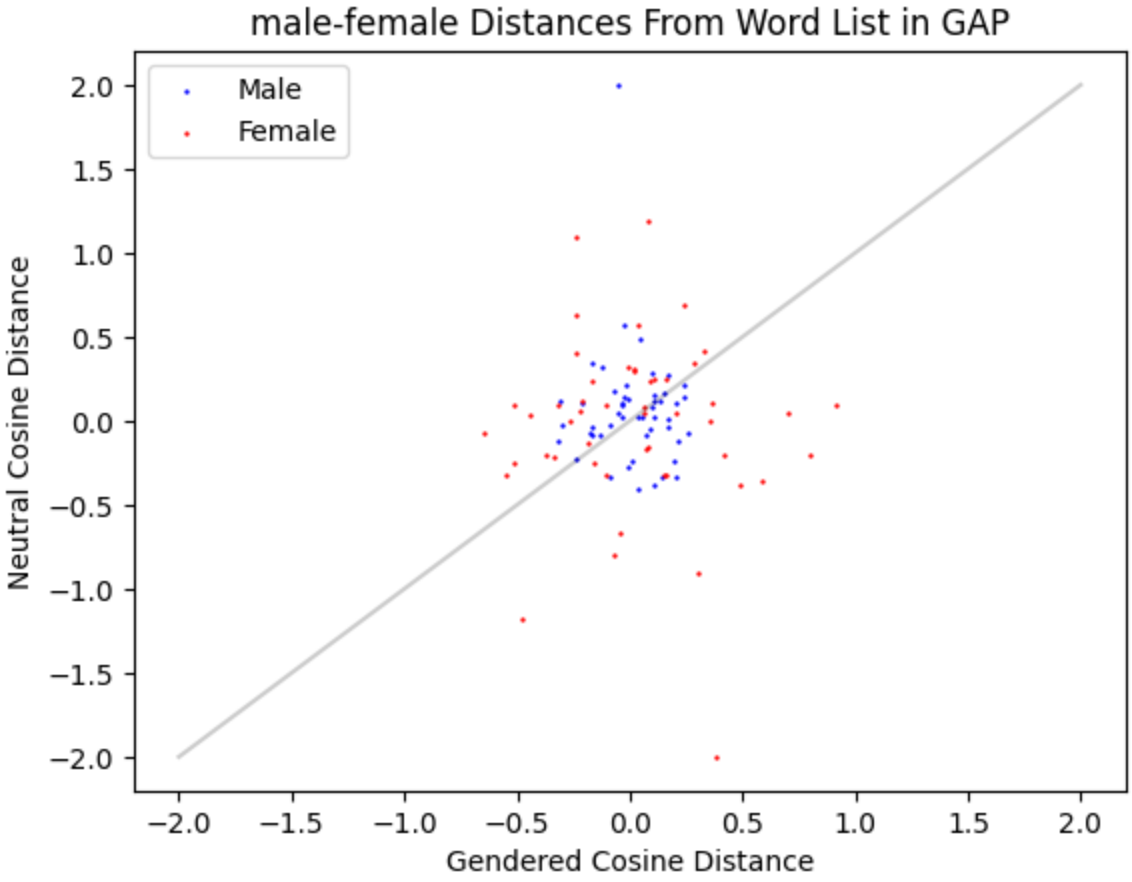
In [ ]:
```
a.plotter(genderPairs, spotlightWords, gapNEmbeds, gapGEmbeds, titles[2])
```

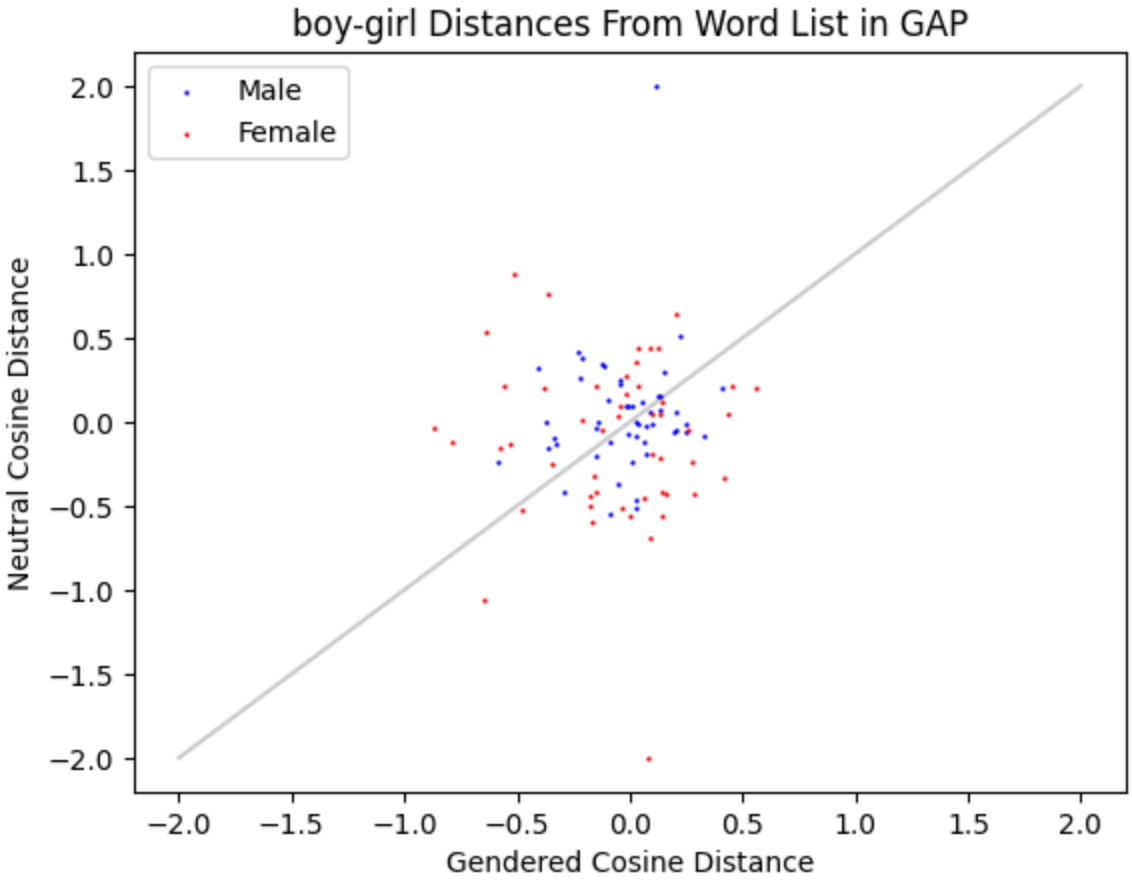

his-her Distances From Word List in GAP
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
3
2
1
0
−1
−2
−2
−1
0
1
2
3

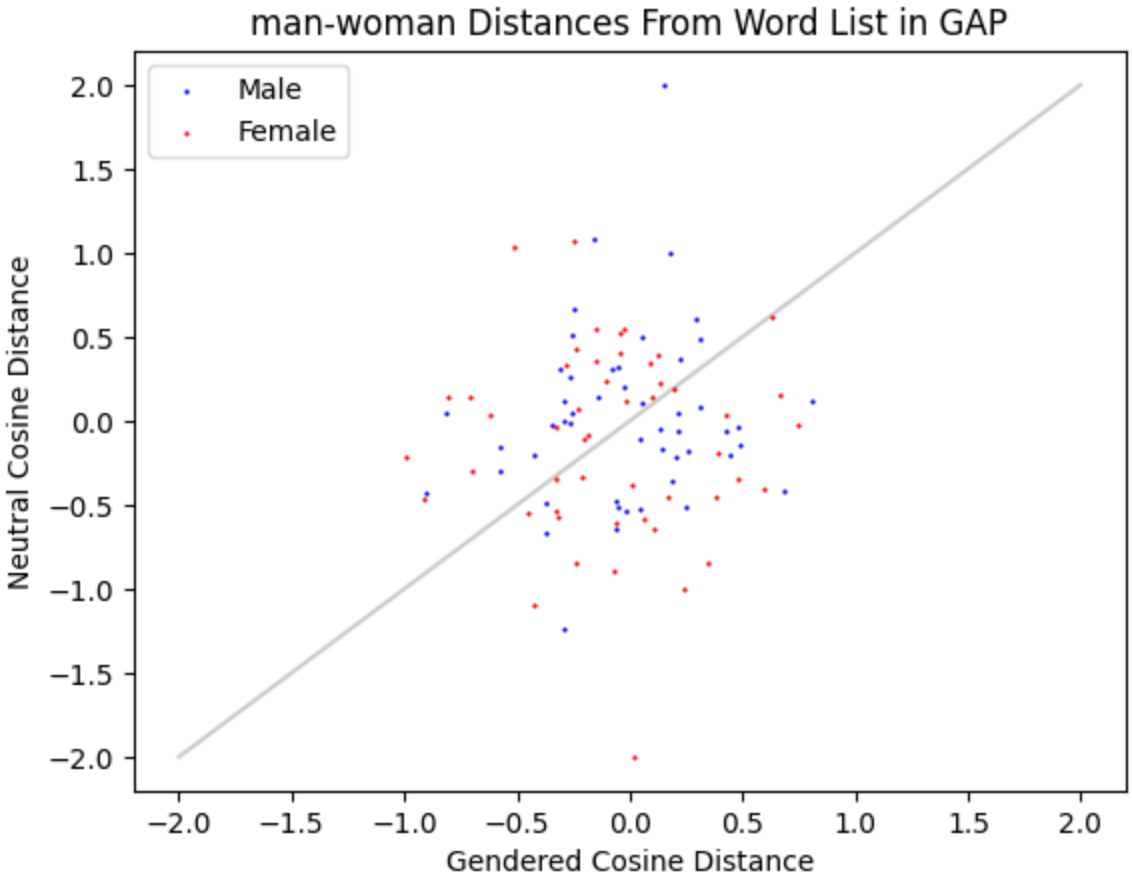

him-her Distances From Word List in GAP
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
3
2
1
0
−1
−2
−2
−1
0
1
2
3

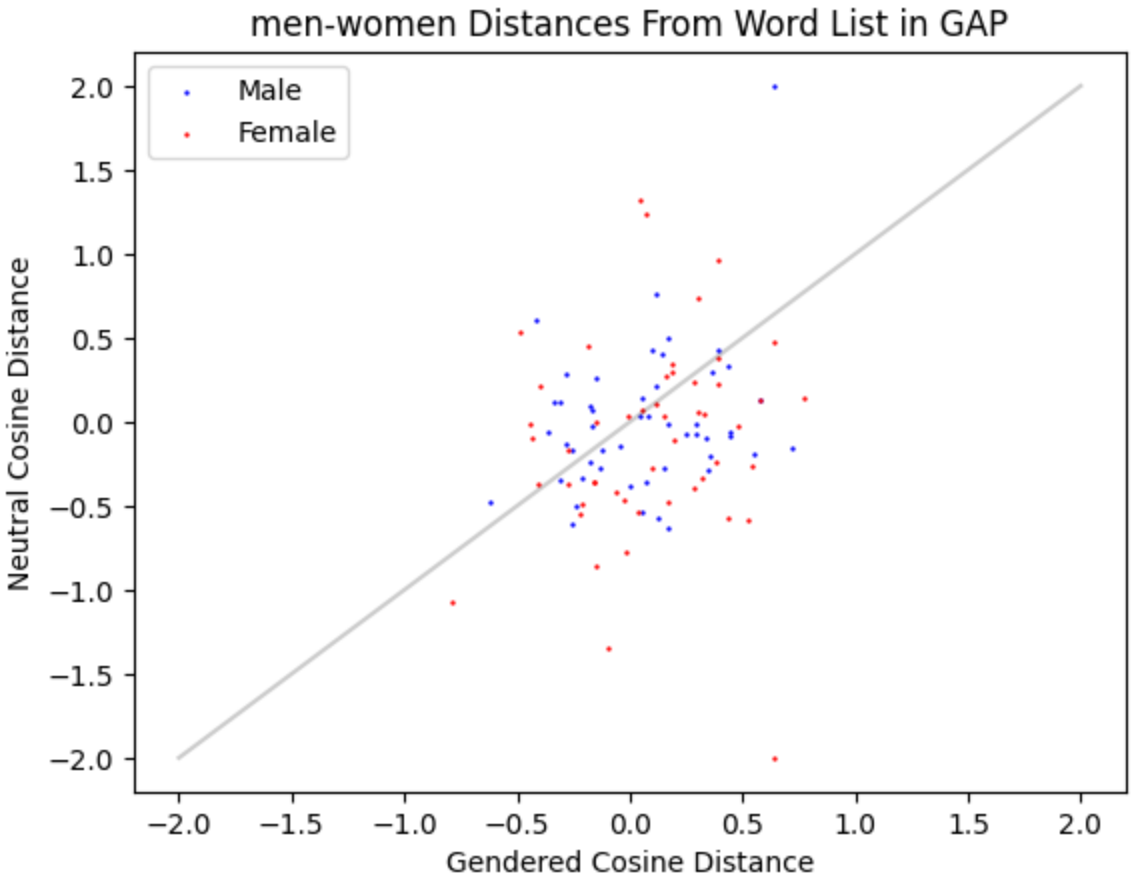

he-she Distances From Word List in GAP
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−2
−1
0
1
2

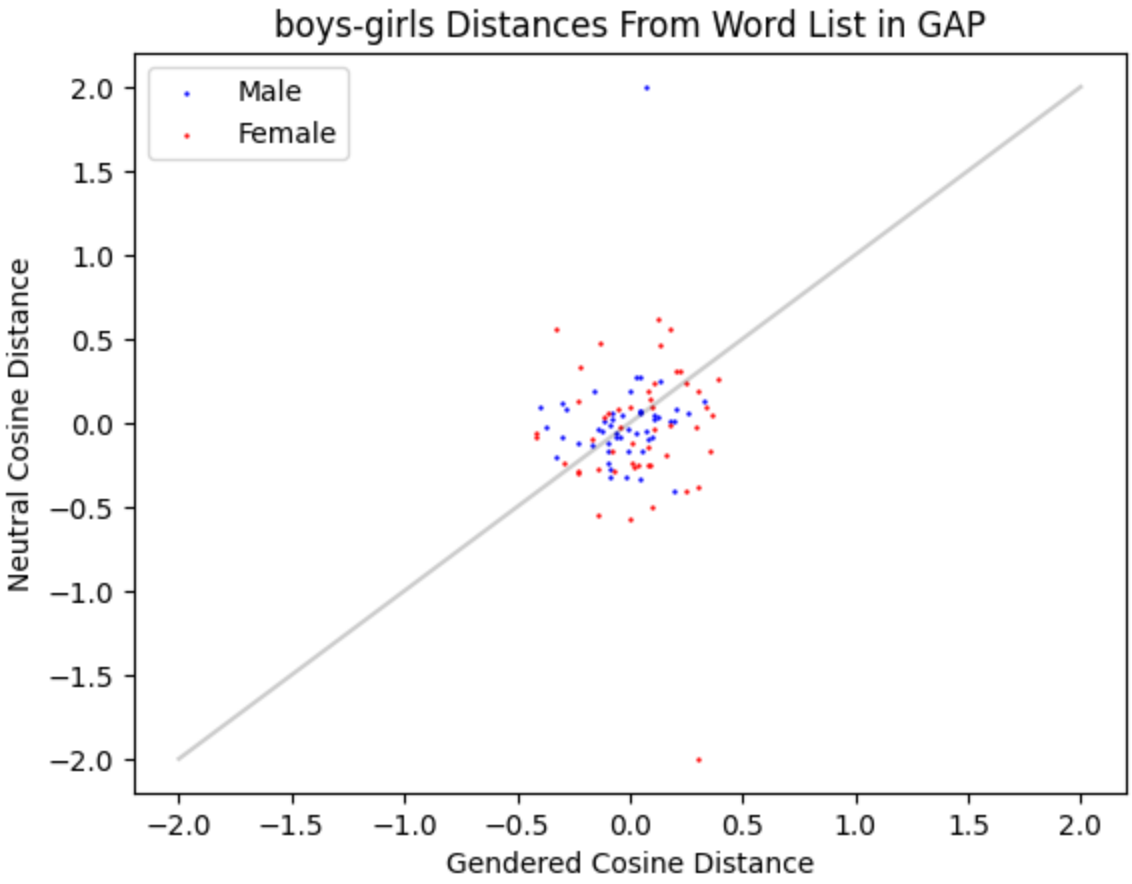

they-them Distances From Word List in GAP
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5

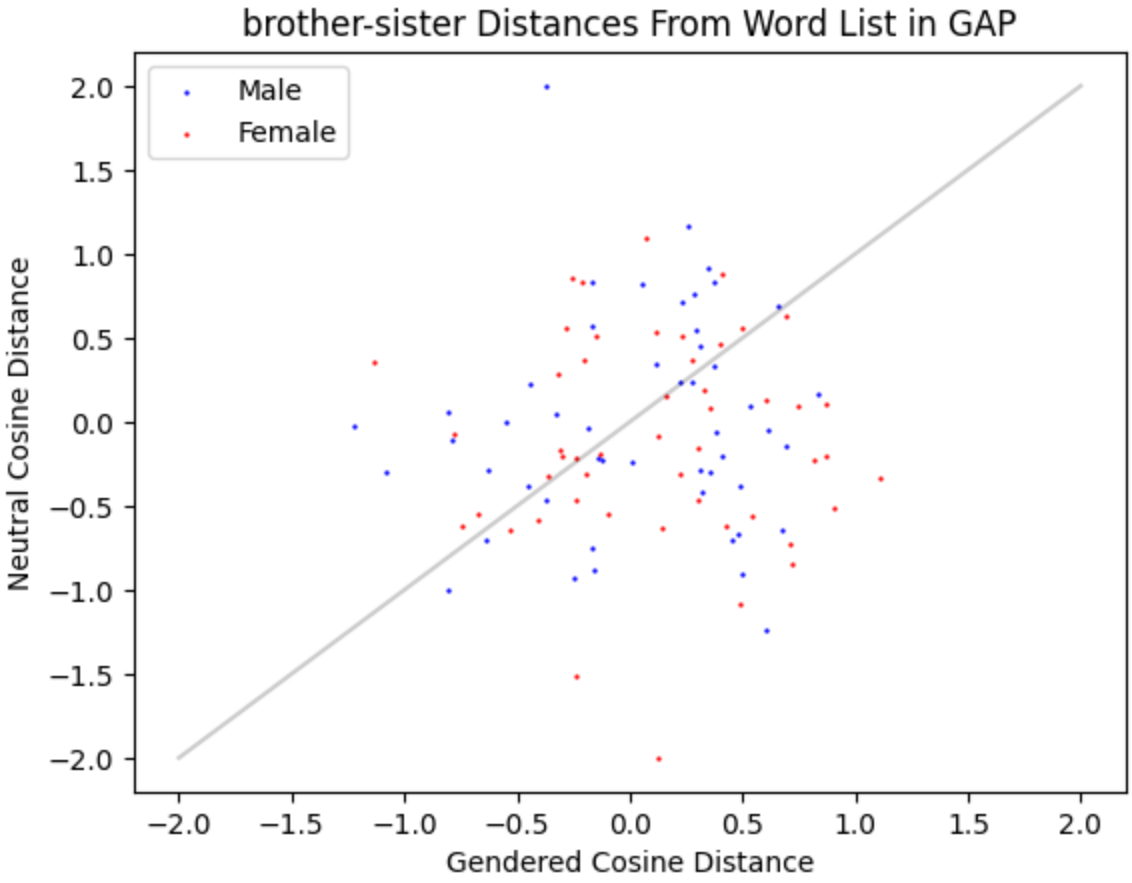

male-female Distances From Word List in GAP
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

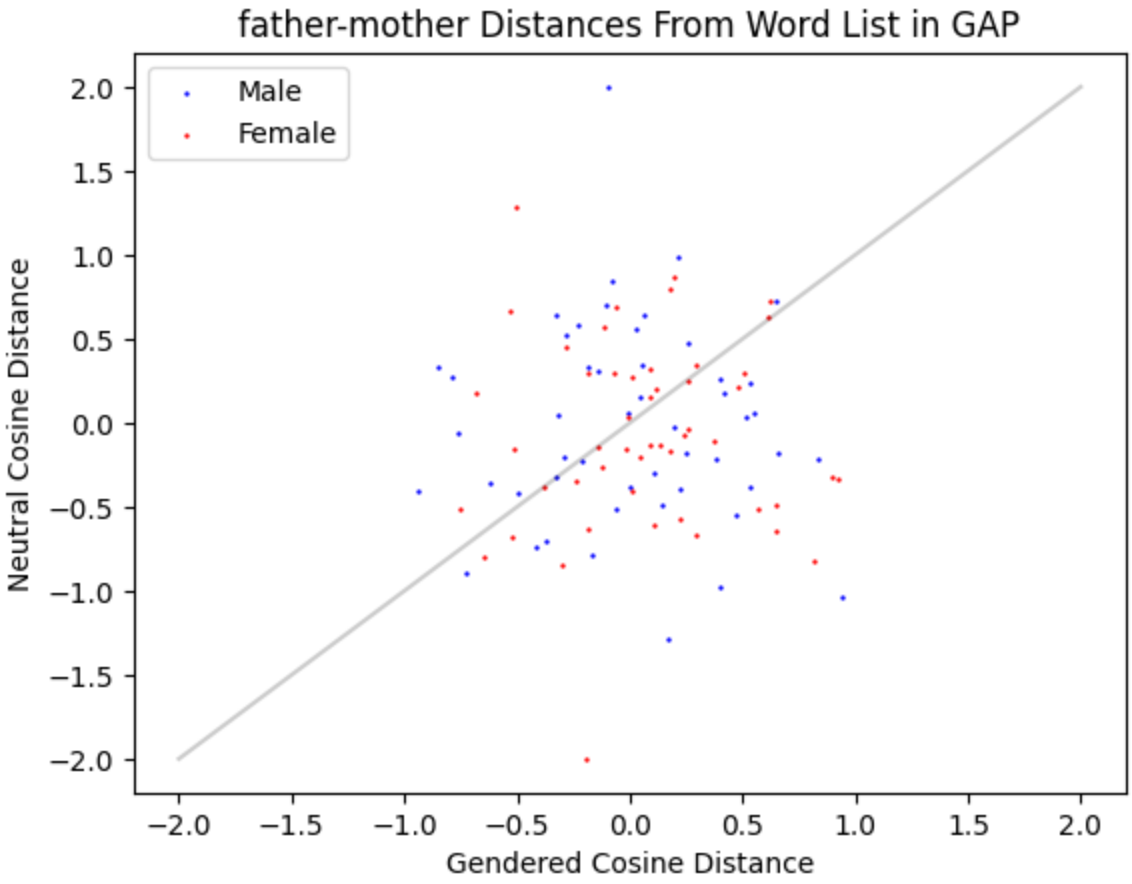

boy-girl Distances From Word List in GAP
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

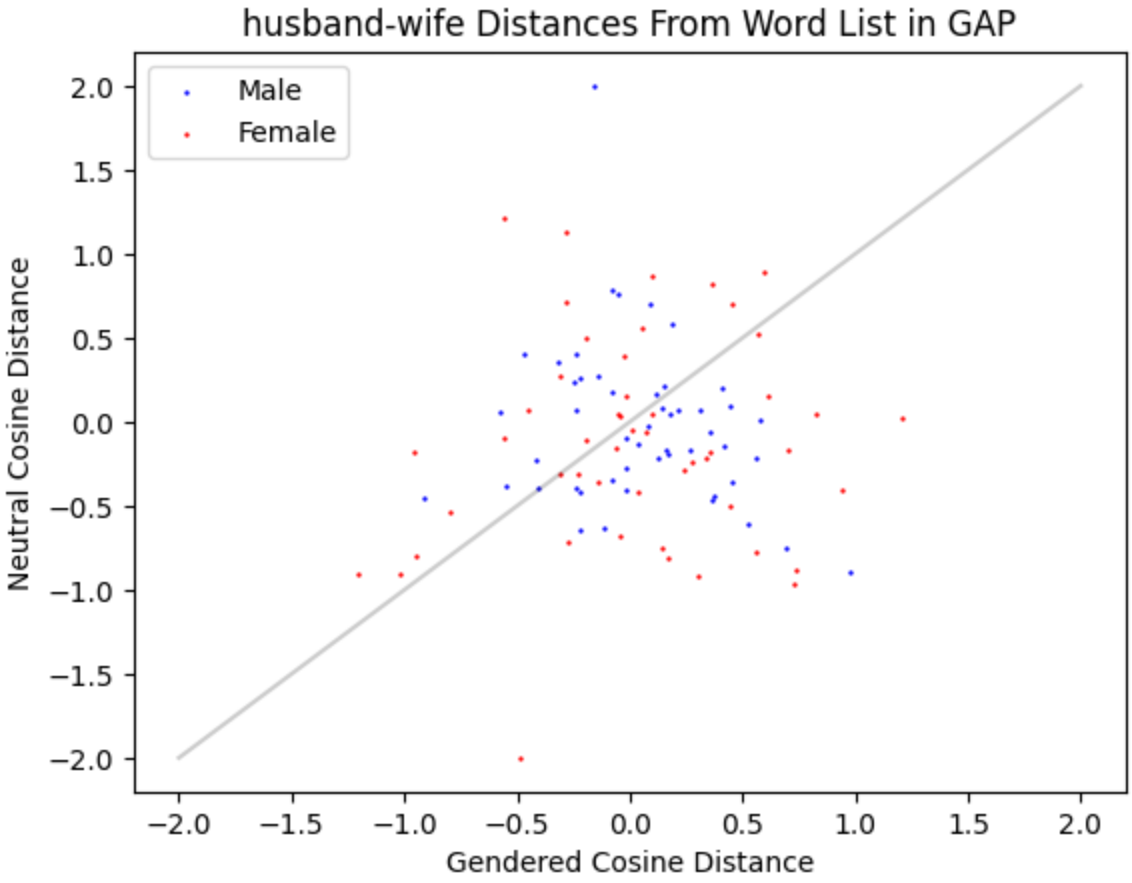

man-woman Distances From Word List in GAP
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

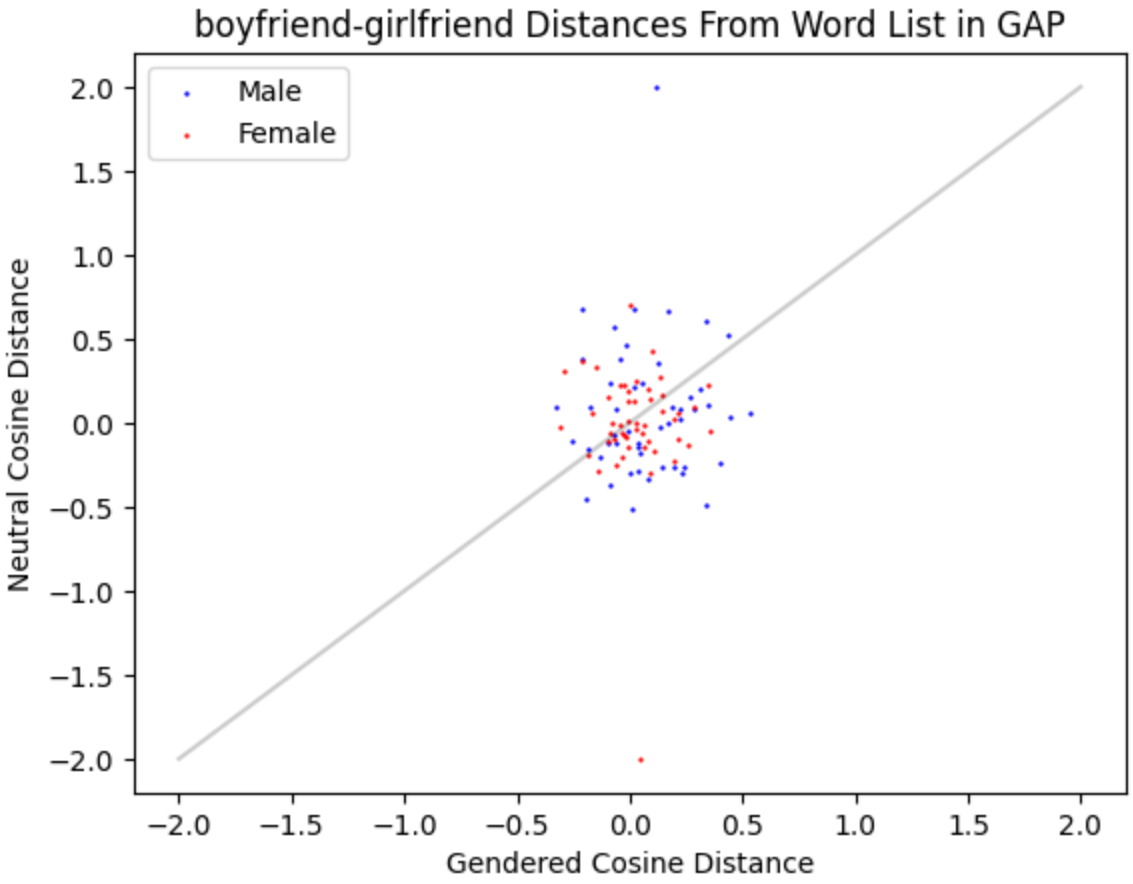

men-women Distances From Word List in GAP
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0


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

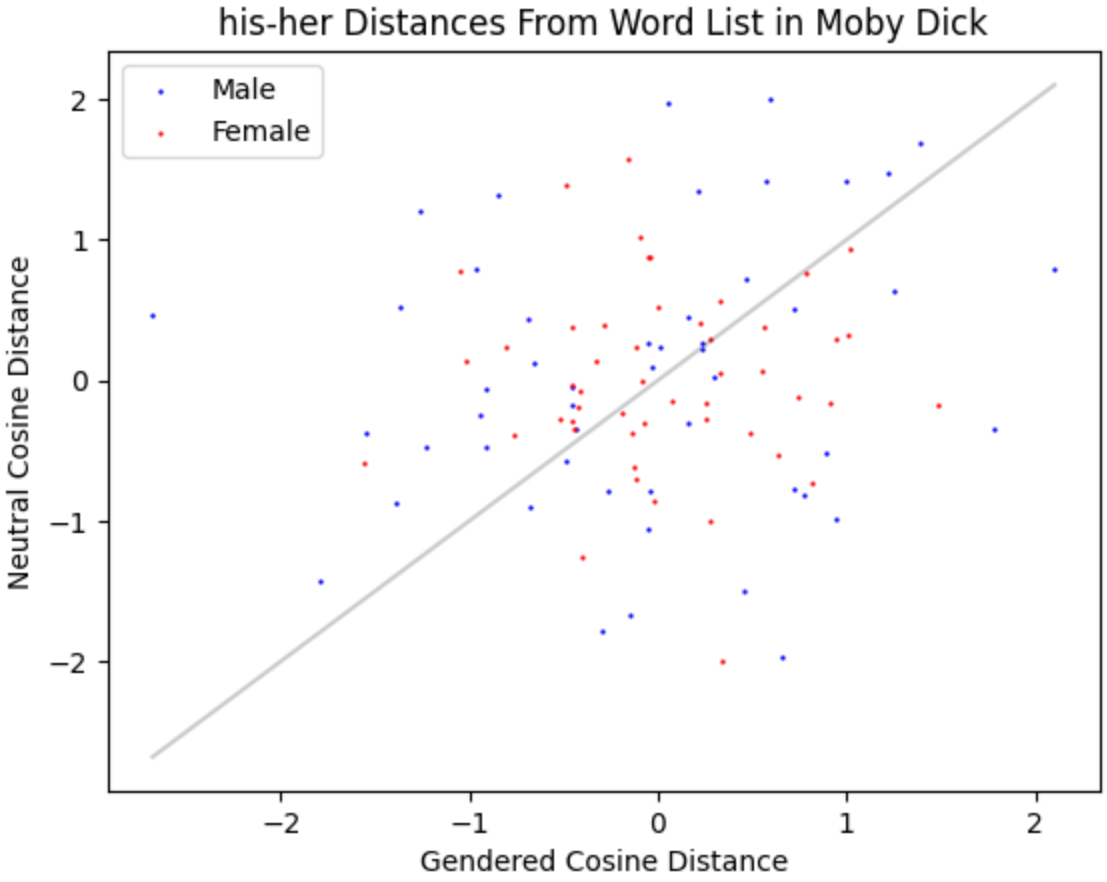

brother-sister Distances From Word List in GAP
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

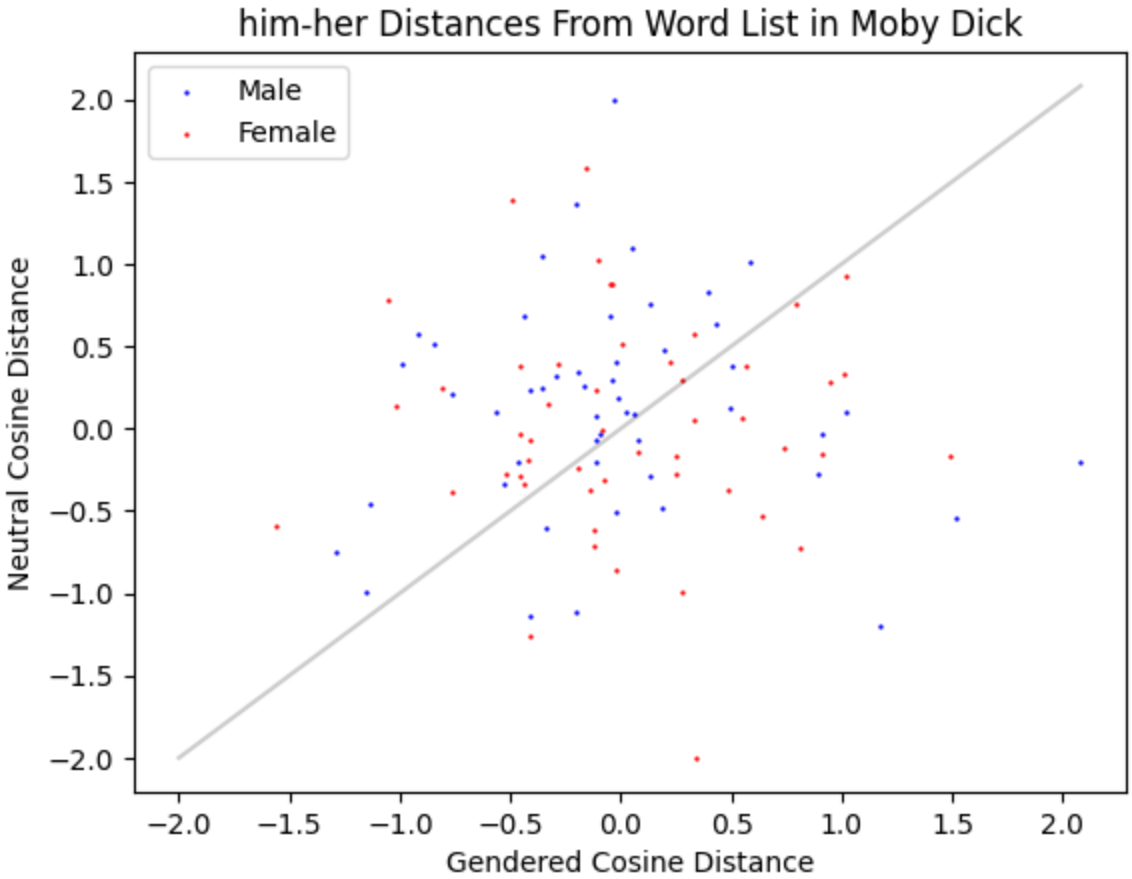

father-mother Distances From Word List in GAP
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

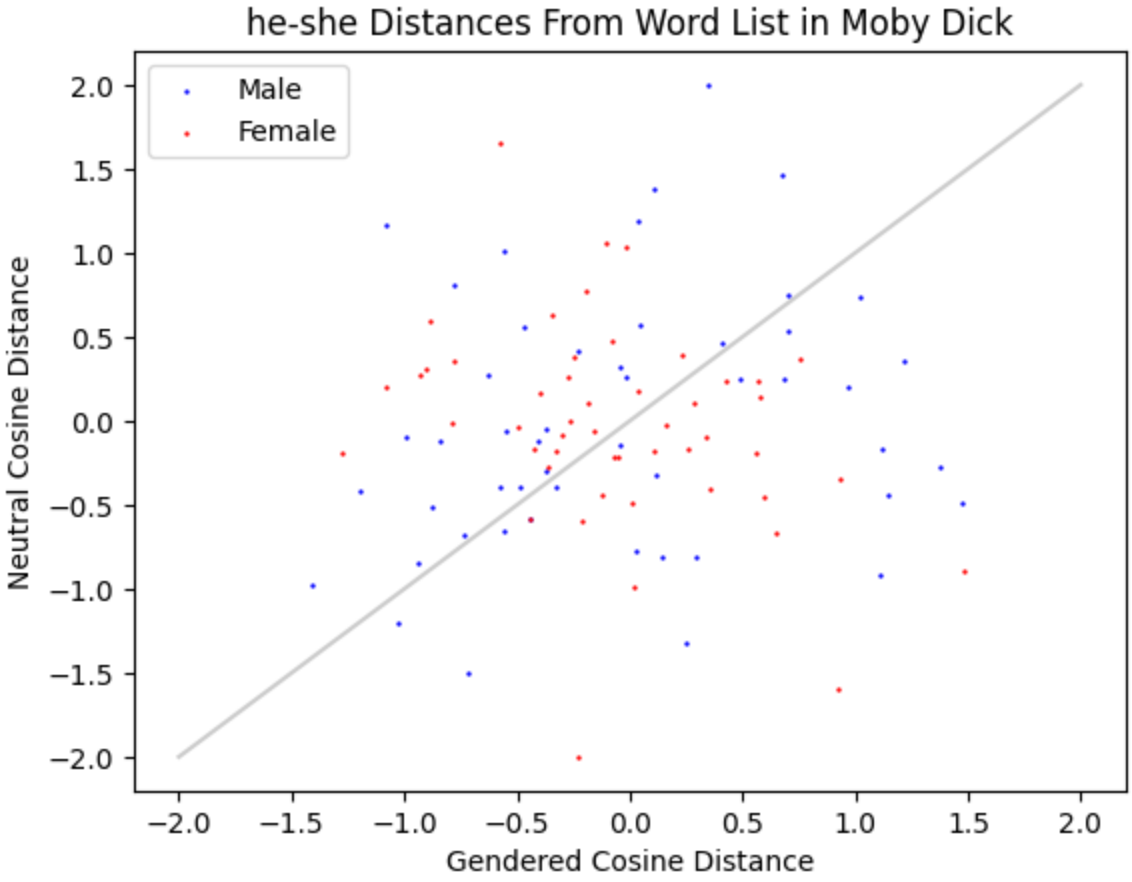

husband-wife Distances From Word List in GAP
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

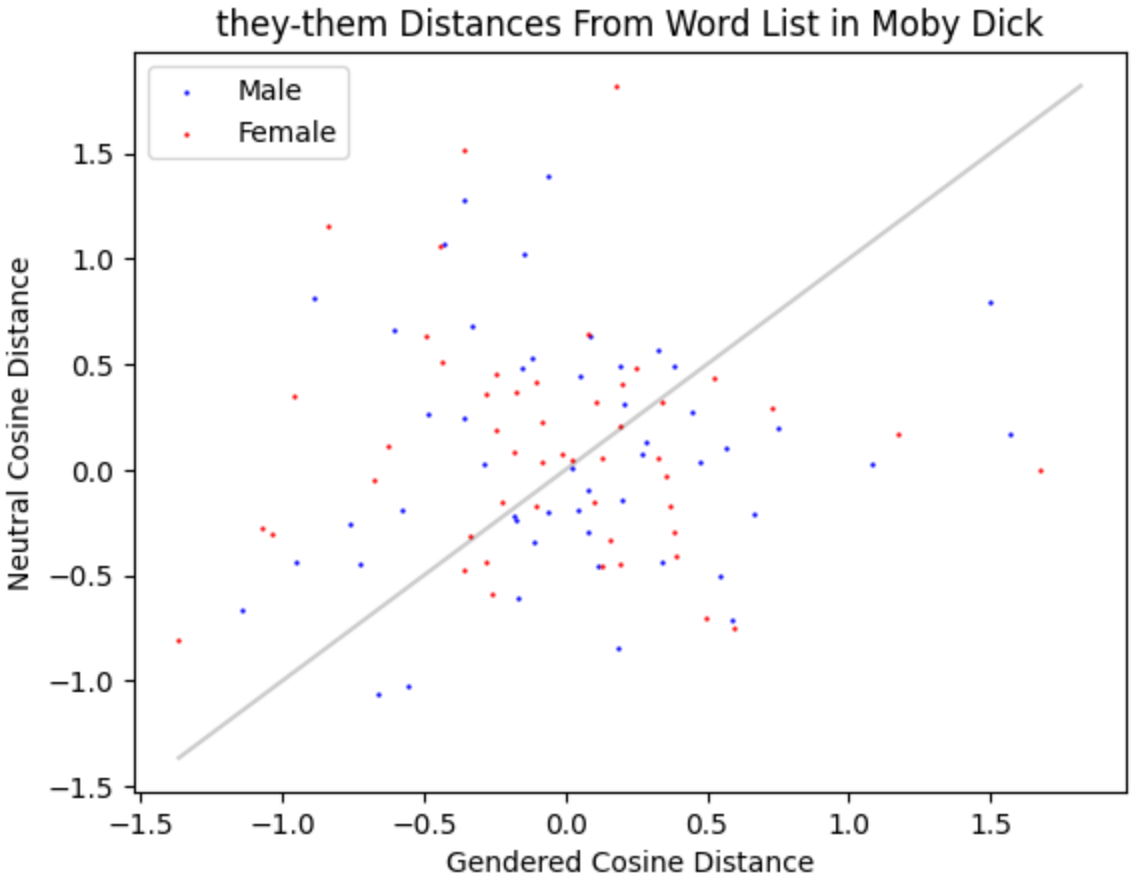


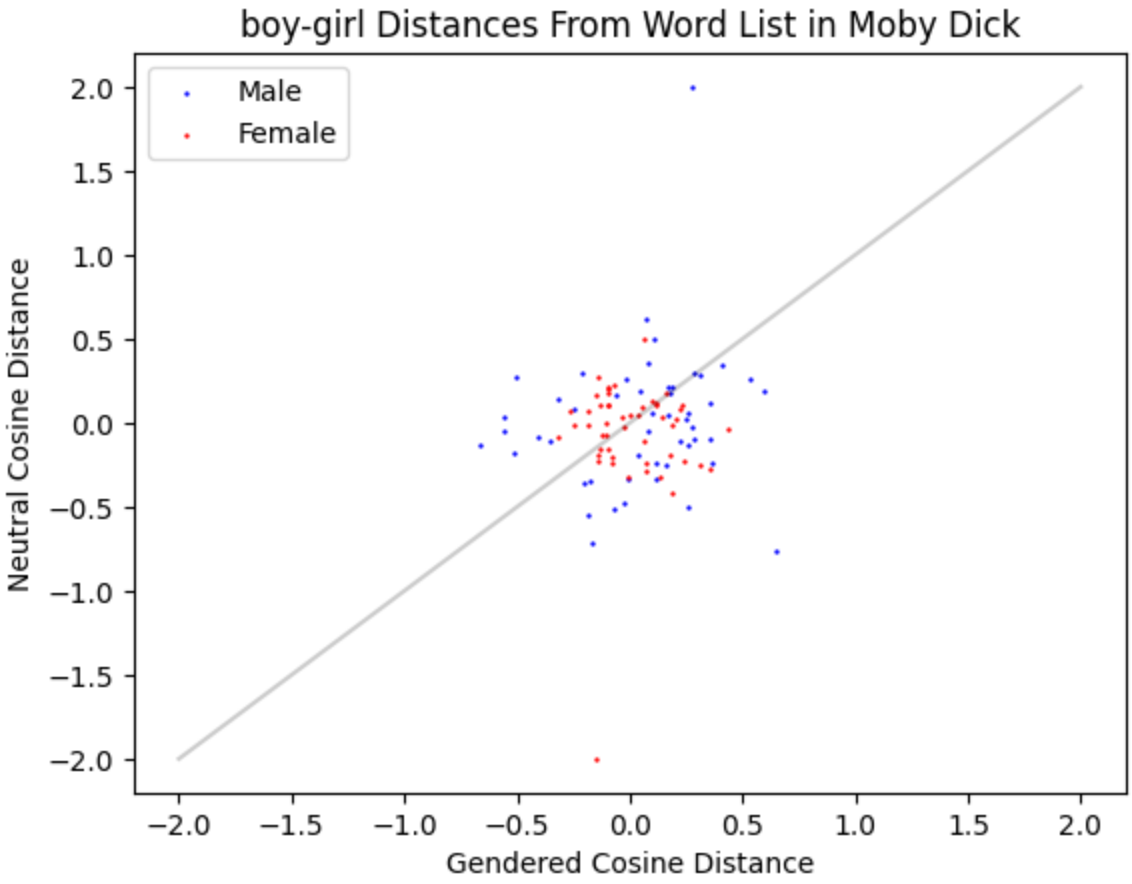
In [ ]:
```
a.plotter(genderPairs, spotlightWords, mobyNEmbeds, mobyGEmbeds, titles[3])
```

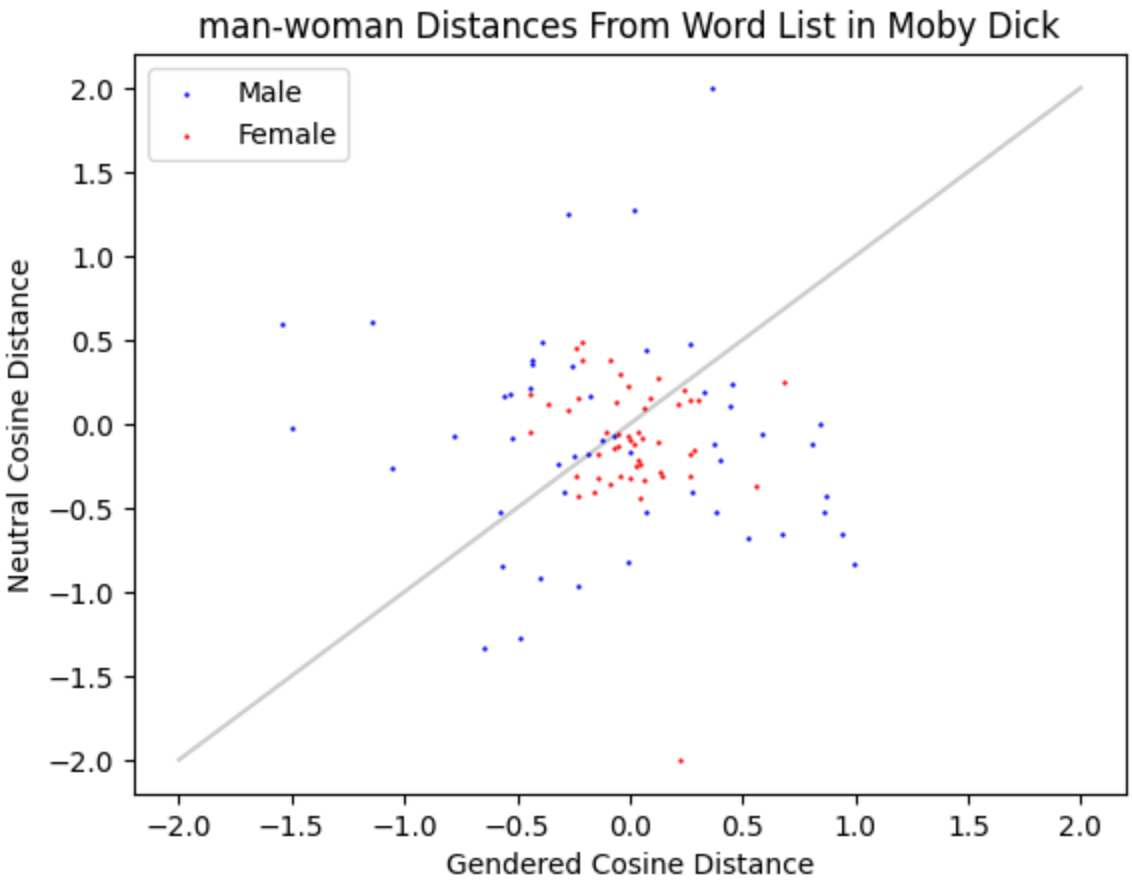

his-her Distances From Word List in Moby Dick
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2
1
0
−1
−2
−2
−1
0
1
2

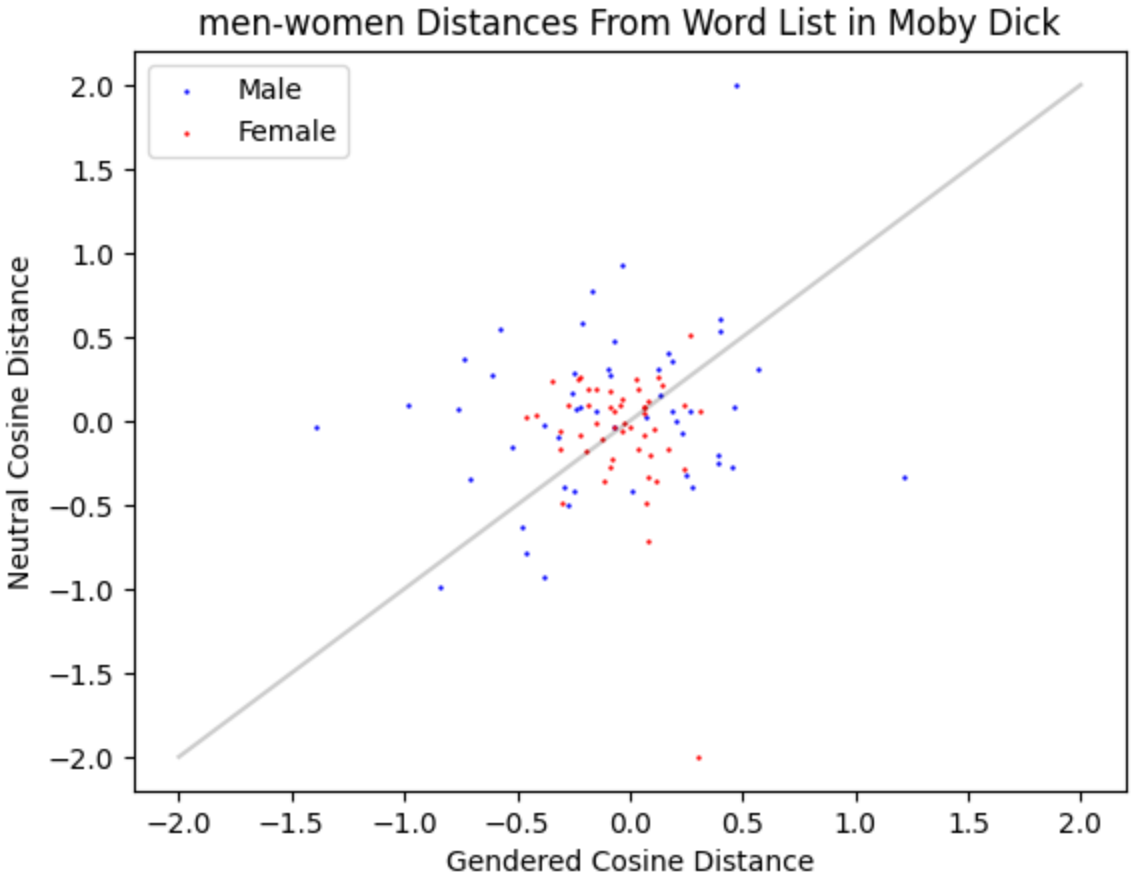

him-her Distances From Word List in Moby Dick
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

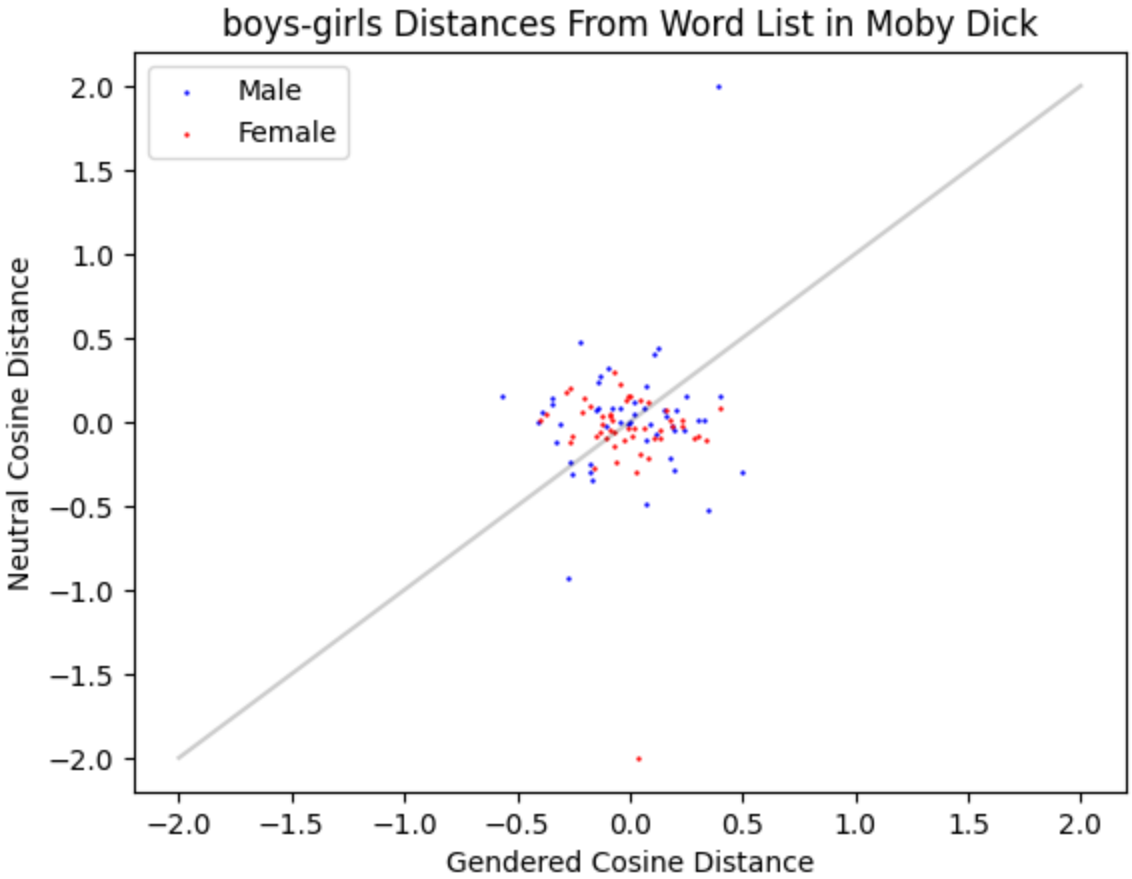

he-she Distances From Word List in Moby Dick
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

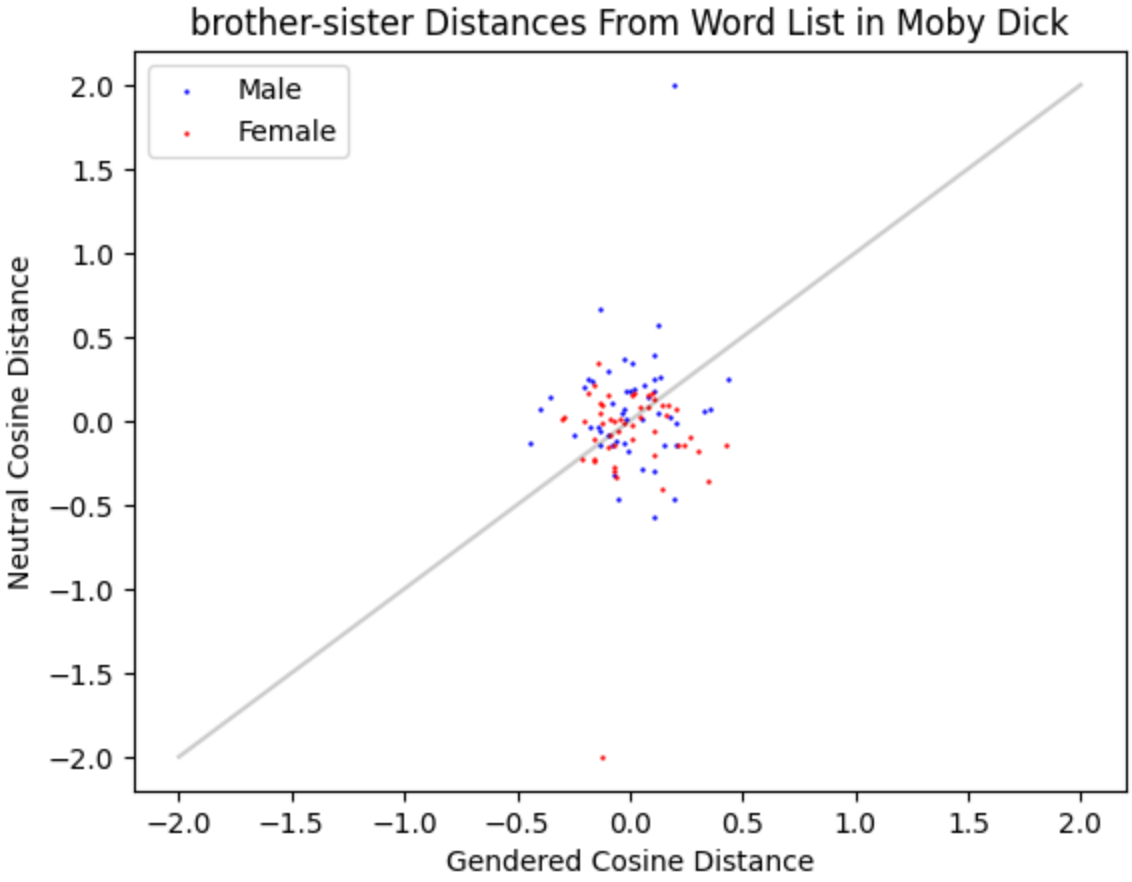

they-them Distances From Word List in Moby Dick
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5

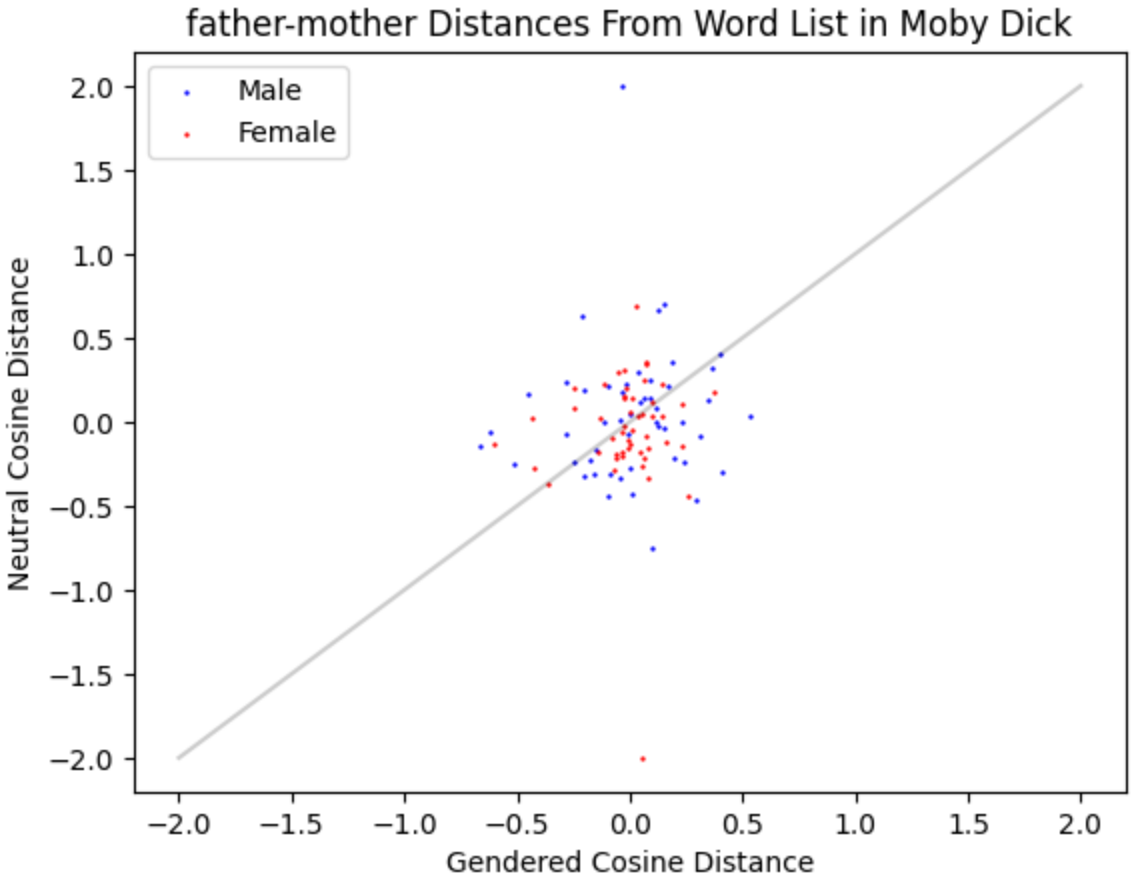

boy-girl Distances From Word List in Moby Dick
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0

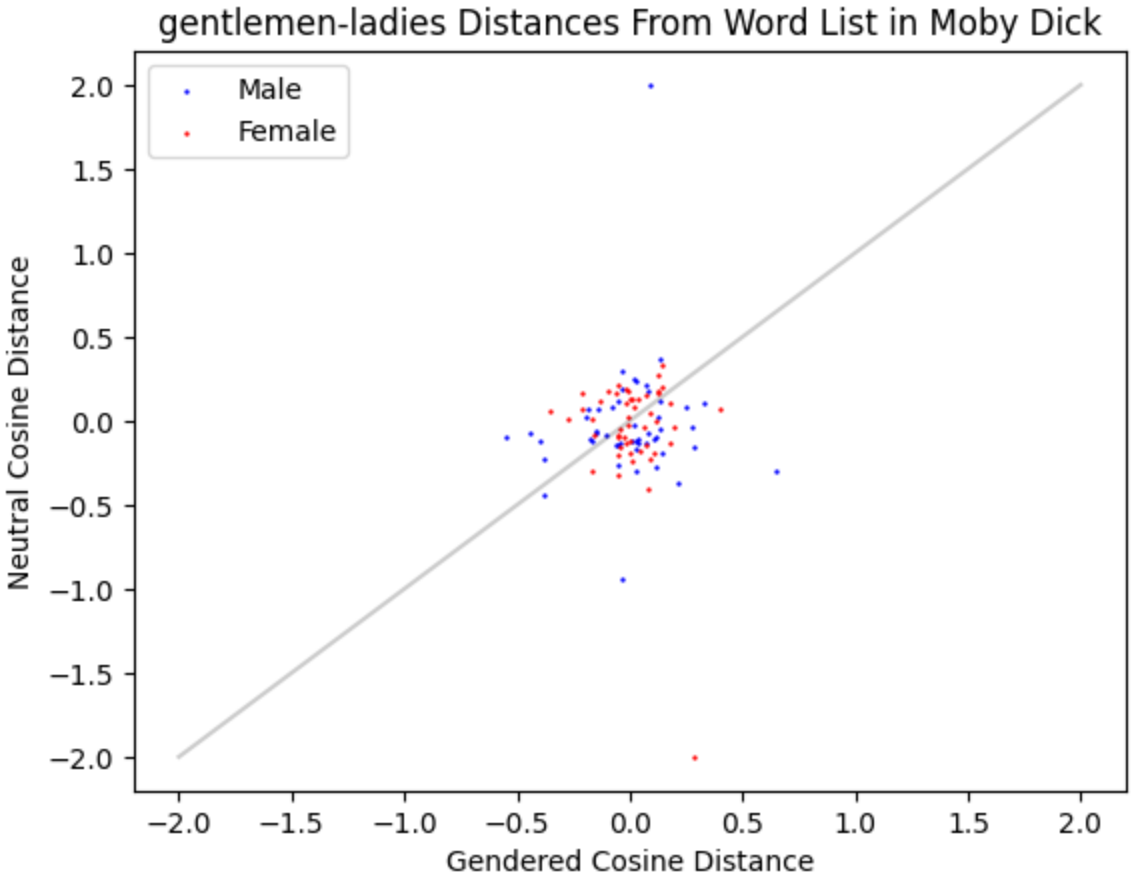

man-woman Distances From Word List in Moby Dick
Male
Female
Neutral Cosine Distance
Gendered Cosine Distance
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0


men-women Distances From Word List in Moby Dick
Male
Female
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 Moby Dick
Male
Female
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 Moby Dick
Male
Female
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
Male
Female
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
print('Top 10')
for i, (gen, neu, title) in enumerate(list(zip(genderEmbeds, neutralEmbeds, titles)
    print(f'{title} Cosine Differences between Neutral and Gendered Embeddings')
    diff = a.closestWordsDistances(spotlightWords, gen, neu, 10)
    print(diff)
print('\n')
print('Top 5')
for i, (gen, neu, title) in enumerate(list(zip(genderEmbeds, neutralEmbeds, titles)
    print(f'{title} Cosine Differences between Neutral and Gendered Embeddings')
    diff = a.closestWordsDistances(spotlightWords, gen, neu, 5)
    print(diff)
```

```
print('\n')
print('Top 2')
for i, (gen, neu, title) in enumerate(list(zip(genderEmbeds, neutralEmbeds, titles)
    print(f'{title} Cosine Differences between Neutral and Gendered Embeddings')
    diff = a.closestWordsDistances(spotlightWords, gen, neu, 2)
    print(diff)
```

```
Top 10
Bible Cosine Differences between Neutral and Gendered Embeddings
0.967
BUG Cosine Differences between Neutral and Gendered Embeddings
0.906
GAP Cosine Differences between Neutral and Gendered Embeddings
0.947
Moby Dick Cosine Differences between Neutral and Gendered Embeddings
0.919


Top 5
Bible Cosine Differences between Neutral and Gendered Embeddings
0.97
BUG Cosine Differences between Neutral and Gendered Embeddings
0.908
GAP Cosine Differences between Neutral and Gendered Embeddings
0.945
Moby Dick Cosine Differences between Neutral and Gendered Embeddings
0.92


Top 2
Bible Cosine Differences between Neutral and Gendered Embeddings
0.972
BUG Cosine Differences between Neutral and Gendered Embeddings
0.914
GAP Cosine Differences between Neutral and Gendered Embeddings
0.952
Moby Dick Cosine Differences between Neutral and Gendered Embeddings
0.915
```