Taller 9

Métodos Computacionales para Políticas Públicas - URosario

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Instrucciones:

- Guarde una copia de este *Jupyter Notebook* en su computador, idealmente en una carpeta destinada al material del curso.
- Modifique el nombre del archivo del *notebook*, agregando al final un guión inferior y su nombre y apellido, separados estos últimos por otro guión inferior. Por ejemplo, mi *notebook* se llamaría: mcpp_taller9_santiago_matallana
- Marque el *notebook* con su nombre y e-mail en el bloque verde arriba. Reemplace el texto "[Su nombre acá]" con su nombre y apellido. Similar para su e-mail.
- Desarrolle la totalidad del taller sobre este *notebook*, insertando las celdas que sea necesario debajo de cada pregunta. Haga buen uso de las celdas para código y de las celdas tipo *markdown* según el caso.
- Recuerde salvar periódicamente sus avances.
- Cuando termine el taller:
    1. Descárguelo en PDF. Si tiene algún problema con la conversión, descárguelo en HTML.
    2. Suba todos los archivos a su repositorio en GitHub, en una carpeta destinada exclusivamente para este taller, antes de la fecha y hora límites.

NLTK Book (http://www.nltk.org/book/), Exercises:

- Chapter 1: 22, 26, 28
- Chapter 2: 2, 4, 11

In [107]:
```
%matplotlib inline
import matplotlib.pyplot as plt
plt.rcParams["figure.figsize"] = [18.0, 8.0]
```

In [2]:
```
import nltk
```

In [3]:
```
from nltk.book import *
```

```
*** Introductory Examples for the NLTK Book ***
Loading text1, ..., text9 and sent1, ..., sent9
Type the name of the text or sentence to view it.
Type: 'texts()' or 'sents()' to list the materials.
text1: Moby Dick by Herman Melville 1851
text2: Sense and Sensibility by Jane Austen 1811
text3: The Book of Genesis
text4: Inaugural Address Corpus
text5: Chat Corpus
text6: Monty Python and the Holy Grail
text7: Wall Street Journal
text8: Personals Corpus
text9: The Man Who Was Thursday by G . K . Chesterton 1908
```

22.Find all the four-letter words in the Chat Corpus (text5). With the help of a frequency distribution (FreqDist), show these words in decreasing order of frequency.

In [4]:
```
four_letter = [w for w in text5 if len(w) == 4]
four_letter
```

Out[4]:
```
['left',
 'with',
 'this',
 'name',
 'PART',
 'well',
 'NICK',
 'name',
 'U121',
 'golf',
 'clap',
 'JOIN',
 'that',
 'nice',
 'JOIN',
 'PART',
 'golf',
 'clap',
 'fuck',
 'U121',
 'PART',
 'PART',
 'clap',
 'your',
 'PART',
 'dont',
 'even',
 'know',
 'what',
 'that',
 'that',
 'chat',
 'JOIN',
 'drew',
 'cast',
 'PART',
```

```
                'sexy',
                'U115',
                'JOIN',
                'PART',
                'drew',
                'girl',
                'with',
                'legs',
                'hope',
                'draw',
                'PART',
                'head',
                'legs',
                'JOIN',
                'JOIN',
                'good',
                'JOIN',
                'PART',
                'take',
                'have',
                'docs',
                'Slip',
                'away',
                'Fade',
                'away',
                'Days',
                'away',
                'feel',
                'have',
                'back',
                'U115',
                'U129',
                'U115',
                'chat',
                'with',
                'PART',
                'JOIN',
                'JOIN',
                'fast',
```

```
                'U116',
                'bowl',
                'bong',
                'JOIN',
                'well',
                'glad',
                'hard',
                'from',
                'here',
                'back',
                'PART',
                'PART',
                'JOIN',
                'U121',
                'name',
                'hard',
                'very',
                'fire',
                'from',
                'here',
                'JOIN',
                'PART',
                'itch',
                'JOIN',
                'U133',
                'ogan',
                'male',
                'JOIN',
                'JOIN',
                'show',
                'will',
                'talk',
                'PART',
                'haha',
                'opps',
                'JOIN',
                'PART',
                'U115',
                'nice',
```

```
                'warm',
                'guys',
                'with',
                'cams',
                'play',
                'sits',
                'JOIN',
                'JOIN',
                'guyz',
                'chat',
                'U126',
                'PART',
                'chat',
                'PART',
                'gooo',
                'sure',
                'U126',
                'JOIN',
                'what',
                'feel',
                'like',
                'room',
                'yeee',
                'JOIN',
                'want',
                'pics',
                'look',
                'U139',
                'PART',
                'PART',
                'JOIN',
                'here',
                'JOIN',
                'PART',
                'JOIN',
                'U139',
                'PART',
                'JOIN',
                'U138',
```

```
                'U139',
                'make',
                'U139',
                'that',
                'U126',
                'late',
                'lmao',
                'ahah',
                'PART',
                'U121',
                'U121',
                'does',
                'like',
                'that',
                'guys',
                'male',
                'JOIN',
                'U139',
                'well',
                'what',
                'yeah',
                'know',
                'U136',
                'hell',
                'with',
                'U139',
                'U101',
                'like',
                'when',
                'plan',
                'PART',
                'JOIN',
                'gold',
                'jeep',
                'make',
                'sure',
                'nice',
                'ring',
                'U115',
```

```
                'isnt',
                'that',
                'U136',
                'hell',
                'have',
                'have',
                'doin',
                'U139',
                'U121',
                'many',
                'Just',
                'fine',
                'that',
                'like',
                'PART',
                'hiya',
                'room',
                'lmao',
                'doin',
                'Deep',
                'Show',
                'that',
                'love',
                'that',
                'Turn',
                'take',
                'Hand',
                'just',
                'even',
                'look',
                'hang',
                'PART',
                'that',
                'such',
                'word',
                'U141',
                'hear',
                '!!!!',
                'PART',
```

```
                'JOIN',
                'PART',
                'deaf',
                'here',
                'dont',
                'U115',
                'U115',
                '....',
                'hugs',
                'chat',
                'with',
                'baby',
                'Only',
                'U121',
                'U121',
                'PART',
                'have',
                'away',
                'from',
                'U121',
                'what',
                'read',
                'here',
                'with',
                'JOIN',
                'read',
                'have',
                'here',
                'JOIN',
                'want',
                'chat',
                'talk',
                'U121',
                'JOIN',
                'U121',
                'VBox',
                'PART',
                'take',
                'that',
```

```
                'JOIN',
                'PART',
                'hate',
                'when',
                'U121',
                'U115',
                'lmao',
                'PART',
                'your',
                'know',
                'what',
                'your',
                'what',
                'JOIN',
                'love',
                'more',
                'than',
                'ELSE',
                'serg',
                'well',
                'most',
                'love',
                'JOIN',
                'know',
                'that',
                'what',
                'lmao',
                'well',
                'have',
                'eyes',
                'lmao',
                'know',
                'JOIN',
                'girl',
                'jerk',
                'kids',
                'guys',
                'type',
                'much',
```

```
                'shut',
                'fuck',
                'girl',
                'nice',
                'shut',
                'fuck',
                'PART',
                'dont',
                'want',
                'JOIN',
                'want',
                'U115',
                'what',
                'miss',
                'much',
                'work',
                'nice',
                'U116',
                'PART',
                'PART',
                'heyy',
                'U148',
                'hate',
                'boys',
                'JOIN',
                'U148',
                'hate',
                'what',
                'PART',
                'hate',
                'U121',
                'fuck',
                'your',
                'ugly',
                'JOIN',
                'bein',
                'PART',
                'What',
                'U115',
```

```
                'whys',
                'that',
                'deep',
                'U121',
                'what',
                'JOIN',
                'tape',
                'Your',
                'sexs',
                'best',
                'phil',
                'said',
                'ugly',
                'PART',
                'date',
                'feel',
                'your',
                'they',
                'form',
                'PART',
                'sits',
                'JOIN',
                'sits',
                'with',
                'hmph',
                'hate',
                'does',
                'that',
                'mean',
                'want',
                'room',
                'this',
                'been',
                'PART',
                'JOIN',
                'U115',
                'U116',
                'your',
                'here',
```

```
                'talk',
                'wait',
                'that',
                'perv',
                'lets',
                'hope',
                'U121',
                'PART',
                'U115',
                '!!!!',
                'lets',
                'chat',
                'JOIN',
                'rule',
                'land',
                'wont',
                'then',
                'find',
                'need',
                'this',
                'HUGE',
                'perv',
                'that',
                'deal',
                '????',
                'JOIN',
                'shit',
                'hell',
                'lmao',
                'PART',
                'hell',
                'JOIN',
                'here',
                'guys',
                'have',
                'U121',
                'JOIN',
                'U155',
                'only',
```

```
                'Poor',
                'U121',
                'love',
                'pick',
                'much',
                'that',
                'PART',
                'PART',
                'sits',
                'with',
                'U121',
                'nads',
                'JOIN',
                'from',
                'pick',
                'your',
                'pick',
                'your',
                'nose',
                'pick',
                'your',
                'nose',
                'JOIN',
                'face',
                'with',
                'PART',
                'U115',
                'owww',
                'PART',
                'JOIN',
                'U116',
                'PART',
                'does',
                'want',
                'talk',
                'head',
                'gags',
                'even',
                'U121',
```

```
                'neck',
                'Meep',
                'U115',
                'LAst',
                'time',
                'that',
                'wash',
                'your',
                'dude',
                'gets',
                'JOIN',
                'U121',
                'dang',
                'just',
                "pm's",
                'that',
                '1.99',
                '....',
                'yeah',
                'nice',
                'neck',
                'U115',
                'like',
                'shut',
                'free',
                'JOIN',
                'goes',
                'wash',
                'lmao',
                'Lies',
                'lmao',
                'U115',
                'lick',
                'very',
                'lmao',
                'U115',
                'ummm',
                'U109',
                'dont',
```

```
                'dead',
                'more',
                'than',
                'call',
                'just',
                'case',
                'dead',
                'good',
                'neck',
                'talk',
                'what',
                'ummm',
                'else',
                'wont',
                'bite',
                'U115',
                'yeah',
                'wait',
                'yeah',
                'PART',
                'your',
                'want',
                'have',
                'sexy',
                'bite',
                'lmao',
                'call',
                'have',
                'free',
                'call',
                'mins',
                'JOIN',
                'nite',
                'lool',
                'know',
                'that',
                'kina',
                'give',
                'away',
```

```
                'then',
                'room',
                'call',
                'yeah',
                'U155',
                'PART',
                'U115',
                'more',
                'U115',
                'guys',
                'baby',
                'U109',
                'fuck',
                'case',
                'know',
                'were',
                'girl',
                'JOIN',
                'baby',
                'what',
                'U109',
                'guys',
                'chat',
                'have',
                'have',
                'sext',
                'piff',
                'dont',
                'talk',
                'read',
                'dang',
                'lazy',
                'dont',
                'read',
                'PART',
                'JOIN',
                'mean',
                'fine',
                '....',
```

```
                'busy',
                'work',
                'okay',
                'dont',
                'talk',
                'calm',
                'down',
                'busy',
                'busy',
                'want',
                'chat',
                'arms',
                'kids',
                'name',
                'PART',
                'sits',
                'down',
                'eats',
                'JOIN',
                'hugs',
                'want',
                'U121',
                'near',
                'just',
                'PART',
                'JOIN',
                'PART',
                'hell',
                'yeah',
                'U115',
                'near',
                'near',
                'good',
                'smax',
                'JOIN',
                'haha',
                'only',
                '>:->',
                'near',
```

```
                'PART',
                'piff',
                'VVil',
                'JOIN',
                'free',
                'wont',
                'cold',
                'U121',
                'cell',
                'runs',
                'thru',
                'back',
                'hair',
                'eyes',
                'neck',
                'yeah',
                'caps',
                'PART',
                'JOIN',
                'PART',
                'PART',
                'U165',
                'jump',
                'U165',
                'baby',
                'here',
                'over',
                'your',
                'good',
                'PART',
                'that',
                'left',
                'room',
                'este',
                'U115',
                'will',
                'PART',
                'U121',
                'U165',
```

```
                'lmao',
                'PART',
                'PART',
                'very',
                'guys',
                'wana',
                'chat',
                'chik',
                'from',
                'mean',
                'chat',
                'well',
                'PART',
                'that',
                'dont',
                'shit',
                'U165',
                'U165',
                'left',
                'room',
                'with',
                'your',
                'JOIN',
                'U115',
                'what',
                'list',
                'wish',
                'cmon',
                'U128',
                'nice',
                'JOIN',
                'list',
                'PART',
                'list',
                'U115',
                'good',
                'lmao',
                'U128',
                'hehe',
```

```
                'hows',
                'bout',
                'good',
                'hear',
                'U165',
                'have',
                'JOIN',
                'good',
                'PART',
                'JOIN',
                'wats',
                'they',
                'PART',
                'piff',
                'aint',
                'know',
                'shut',
                'much',
                'good',
                'PART',
                'JOIN',
                'JOIN',
                'yeah',
                'lost',
                'like',
                'same',
                'well',
                'work',
                'what',
                'Boyz',
                'rock',
                'what',
                'hehe',
                'went',
                'back',
                'some',
                'then',
                'came',
                'back',
```

```
                'home',
                'PART',
                'what',
                'they',
                'coat',
                'nice',
                'read',
                'many',
                'nice',
                'hehe',
                'lmao',
                'even',
                'JOIN',
                'well',
                'talk',
                'nite',
                'what',
                'very',
                'time',
                'What',
                'kind',
                '....',
                'nite',
                'PART',
                'Eyes',
                'Dawn',
                'last',
                'song',
                'LIVE',
                'cool',
                'good',
                'nite',
                'mauh',
                'nite',
                'mike',
                'keep',
                'must',
                'girl',
                'seem',
```

```
                'pick',
                'else',
                '....',
                'take',
                'your',
                'your',
                'JOIN',
                'lmao',
                'just',
                'days',
                'late',
                'with',
                'room',
                'JOIN',
                'PART',
                'good',
                'ques',
                'lmao',
                'JOIN',
                'that',
                'like',
                'dont',
                'quit',
                'what',
                'your',
                '4.20',
                'PART',
                'like',
                'mine',
                'over',
                'cali',
                'good',
                'this',
                'year',
                'NICK',
                'whoa',
                'have',
                'have',
                'have',
```

```
                'what',
                'boys',
                'gosh',
                'that',
                'ruff',
                'what',
                'PART',
                'hell',
                'rock',
                'roll',
                'PART',
                'with',
                'like',
                'that',
                'nope',
                '....',
                'rest',
                'rock',
                'roll',
                '....',
                '....',
                'sing',
                'from',
                'kids',
                '....',
                'mame',
                'nada',
                'cali',
                'here',
                'that',
                'cool',
                'kids',
                'cool',
                'JOIN',
                'with',
                'from',
                'said',
                'alot',
                'JOIN',
```

```
                'year',
                'band',
                'JOIN',
                'NICK',
                'cool',
                'nice',
                'here',
                'hair',
                'hard',
                'what',
                'type',
                'does',
                'your',
                'band',
                'play',
                'hair',
                'yeah',
                'what',
                'doin',
                '....',
                'with',
                'hand',
                'what',
                'JOIN',
                'room',
                '....',
                'sexy',
                'PART',
                'dumb',
                'they',
                'wont',
                'chat',
                'with',
                'lmao',
                'damn',
                'what',
                'orgy',
                'orgy',
                'lmao',
```

```
                'what',
                'word',
                'some',
                'easy',
                'PART',
                'JOIN',
                'back',
                'orgy',
                'lmao',
                'PART',
                'lets',
                'play',
                'room',
                'PART',
                'JOIN',
                'JOIN',
                'were',
                'damn',
                'PART',
                'good',
                'call',
                'what',
                'like',
                'just',
                'late',
                'date',
                'know',
                'push',
                'PART',
                'lose',
                'name',
                'shit',
                'head',
                'long',
                'time',
                'said',
                'shit',
                'lost',
                'baby',
```

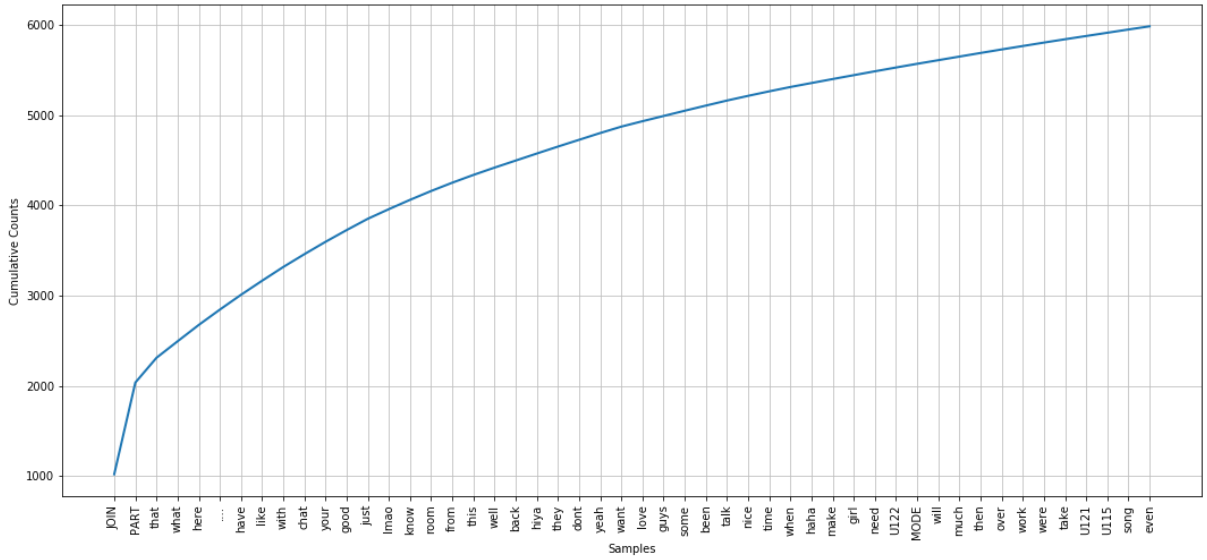
```
                'then',
                'JOIN',
                'PART',
                'JOIN',
                'What',
                'sure',
                'JOIN',
                'sure',
                'lmao',
                'this',
                'room',
                '....',
                '....',
                'your',
                '....',
                'lmao',
                'that',
                'yeah',
                'have',
                'many',
                'lmao',
                'sexy',
                'stay',
                'keep',
                'lmao',
                'with',
                'hair',
                'like',
                'that',
                '....',
                'down',
                'door',
                'prob',
                '....',
                'hair',
                'lmao',
                'JOIN',
                'sexy',
                'just',
```

```
 'this',
 'life',
 'just',
 'PART',
 'room',
 'with',
 'hair',
 'like',
 'what',
 'from',
 'here',
 'said',
 'wild',
 '....',
 'even',
 'from',
 'JOIN',
 'cool',
 'sexy',
 'JOIN',
 'sexy',
 'only',
 'none',
 'sexy',
 'whew',
 'sexy',
 'hell',
 'have',
 ...]
```

In [8]:
```
fdist5 = FreqDist(four_letter)
fdist5
```

Out[8]:
```
FreqDist({'JOIN': 1021, 'PART': 1016, 'that': 274, 'what': 183, 'here':
181, '....': 170, 'have': 164, 'like': 156, 'with': 152, 'chat': 142,
...})
```

In [108]:
```
fdist5.plot(50, cumulative=True)
```



26.What does the following Python code do?

sum(len(w) for w in text1)

Can you use it to work out the average word length of a text?

El código está sumando el tamaño de cada palabra, por lo que al final va a dar el tamaño total de la suma de todas las palabras. Una vez ejecutado el código, se puede encontrar el tamaño promedio de la palabra de un texto si se divide por el número total de palabras.

Una aclaración importante, es que esta operación cuenta tokens, no únicamente palabras. Para tener el promedio de palabras únicamente, se debe utiliza la función set.

In [11]:
```
total_length = sum(len(w) for w in text1)
total_length
```

Out[11]: 999044

In [22]:
```
total_words = len(text1)
total_words
```

Out[22]: 260819

In [68]:
```
avg_wrd_ln = (sum(len(w) for w in text1))/(len(text1))
avg_wrd_ln
```

Out[68]: 3.830411128023649

In [23]:
```
def avg_word_lenght(text):
    total_length = sum(len(w) for w in text)
    total_words = len(text)
    avg_word = (total_length)/(total_words)
    return avg_word
```

In [24]:
```
avg_word_lenght(text1)
```

Out[24]: 3.830411128023649

In [25]:
```
avg_word_lenght(text2)
```

Out[25]: 3.881371136350794

En promedio, el tamaño de las palabras del texto1 son de alrededor de 4 caracteres (3.8)

28. Define a function percent(word, text) that calculates how often a given word occurs in a text, and expresses the result as a percentage.

In [72]:
```
def percent(word,text):
    fdist = FreqDist(text)
    w = fdist [word]
    l = len(text)
    word_percentage = 100 * w / l
```

```
    return  word_percentage
```

In [73]:
```
percent("whale", text1)
```

Out[73]:
```
0.3473673313677301
```

In [74]:
```
percent("God", text3)
```

Out[74]:
```
0.5160396747386292
```

2. Use the corpus module to explore austen-persuasion.txt. How many word tokens does this book have? How many word types?

In [75]:
```
import nltk
nltk.corpus.gutenberg.fileids()
```

Out[75]:
```
['austen-emma.txt',
 'austen-persuasion.txt',
 'austen-sense.txt',
 'bible-kjv.txt',
 'blake-poems.txt',
 'bryant-stories.txt',
 'burgess-busterbrown.txt',
 'carroll-alice.txt',
 'chesterton-ball.txt',
 'chesterton-brown.txt',
 'chesterton-thursday.txt',
 'edgeworth-parents.txt',
 'melville-moby_dick.txt',
 'milton-paradise.txt',
 'shakespeare-caesar.txt',
 'shakespeare-hamlet.txt',
 'shakespeare-macbeth.txt',
 'whitman-leaves.txt']
```

In [77]:
```
from nltk.corpus import gutenberg
```

```
gutenberg.fileids()
```

Out[77]:
```
['austen-emma.txt',
 'austen-persuasion.txt',
 'austen-sense.txt',
 'bible-kjv.txt',
 'blake-poems.txt',
 'bryant-stories.txt',
 'burgess-busterbrown.txt',
 'carroll-alice.txt',
 'chesterton-ball.txt',
 'chesterton-brown.txt',
 'chesterton-thursday.txt',
 'edgeworth-parents.txt',
 'melville-moby_dick.txt',
 'milton-paradise.txt',
 'shakespeare-caesar.txt',
 'shakespeare-hamlet.txt',
 'shakespeare-macbeth.txt',
 'whitman-leaves.txt']
```

In [80]:
```
austen_p = gutenberg.words('austen-persuasion.txt')
#word tokens
len(austen_p)
```

Out[80]:
```
98171
```

In [81]:
```
#word types
len(set(austen_p))
```

Out[81]:
```
6132
```

4. Read in the texts of the State of the Union addresses, using the state_union corpus reader. Count occurrences of men, women, and people in each document. What has happened to the usage of these words over time?

In [84]:
```
from nltk.corpus import state_union
state_union.fileids()
```

Out[84]:
```
['1945-Truman.txt',
 '1946-Truman.txt',
 '1947-Truman.txt',
 '1948-Truman.txt',
 '1949-Truman.txt',
 '1950-Truman.txt',
 '1951-Truman.txt',
 '1953-Eisenhower.txt',
 '1954-Eisenhower.txt',
 '1955-Eisenhower.txt',
 '1956-Eisenhower.txt',
 '1957-Eisenhower.txt',
 '1958-Eisenhower.txt',
 '1959-Eisenhower.txt',
 '1960-Eisenhower.txt',
 '1961-Kennedy.txt',
 '1962-Kennedy.txt',
 '1963-Johnson.txt',
 '1963-Kennedy.txt',
 '1964-Johnson.txt',
 '1965-Johnson-1.txt',
 '1965-Johnson-2.txt',
 '1966-Johnson.txt',
 '1967-Johnson.txt',
 '1968-Johnson.txt',
 '1969-Johnson.txt',
 '1970-Nixon.txt',
 '1971-Nixon.txt',
 '1972-Nixon.txt',
 '1973-Nixon.txt',
 '1974-Nixon.txt',
 '1975-Ford.txt',
 '1976-Ford.txt',
 '1977-Ford.txt',
 '1978-Carter.txt',
 '1979-Carter.txt',
 '1980-Carter.txt',
```

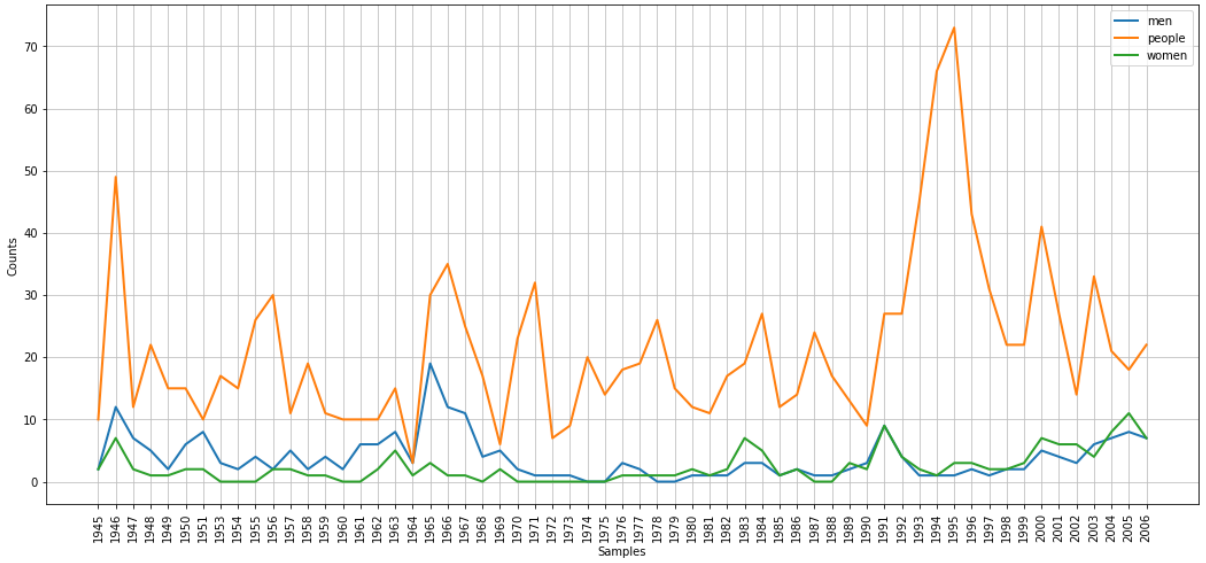
```
 '1981-Reagan.txt',
 '1982-Reagan.txt',
 '1983-Reagan.txt',
 '1984-Reagan.txt',
 '1985-Reagan.txt',
 '1986-Reagan.txt',
 '1987-Reagan.txt',
 '1988-Reagan.txt',
 '1989-Bush.txt',
 '1990-Bush.txt',
 '1991-Bush-1.txt',
 '1991-Bush-2.txt',
 '1992-Bush.txt',
 '1993-Clinton.txt',
 '1994-Clinton.txt',
 '1995-Clinton.txt',
 '1996-Clinton.txt',
 '1997-Clinton.txt',
 '1998-Clinton.txt',
 '1999-Clinton.txt',
 '2000-Clinton.txt',
 '2001-GWBush-1.txt',
 '2001-GWBush-2.txt',
 '2002-GWBush.txt',
 '2003-GWBush.txt',
 '2004-GWBush.txt',
 '2005-GWBush.txt',
 '2006-GWBush.txt']
```

In [92]:
```
len(state_union.fileids())
```

Out[92]:
```
65
```

In [109]:
```
cfd = nltk.ConditionalFreqDist(
    (interest, fileid[:4])
    for fileid in state_union.fileids()
    for w in state_union.words(fileid)
    for interest in ['men', 'women', 'people']
```

```
    if w.lower() == interest)
cfd.plot()
```



11. Investigate the table of modal distributions and look for other patterns. Try to explain them in terms of your own impressionistic understanding of the different genres. Can you find other closed classes of words that exhibit significant differences across different genres?

In [101]:
```
from nltk.corpus import brown
brown.categories()
```

Out[101]:
```
['adventure',
 'belles_lettres',
 'editorial',
 'fiction',
 'government',
 'hobbies',
 'humor',
 'learned',
```

```
 'lore',
 'mystery',
 'news',
 'religion',
 'reviews',
 'romance',
 'science_fiction']
```

In [102]:
```
cfd = nltk.ConditionalFreqDist(
          (genre, word)
          for genre in brown.categories()
          for word in brown.words(categories=genre))
genres = ['news', 'religion', 'hobbies', 'science_fiction', 'romance',
'humor']
modals = ['can', 'could', 'may', 'might', 'must', 'will']
cfd.tabulate(conditions=genres, samples=modals)
```

```
                  can could   may might  must  will
           news    93    86    66    38    50   389
       religion    82    59    78    12    54    71
        hobbies   268    58   131    22    83   264
science_fiction    16    49     4    12     8    16
        romance    74   193    11    51    45    43
          humor    16    30     8     8     9    13
```

In [103]:
```
cfd = nltk.ConditionalFreqDist(
    (genre, word)
    for genre in brown.categories()
    for word in brown.words(categories=genre))
genres = ['news', 'religion', 'hobbies', 'science_fiction', 'romance',
'humor', 'editorial', 'belles_lettres', 'government']
pronouns = ['I', 'you', 'he', 'she', 'it', 'we', 'they']
cfd.tabulate(conditions=genres, samples=pronouns)
```

```
                   I  you   he  she   it   we they
           news  179   55  451   42  363   77  205
       religion  155  100  137   10  264  176  115
        hobbies  154  383  155   21  476  100  177
science_fiction   98   81  139   36  129   30   53
```

```
          romance  951  456  702  496  573   78  168
            humor  239  131  146   58  162   32   70
        editorial  201   83  268   41  386  167  148
   belles_lettres  845  188 1174  178 1059  398  488
       government   97   74  120    0  218  112   92
```

In [106]:

```
cfd = nltk.ConditionalFreqDist(
    (genre, word)
    for genre in brown.categories()
    for word in brown.words(categories=genre))
genres = ['news', 'religion', 'hobbies', 'science_fiction', 'romance',
'humor', 'editorial', 'belles_lettres', 'government']
others = ['love', 'family', 'entertainment', 'important', "society"]
cfd.tabulate(conditions=genres, samples=others)
```

```
                      love        family entertainment     important     society
            news         3            41             7            13          12
        religion        13            20             2            17          10
         hobbies         6            25             2            40           3
  science_fiction        3             1             0             2           0
         romance        32            23             0             4           1
           humor         4             6             1             7           2
       editorial        13            14             0            16           2
    belles_lettres      68            54             2            61          78
        government       1            10             7            44           3
```