

## Milestone 2

### Cleaning, Formatting Flat File Source

In [1]: 54/869

Out[1]: 0.06214039125431531

```
In [2]: import pandas as pd
import numpy as np
import os
# os.chdir('Downloads')
```

```
In [3]: np_complete = pd.read_csv('complete.csv')
pd.set_option('display.max_columns', None)
np_complete.head()
```

Out[3]:

	awardYear	category	categoryFullName	sortOrder	portion	prizeAmount	prizeAmountAdjusted
--	-----------	----------	------------------	-----------	---------	-------------	---------------------

0	2001	Economic Sciences	The Sveriges Riksbank Prize in Economic Scienc...	2	1/3	10000000	12295082
1	1975	Physics	The Nobel Prize in Physics	1	1/3	630000	3404179
2	2004	Chemistry	The Nobel Prize in Chemistry	1	1/3	10000000	11762861
3	1982	Chemistry	The Nobel Prize in Chemistry	1	1	1150000	3102518
4	1979	Physics	The Nobel Prize in Physics	2	1/3	800000	2988048

In [4]: np\_complete.shape

Out[4]: (950, 52)

```
In [5]: np_complete.info()
```

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 950 entries, 0 to 949
Data columns (total 52 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   awardYear                            950 non-null    int64
1   category                             950 non-null    object
2   categoryFullName                     950 non-null    object
3   sortOrder                            950 non-null    int64
4   portion                             950 non-null    object
5   prizeAmount                         950 non-null    int64
6   prizeAmountAdjusted                 950 non-null    int64
7   dateAwarded                         533 non-null    object
8   prizeStatus                         950 non-null    object
9   motivation                          950 non-null    object
10  categoryTopMotivation                20 non-null     object
11  award_link                           950 non-null    object
12  id                                   950 non-null    int64
13  name                                950 non-null    object
14  knownName                           923 non-null    object
15  givenName                           923 non-null    object
16  familyName                           921 non-null    object
17  fullName                             923 non-null    object
18  penName                              11 non-null     object
19  gender                              923 non-null    object
20  laureate_link                       950 non-null    object
21  birth_date                          923 non-null    object
22  birth_city                          922 non-null    object
23  birth_cityNow                       922 non-null    object
24  birth_continent                     923 non-null    object
25  birth_country                       923 non-null    object
26  birth_countryNow                    923 non-null    object
27  birth_locationString                923 non-null    object
28  death_date                          630 non-null    object
29  death_city                          611 non-null    object
30  death_cityNow                       611 non-null    object
31  death_continent                     617 non-null    object
32  death_country                       617 non-null    object
33  death_countryNow                    617 non-null    object
34  death_locationString                618 non-null    object
35  orgName                             27 non-null     object
36  nativeName                          27 non-null     object
37  acronym                             11 non-null     object
38  org_founded_date                    26 non-null     object
39  org_founded_city                    22 non-null     object
40  org_founded_cityNow                 22 non-null     object
41  org_founded_continent               24 non-null     object
42  org_founded_country                 24 non-null     object
43  org_founded_countryNow              24 non-null     object
44  org_founded_locationString          24 non-null     object
45  ind_or_org                          950 non-null    object
46  residence_1                         219 non-null    object
47  residence_2                         2 non-null      object
48  affiliation_1                       697 non-null    object
49  affiliation_2                       67 non-null     object
50  affiliation_3                       2 non-null      object
51  affiliation_4                       1 non-null      object
dtypes: int64(5), object(47)
memory usage: 386.1+ KB

```

```
In [6]: np_complete.isnull().sum()
```

```
Out[6]: awardYear          0
category          0
categoryFullName  0
sortOrder         0
portion           0
prizeAmount       0
prizeAmountAdjusted 0
dateAwarded       417
prizeStatus       0
motivation        0
categoryTopMotivation 930
award_link        0
id               0
name             0
knownName        27
givenName        27
familyName       29
fullName         27
penName          939
gender           27
laureate_link     0
birth_date       27
birth_city       28
birth_cityNow    28
birth_continent  27
birth_country    27
birth_countryNow 27
birth_locationString 27
death_date       320
death_city       339
death_cityNow    339
death_continent  333
death_country    333
death_countryNow 333
death_locationString 332
orgName          923
nativeName       923
acronym          939
org_founded_date 924
org_founded_city 928
org_founded_cityNow 928
org_founded_continent 926
org_founded_country 926
org_founded_countryNow 926
org_founded_locationString 926
ind_or_org       0
residence_1      731
residence_2      948
affiliation_1     253
affiliation_2     883
affiliation_3     948
affiliation_4     949
dtype: int64
```

```
In [7]: np_complete.columns
```

```
Out[7]: Index(['awardYear', 'category', 'categoryFullName', 'sortOrder', 'portion',
      'prizeAmount', 'prizeAmountAdjusted', 'dateAwarded', 'prizeStatus',
      'motivation', 'categoryTopMotivation', 'award_link', 'id', 'name',
      'knownName', 'givenName', 'familyName', 'fullName', 'penName', 'gender',
      'laureate_link', 'birth_date', 'birth_city', 'birth_cityNow',
      'birth_continent', 'birth_country', 'birth_countryNow',
      'birth_locationString', 'death_date', 'death_city', 'death_cityNow',
      'death_continent', 'death_country', 'death_countryNow',
      'death_locationString', 'orgName', 'nativeName', 'acronym',
      'org_founded_date', 'org_founded_city', 'org_founded_cityNow',
      'org_founded_continent', 'org_founded_country',
      'org_founded_countryNow', 'org_founded_locationString', 'ind_or_org',
      'residence_1', 'residence_2', 'affiliation_1', 'affiliation_2',
      'affiliation_3', 'affiliation_4'],
      dtype='object')
```

**Step 1: Remove many columns with null values, and keep necessary columns. This will solve a large part of the null value problem so present in the df. Keep columns that may be necessary for the EDA, and decide on a case by case basis how to deal with the NaNs.**

```
In [8]: new_flat_df = np_complete[['awardYear', 'category', 'categoryFullName', 'portion', 'pri
      'dateAwarded', 'name', 'knownName', 'givenName', 'familyName',
      'death_date']]

new_flat_df
```

Out[8]:

	awardYear	category	categoryFullName	portion	prizeAmount	prizeAmountAdjusted	dateAwarded
<b>0</b>	2001	Economic Sciences	The Sveriges Riksbank Prize in Economic Scienc...	1/3	10000000	12295082	2001-10
<b>1</b>	1975	Physics	The Nobel Prize in Physics	1/3	630000	3404179	1975-10
<b>2</b>	2004	Chemistry	The Nobel Prize in Chemistry	1/3	10000000	11762861	2004-10
<b>3</b>	1982	Chemistry	The Nobel Prize in Chemistry	1	1150000	3102518	1982-10
<b>4</b>	1979	Physics	The Nobel Prize in Physics	1/3	800000	2988048	1979-10
...	...	...	...	...	...	...	...
<b>945</b>	1972	Physics	The Nobel Prize in Physics	1/3	480000	3345725	1972-10
<b>946</b>	1954	Chemistry	The Nobel Prize in Chemistry	1	181647	2640218	1954-10
<b>947</b>	1911	Chemistry	The Nobel Prize in Chemistry	1	140695	7327865	1911-10
<b>948</b>	1981	Peace	The Nobel Peace Prize	1	1000000	2929688	1981-10
<b>949</b>	1963	Peace	The Nobel Peace Prize	1/2	265000	2839286	1963-10

950 rows × 14 columns

In [9]: `new_flat_df.isnull().sum()`

```
Out[9]:
awardYear          0
category           0
categoryFullName   0
portion            0
prizeAmount        0
prizeAmountAdjusted 0
dateAwarded       417
name               0
knownName         27
givenName         27
familyName        29
gender            27
birth_date        27
death_date       320
dtype: int64
```

In [10]: `new_flat_df.dtypes`

```
Out[10]: awardYear      int64
category    object
categoryFullName  object
portion     object
prizeAmount  int64
prizeAmountAdjusted  int64
dateAwarded  object
name         object
knownName    object
givenName    object
familyName   object
gender       object
birth_date   object
death_date   object
dtype: object
```

**Step 2: These three date columns are object strings. Use datetime to convert them to datetime objects and enable to work with as dates.**

```
In [11]: new_flat_df[['dateAwarded', 'birth_date', 'death_date']] = new_flat_df[['dateAwarded',
      .apply(pd.to_datetime, errors='coerce')]
```

C:\Users\Admin\AppData\Local\Temp\ipykernel\_14880\3613623049.py:1: SettingWithCopyWarning:  
A value is trying to be set on a copy of a slice from a DataFrame.  
Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)

```
new_flat_df[['dateAwarded', 'birth_date', 'death_date']] = new_flat_df[['dateAwarded', 'birth_date', 'death_date']]\
```

```
In [12]: new_flat_df[['dateAwarded', 'birth_date', 'death_date']]
```

```
Out[12]:
```

	dateAwarded	birth_date	death_date
0	2001-10-10	NaT	NaT
1	1975-10-17	1922-06-19	2009-09-08
2	2004-10-06	1947-10-01	NaT
3	1982-10-18	1926-08-11	2018-11-20
4	1979-10-15	1926-01-29	1996-11-21
...	...	...	...
945	NaT	1908-05-23	1991-01-30
946	NaT	1901-02-28	1994-08-19
947	NaT	1867-11-07	1934-07-04
948	1981-10-14	NaT	NaT
949	1963-10-10	NaT	NaT

950 rows × 3 columns

```
In [13]: new_flat_df.dtypes
```

```
Out[13]:
```

awardYear	int64
category	object
categoryFullName	object
portion	object
prizeAmount	int64
prizeAmountAdjusted	int64
dateAwarded	datetime64[ns]
name	object
knownName	object
givenName	object
familyName	object
gender	object
birth_date	datetime64[ns]
death_date	datetime64[ns]
dtype:	object

```
In [14]: new_flat_df.isnull().sum()
```

```
Out[14]:
```

awardYear	0
category	0
categoryFullName	0
portion	0
prizeAmount	0
prizeAmountAdjusted	0
dateAwarded	417
name	0
knownName	27
givenName	27
familyName	29
gender	27
birth_date	33
death_date	320
dtype:	int64



In [ ]:

## Explore different groupings.

In [15]: `new_flat_df['portion'].unique()`Out[15]: `array(['1/3', '1', '1/4', '1/2'], dtype=object)`In [16]: `new_flat_df['category'].unique()`Out[16]: `array(['Economic Sciences', 'Physics', 'Chemistry', 'Peace',  
 'Physiology or Medicine', 'Literature'], dtype=object)`In [17]: `new_flat_df['categoryFullName'].unique()`Out[17]: `array(['The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel',  
 'The Nobel Prize in Physics', 'The Nobel Prize in Chemistry',  
 'The Nobel Peace Prize',  
 'The Nobel Prize in Physiology or Medicine',  
 'The Nobel Prize in Literature'], dtype=object)`In [18]: `new_flat_df['prizeAmountAdjusted'].describe()`Out[18]: 

```
count    9.500000e+02
mean     6.145681e+06
std      3.276874e+06
min      2.377268e+06
25%      3.052326e+06
50%      4.997406e+06
75%      9.044276e+06
max      1.229508e+07
Name: prizeAmountAdjusted, dtype: float64
```

In [19]: `new_flat_df['prizeAmountAdjusted'].mean()`Out[19]: `6145680.669473684`In [20]: `new_flat_df['birth_date'].sort_values()`Out[20]: 

```
850    1817-11-30
260    1822-05-20
705    1828-03-18
360    1828-05-08
78     1829-07-26
...
877         NaT
880         NaT
944         NaT
948         NaT
949         NaT
Name: birth_date, Length: 950, dtype: datetime64[ns]
```

In [21]: `new_flat_df['birth_date'].describe()`

C:\Users\Admin\AppData\Local\Temp\ipykernel\_14880\2148452641.py:1: FutureWarning: Treating datetime data as categorical rather than numeric in `.describe` is deprecated and will be removed in a future version of pandas. Specify `datetime_is_numeric=True` to silence this warning and adopt the future behavior now.

```
new_flat_df['birth_date'].describe()
```

```
Out[21]: count          917
unique         900
top    1941-05-31 00:00:00
freq           2
first    1817-11-30 00:00:00
last     1997-07-12 00:00:00
Name: birth_date, dtype: object
```

```
In [22]: new_flat_df['birth_date'].describe(datetime_is_numeric=True)
```

```
Out[22]: count          917
mean    1911-07-16 04:09:41.025081856
min      1817-11-30 00:00:00
25%      1891-10-20 00:00:00
50%      1917-03-24 00:00:00
75%      1936-03-28 00:00:00
max      1997-07-12 00:00:00
Name: birth_date, dtype: object
```

```
In [23]: from dateutil import relativedelta
```

## Step 3: Create column 'years\_lived' to represent lifespan. Use `np.timedelta64` to compute lifespans from birth date and death date.

```
In [24]: # Calculate lifespan
new_flat_df['years_lived'] = (new_flat_df['death_date'] - new_flat_df['birth_date']) /
new_flat_df['years_lived']
```

C:\Users\Admin\AppData\Local\Temp\ipykernel\_14880\212087586.py:2: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame.  
Try using `.loc[row_indexer,col_indexer] = value` instead

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)

```
new_flat_df['years_lived'] = (new_flat_df['death_date'] - new_flat_df['birth_date']) / np.timedelta64(1, 'Y')
```

```
Out[24]: 0      NaN
1      87.224241
2      NaN
3      92.278418
4      70.813227
...
945    82.690267
946    93.472145
947    66.654346
948     NaN
949     NaN
Name: years_lived, Length: 950, dtype: float64
```

```
In [25]: # Round down to lower integer to get age in years
new_flat_df['years_lived'] = new_flat_df['years_lived'].apply(np.floor)
new_flat_df['years_lived']
```

C:\Users\Admin\AppData\Local\Temp\ipykernel\_14880\935813651.py:2: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame.  
Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)

```
new_flat_df['years_lived'] = new_flat_df['years_lived'].apply(np.floor)
```

```
Out[25]: 0      NaN
1      87.0
2      NaN
3      92.0
4      70.0
...
945    82.0
946    93.0
947    66.0
948     NaN
949     NaN
Name: years_lived, Length: 950, dtype: float64
```

```
In [26]: new_flat_df
```

Out[26]:

	awardYear	category	categoryFullName	portion	prizeAmount	prizeAmountAdjusted	dateAwarded
0	2001	Economic Sciences	The Sveriges Riksbank Prize in Economic Scienc...	1/3	10000000	12295082	2001-10
1	1975	Physics	The Nobel Prize in Physics	1/3	630000	3404179	1975-10
2	2004	Chemistry	The Nobel Prize in Chemistry	1/3	10000000	11762861	2004-10
3	1982	Chemistry	The Nobel Prize in Chemistry	1	1150000	3102518	1982-10
4	1979	Physics	The Nobel Prize in Physics	1/3	800000	2988048	1979-10
...	...	...	...	...	...	...	...
945	1972	Physics	The Nobel Prize in Physics	1/3	480000	3345725	
946	1954	Chemistry	The Nobel Prize in Chemistry	1	181647	2640218	
947	1911	Chemistry	The Nobel Prize in Chemistry	1	140695	7327865	
948	1981	Peace	The Nobel Peace Prize	1	1000000	2929688	1981-10
949	1963	Peace	The Nobel Peace Prize	1/2	265000	2839286	1963-10

950 rows × 15 columns

```
In [27]: duplicate_Rows = new_flat_df[new_flat_df.duplicated()]
duplicate_Rows
```

```
Out[27]: awardYear category categoryFullName portion prizeAmount prizeAmountAdjusted dateAwarded
```

**Step 4: Explore different groupings for average age. Display laureates by prize category and gender. Show numbers of laureates per gender, per prize. Initiate variables to hold grouped values.**

```
In [28]: new_flat_df.groupby('gender')['years_lived'].mean()
```

```
Out[28]: gender
female    78.392857
male      79.948419
Name: years_lived, dtype: float64
```

```
In [29]: avg_lifespan_by_category_by_sex = new_flat_df.groupby(['categoryFullName', 'gender'])[
avg_lifespan_by_category_by_sex
```

```
Out[29]: categoryFullName      gender
The Nobel Peace Prize      female
79.571429
                                     male
76.925373
The Nobel Prize in Literature      female
79.700000
                                     male
78.853933
The Nobel Prize in Chemistry      female
69.333333
                                     male
78.848739
The Nobel Prize in Physics      female
65.500000
                                     male
80.299270
The Nobel Prize in Physiology or Medicine      female
84.800000
                                     male
80.851351
The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel      female
78.000000
                                     male
86.024390
Name: years_lived, dtype: float64
```

```
In [30]: new_flat_df['gender'].value_counts()
```

```
Out[30]: male      869
female    54
Name: gender, dtype: int64
```

```
In [31]: gendercount_by_category = new_flat_df.groupby('categoryFullName')['gender'].value_cour
gendercount_by_category
```

```
Out[31]: categoryFullName                                     gender
The Nobel Peace Prize                                     male
90
                                                    female
17
The Nobel Prize in Literature                             male
101
                                                    female
15
The Nobel Prize in Chemistry                             male
179
                                                    female
5
The Nobel Prize in Physics                               male
210
                                                    female
3
The Nobel Prize in Physiology or Medicine                male
207
                                                    female
12
The Sveriges Riksbank Prize in Economic Sciences in      male
Memory of Alfred Nobel
82
                                                    female
2
Name: gender, dtype: int64

In [32]: prize_portion_by_gender_age = new_flat_df.groupby(['categoryFullName', 'gender', 'port
prize_portion_by_gender_age
```

```

Out[32]: categoryFullName                                gender  p
ortion
The Nobel Peace Prize                                female  1
76.333333

1/2          82.000000

1/3          NaN
76.272727
male        1

1/2          77.290323

1/3          80.333333
The Nobel Prize in Literature                        female  1
79.888889

1/2          78.000000
78.939024
male        1

1/2          77.857143
The Nobel Prize in Chemistry                        female  1
75.000000

1/2          58.000000

1/3          NaN
76.309091
male        1

1/2          80.714286

1/3          79.666667

1/4          84.000000
The Nobel Prize in Physics                          female
1/4          65.500000
male        1
77.304348

1/2          82.309091

1/3          81.333333

1/4          80.500000
The Nobel Prize in Physiology or Medicine           female  1
90.000000

1/2          96.000000

1/3          81.000000

1/4          61.000000
male        1
74.142857

1/2          81.375000

1/3          84.278689

```

```

1/4      81.000000
The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel  female
1/2      78.000000

1/3      NaN
male      1
88.437500

1/2      85.263158

1/3      82.000000
Name: years_lived, dtype: float64

```

```
In [33]: new_flat_df.groupby(['categoryFullName', 'gender'])['portion'].value_counts()
```



categoryFullName			gender	p
ortion				
The Nobel Peace Prize			female	
1/2	8			1
6				
1/3	3			
45			male	1
1/2	42			
1/3	3			
The Nobel Prize in Literature			female	1
14				
1/2	1			
94			male	1
1/2	7			
The Nobel Prize in Chemistry			female	1
2				
1/2	2			
1/3	1			
61			male	1
1/2	52			
1/3	50			
1/4	16			
The Nobel Prize in Physics			female	
1/4	3			
			male	
1/2	82			
1/3	48			
				1
47				
1/4	33			
The Nobel Prize in Physiology or Medicine			female	
1/2	4			
1/3	4			
1/4	3			
				1
1				
			male	
1/3	86			
1/2	70			
				1
38				

```

1/4      13
The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel  female
1/2      1

1/3      1
male

1/2      37
1
25

1/3      20
Name: portion, dtype: int64

```

```
In [34]: new_flat_df.groupby(['gender'])['portion'].value_counts()
```

```

Out[34]: gender  portion
female  1          23
        1/2        16
        1/3         9
        1/4         6
male    1         310
        1/2        290
        1/3        207
        1/4         62
Name: portion, dtype: int64

```

```
In [35]: new_flat_df.groupby(['gender', 'portion'])['years_lived'].mean()
```

```

Out[35]: gender  portion
female  1          79.200000
        1/2        81.555556
        1/3        81.000000
        1/4        64.000000
male    1          77.726592
        1/2        81.108911
        1/3        82.849057
        1/4        81.923077
Name: years_lived, dtype: float64

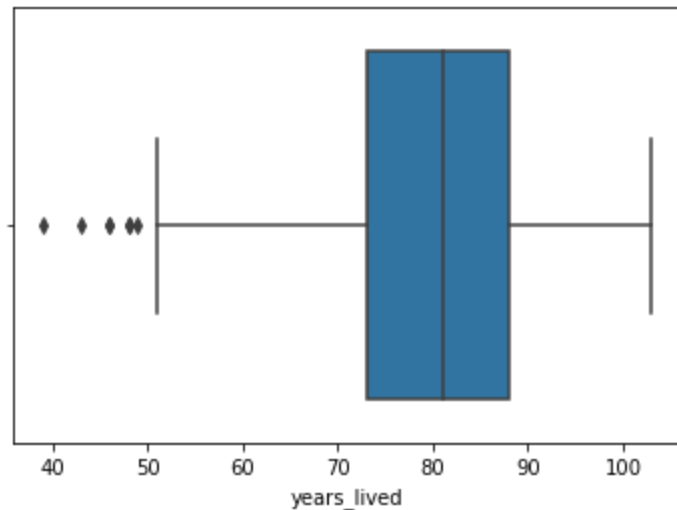
```

```
In [36]: import seaborn as sns
sns.boxplot(new_flat_df.years_lived)
```

C:\Users\Admin\anaconda3\lib\site-packages\seaborn\\_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.

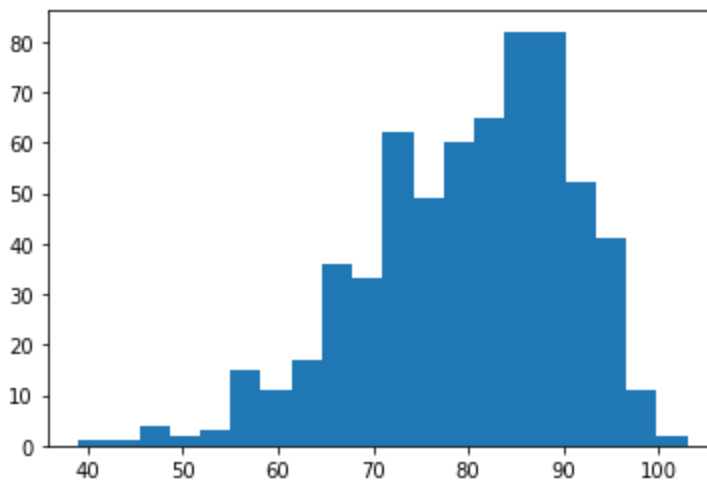
```
warnings.warn(
```

```
Out[36]: <AxesSubplot:xlabel='years_lived'>
```



```
In [37]: import matplotlib.pyplot as plt
plt.hist(new_flat_df.years_lived, 20)
```

```
Out[37]: (array([ 1.,  1.,  4.,  2.,  3., 15., 11., 17., 36., 33., 62., 49., 60.,
        65., 82., 82., 52., 41., 11.,  2.]),
array([ 39. ,  42.2,  45.4,  48.6,  51.8,  55. ,  58.2,  61.4,  64.6,
        67.8,  71. ,  74.2,  77.4,  80.6,  83.8,  87. ,  90.2,  93.4,
        96.6,  99.8, 103. ]),
<BarContainer object of 20 artists>)
```



```
In [ ]:
```

## Step 5: Use fuzzy matching on 2 name columns

I anticipate merging on names. Will try to assess best names to use. Will get a score comparing the two strings and will make new bool column displaying close matches.

```
In [38]: # Compare 2 of the name columns
new_flat_df['name'].tail(), new_flat_df['knownName'].tail()
```

```
Out[38]: (945          John Bardeen
946          Linus Pauling
947          Marie Curie
948  Office of the United Nations High Commissioner...
949          International Committee of the Red Cross
Name: name, dtype: object,
945          John Bardeen
946          Linus Pauling
947          Marie Curie
948                NaN
949                NaN
Name: knownName, dtype: object)
```

```
In [39]: # !pip install fuzzywuzzy
# !pip install python-Levenshtein
```

```
In [40]: from fuzzywuzzy import fuzz
from fuzzywuzzy import process, fuzz
```

```
In [41]: new_flat_df['name'].isna().sum()
```

```
Out[41]: 0
```

```
In [42]: new_flat_df['knownName'].isna().sum()
```

```
Out[42]: 27
```

```
In [43]: # Compare columns to check for equal values
new_flat_df['name'].equals(new_flat_df['knownName'])
```

```
Out[43]: False
```

```
In [44]: new_flat_df['name_matches'] = new_flat_df['name'].map(lambda x : process.extractOne(x,
```

C:\Users\Admin\AppData\Local\Temp\ipykernel\_14880\2169242408.py:1: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame.  
Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)

```
new_flat_df['name_matches'] = new_flat_df['name'].map(lambda x : process.extractOne(x, new_flat_df['knownName'])[1])
```

```
In [45]: new_flat_df['name_matches']
```

```
Out[45]: 0      100
         1      100
         2      100
         3      100
         4      100
         ...
        945     100
        946     100
        947     100
        948      86
        949      86
        Name: name_matches, Length: 950, dtype: int64
```

```
In [46]: type(new_flat_df['name_matches'])
```

```
Out[46]: pandas.core.series.Series
```

```
In [47]: new_flat_df[['name', 'knownName', 'name_matches']]
```

```
Out[47]:
```

	name	knownName	name_matches
0	A. Michael Spence	A. Michael Spence	100
1	Aage N. Bohr	Aage N. Bohr	100
2	Aaron Ciechanover	Aaron Ciechanover	100
3	Aaron Klug	Aaron Klug	100
4	Abdus Salam	Abdus Salam	100
...	...	...	...
945	John Bardeen	John Bardeen	100
946	Linus Pauling	Linus Pauling	100
947	Marie Curie	Marie Curie	100
948	Office of the United Nations High Commissioner...	NaN	86
949	International Committee of the Red Cross	NaN	86

950 rows × 3 columns

```
In [48]: new_flat_df['good_matches'] = new_flat_df['name_matches'] > 86
```

C:\Users\Admin\AppData\Local\Temp\ipykernel\_14880\1507015793.py:1: SettingWithCopyWarning:  
A value is trying to be set on a copy of a slice from a DataFrame.  
Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)

```
new_flat_df['good_matches'] = new_flat_df['name_matches'] > 86
```

```
In [49]: new_flat_df.head(10)
```

Out[49]:

	awardYear	category	categoryFullName	portion	prizeAmount	prizeAmountAdjusted	dateAwarde
0	2001	Economic Sciences	The Sveriges Riksbank Prize in Economic Scienc...	1/3	10000000	12295082	2001-10-1
1	1975	Physics	The Nobel Prize in Physics	1/3	630000	3404179	1975-10-1
2	2004	Chemistry	The Nobel Prize in Chemistry	1/3	10000000	11762861	2004-10-0
3	1982	Chemistry	The Nobel Prize in Chemistry	1	1150000	3102518	1982-10-1
4	1979	Physics	The Nobel Prize in Physics	1/3	800000	2988048	1979-10-1
5	2019	Economic Sciences	The Sveriges Riksbank Prize in Economic Scienc...	1/3	9000000	9000000	2019-10-1
6	2019	Peace	The Nobel Peace Prize	1	9000000	9000000	2019-10-1
7	2009	Chemistry	The Nobel Prize in Chemistry	1/3	10000000	10958504	2009-10-0
8	2011	Physics	The Nobel Prize in Physics	1/4	10000000	10545557	2011-10-0
9	1939	Chemistry	The Nobel Prize in Chemistry	1/2	148822	4227898	Na

In [50]:

```
flat_file_df = new_flat_df[['awardYear', 'category', 'portion', 'prizeAmountAdjusted',
```

In [51]:

```
flat_file_df.head()
```

Out[51]:

	awardYear	category	portion	prizeAmountAdjusted	knownName	gender	years_lived
0	2001	Economic Sciences	1/3	12295082	A. Michael Spence	male	NaN
1	1975	Physics	1/3	3404179	Aage N. Bohr	male	87.0
2	2004	Chemistry	1/3	11762861	Aaron Ciechanover	male	NaN
3	1982	Chemistry	1	3102518	Aaron Klug	male	92.0
4	1979	Physics	1/3	2988048	Abdus Salam	male	70.0

# Ethical implications of EDA

There are several ethical implications involved in the EDA of this flat file. One must

deal with thousands of nulls. Many of the 52 columns are not necessary for the analysis and therefore can be dropped, obviating the need to address those many null values in the dropped columns. I left the remaining null values intact, preferring not to impute by deciding the best metric which will not alter the model due to its inexactness. Fuzzy matching is used to compare strings which are of unequal value. One must beware of false positives. Is the gain of using Fuzzy worth the downside? I mitigate the errors by setting the score for a match to be more than 86. I anticipate merging dfs and replacing nulls with real values. One must consider outliers in age and decide if they will adversely affect any extrapolations. Most concerning, however, is the small number of female laureates. Females represent such a small proportion of winners. Can one extrapolate anything meaningful from such a small sample. This problem is exacerbated when looking at female laureates by category. On such a granular level, females can be represented by single digits.

## Project: Milestone 3 Cleaning/Formatting Website Data

### Wiki table of life expectancy

```
In [52]: # Initialize variable to hold pandas read_html from a web path
wiki_page = pd.read_html('https://en.wikipedia.org/wiki/List_of_countries_by_past_life
```

```
In [53]: # pandas creates list from pd.read_html
         type(wiki_page)
```

```
Out[53]: list
```

## Inspect elements on web page and note only one table. Call first index with [0]

```
In [54]: table = wiki_page[0]
```

```
In [55]: # In tbody there is a long list of rows...231
         table.shape
```

```
Out[55]: (231, 14)
```

```
In [56]: # pandas created a df from the table in wiki_page list
         type(table)
```

```
Out[56]: pandas.core.frame.DataFrame
```

```
In [57]: table.head()
```

```
Out[57]:
```

	Country or subnational area	1950– 1955	1955– 1960	1960– 1965	1965– 1970	1970– 1975	1975– 1980	1980– 1985	1985– 1990	1990– 1995	1995– 2000	2000– 2005	2005– 2010
0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	Afghanistan*	28.61	31.12	33.41	35.58	37.83	40.39	43.56	47.70	51.74	54.17	56.89	60.00
2	Albania*	55.26	59.31	64.85	66.24	67.69	69.70	70.61	71.98	71.73	72.95	74.83	77.00
3	Algeria*	42.89	45.00	47.29	49.47	51.48	54.93	61.57	65.85	67.20	69.14	71.50	74.00
4	Angola*	31.39	32.54	34.09	36.04	38.05	40.00	40.89	41.48	42.22	44.73	49.98	55.00

```
In [58]: table.dtypes
```



```
Out[58]: Country or subnational area    object
1950-1955                             float64
1955-1960                             float64
1960-1965                             float64
1965-1970                             float64
1970-1975                             float64
1975-1980                             float64
1980-1985                             float64
1985-1990                             float64
1990-1995                             float64
1995-2000                             float64
2000-2005                             float64
2005-2010                             float64
2010-2015                             float64
dtype: object
```

```
In [59]: # Visualize North America row and note the steady rise in life expectancy
table[table['Country or subnational area']=='NORTH AMERICA']
```

```
Out[59]:
```

	Country or subnational area	1950- 1955	1955- 1960	1960- 1965	1965- 1970	1970- 1975	1975- 1980	1980- 1985	1985- 1990	1990- 1995	1995- 2000	2000- 2005
202	NORTH AMERICA	68.73	69.7	70.2	70.51	71.56	73.34	74.51	75.08	75.85	76.68	77.41

## Transformation 1. Assign countries to columns in order to use them as features.

```
In [60]: table_transposed = table.T
```

```
In [61]: table_transposed.shape
```

```
Out[61]: (14, 231)
```

```
In [62]: type(table_transposed)
```

```
Out[62]: pandas.core.frame.DataFrame
```

```
In [63]: countries = table['Country or subnational area']
countries
```

```
Out[63]: 0                NaN
1      Afghanistan *
2         Albania *
3         Algeria *
4         Angola *
...
226  Australia/New Zealand
227                Polynesia
228                Melanesia
229                Micronesia
230                World
Name: Country or subnational area, Length: 231, dtype: object
```

In [64]: `table_transposed.dtypes`

Out[64]:

```

0      object
1      object
2      object
3      object
4      object
...
226   object
227   object
228   object
229   object
230   object
Length: 231, dtype: object

```

In [65]: `table_transposed.describe()`

Out[65]:

	0	1	2	3	4	5	6	7	8
<b>count</b>	0	14	14	14	14	14	14	14	14
<b>unique</b>	0	14	14	14	14	14	14	14	14
<b>top</b>	NaN	Afghanistan *	Albania *	Algeria *	Angola *	Antigua and Barbuda	Argentina *	Armenia *	Aruba (Netherlands)
<b>freq</b>	NaN	1	1	1	1	1	1	1	1

**Transformation 2. Country or subnational area followed by year periods became the index. Remove it and leave an index of numbers starting at 0.**

In [66]: `table_transposed.head()`

Out[66]:

	0	1	2	3	4	5	6	7	
<b>Country or subnational area</b>	NaN	Afghanistan *	Albania *	Algeria *	Angola *	Antigua and Barbuda	Argentina *	Armenia *	Aruba (Netherlands)
<b>1950–1955</b>	NaN	28.61	55.26	42.89	31.39	58.51	62.57	62.82	60
<b>1955–1960</b>	NaN	31.12	59.31	45.0	32.54	61.03	64.58	64.92	64
<b>1960–1965</b>	NaN	33.41	64.85	47.29	34.09	63.18	65.31	67.04	66
<b>1965–1970</b>	NaN	35.58	66.24	49.47	36.04	65.05	65.84	69.18	68

```
In [67]: table_transposed.reset_index(level=0, inplace=True)
```

```
In [68]: table_transposed.head()
```

```
Out[68]:
```

	index	0	1	2	3	4	5	6	7
0	Country or subnational area	NaN	Afghanistan *	Albania *	Algeria *	Angola *	Antigua and Barbuda	Argentina *	Armenia * (Netherl
1	1950–1955	NaN	28.61	55.26	42.89	31.39	58.51	62.57	62.82
2	1955–1960	NaN	31.12	59.31	45.0	32.54	61.03	64.58	64.92
3	1960–1965	NaN	33.41	64.85	47.29	34.09	63.18	65.31	67.04
4	1965–1970	NaN	35.58	66.24	49.47	36.04	65.05	65.84	69.18

## Transformation 3. Set the first row as column names.

```
In [69]: table_transposed.columns = table_transposed.iloc[0]
```

```
In [70]: table_transposed.head()
```

```
Out[70]:
```

	Country or subnational area	NaN	Afghanistan *	Albania *	Algeria *	Angola *	Antigua and Barbuda	Argentina *	Armenia * (
0	Country or subnational area	NaN	Afghanistan *	Albania *	Algeria *	Angola *	Antigua and Barbuda	Argentina *	Armenia * (
1	1950–1955	NaN	28.61	55.26	42.89	31.39	58.51	62.57	62.82
2	1955–1960	NaN	31.12	59.31	45.0	32.54	61.03	64.58	64.92
3	1960–1965	NaN	33.41	64.85	47.29	34.09	63.18	65.31	67.04
4	1965–1970	NaN	35.58	66.24	49.47	36.04	65.05	65.84	69.18

## Remove first row

```
In [71]: table_transposed = table_transposed[1:]
```

```
In [72]: table_transposed.head()
```

Out[72]:

	Country or subnational area	NaN	Afghanistan *	Albania *	Algeria *	Angola *	Antigua and Barbuda	Argentina *	Armenia *	(f
1	1950–1955	NaN	28.61	55.26	42.89	31.39	58.51	62.57	62.82	
2	1955–1960	NaN	31.12	59.31	45.0	32.54	61.03	64.58	64.92	
3	1960–1965	NaN	33.41	64.85	47.29	34.09	63.18	65.31	67.04	
4	1965–1970	NaN	35.58	66.24	49.47	36.04	65.05	65.84	69.18	
5	1970–1975	NaN	37.83	67.69	51.48	38.05	66.71	67.28	70.75	

In [73]:

```
# Reset index values
table_transposed.reset_index(drop=True, inplace=True)
```

In [74]:

```
table_transposed.head()
```

Out[74]:

	Country or subnational area	NaN	Afghanistan *	Albania *	Algeria *	Angola *	Antigua and Barbuda	Argentina *	Armenia *	(f
0	1950–1955	NaN	28.61	55.26	42.89	31.39	58.51	62.57	62.82	
1	1955–1960	NaN	31.12	59.31	45.0	32.54	61.03	64.58	64.92	
2	1960–1965	NaN	33.41	64.85	47.29	34.09	63.18	65.31	67.04	
3	1965–1970	NaN	35.58	66.24	49.47	36.04	65.05	65.84	69.18	
4	1970–1975	NaN	37.83	67.69	51.48	38.05	66.71	67.28	70.75	

In [75]:

```
table_transposed.dtypes
```

Out[75]:

```
0
Country or subnational area    object
NaN                            object
Afghanistan *                  object
Albania *                      object
Algeria *                      object
...
Australia/New Zealand          object
Polynesia                      object
Melanesia                      object
Micronesia                     object
World                          object
Length: 232, dtype: object
```

In [76]:

```
table_transposed.describe()
```

Out[76]:

	Country or subnational area	NaN	Afghanistan *	Albania *	Algeria *	Angola *	Antigua and Barbuda	Argentina *	Armenia *
count	13	0	13.00	13.00	13.00	13.00	13.00	13.00	13.00
unique	13	0	13.00	13.00	13.00	13.00	13.00	13.00	13.00
top	1950–1955	NaN	28.61	55.26	42.89	31.39	58.51	62.57	62.57
freq	1	NaN	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Columns are all objects. Check for nulls which may preclude converting columns to floats.

In [77]: `table_transposed.isnull()`

Out[77]:

	Country or subnational area	NaN	Afghanistan *	Albania *	Algeria *	Angola *	Antigua and Barbuda	Argentina *	Armenia *
0	False	True	False	False	False	False	False	False	False
1	False	True	False	False	False	False	False	False	False
2	False	True	False	False	False	False	False	False	False
3	False	True	False	False	False	False	False	False	False
4	False	True	False	False	False	False	False	False	False
5	False	True	False	False	False	False	False	False	False
6	False	True	False	False	False	False	False	False	False
7	False	True	False	False	False	False	False	False	False
8	False	True	False	False	False	False	False	False	False
9	False	True	False	False	False	False	False	False	False
10	False	True	False	False	False	False	False	False	False
11	False	True	False	False	False	False	False	False	False
12	False	True	False	False	False	False	False	False	False

In [78]: `table_transposed.isnull().sum()`

```
Out[78]: 0
Country or subnational area    0
NaN                             13
Afghanistan *                  0
Albania *                      0
Algeria *                      0
..
Australia/New Zealand          0
Polynesia                      0
Melanesia                      0
Micronesia                     0
World                          0
Length: 232, dtype: int64
```

## Transformation 4. Remove 'NaN' column and convert df to floats.

```
In [79]: table_transposed = table_transposed.dropna(axis=1)
table_transposed
```

```
Out[79]:
```

	Country or subnational area	Afghanistan *	Albania *	Algeria *	Angola *	Antigua and Barbuda	Argentina *	Armenia *	(Nethe
0	1950–1955	28.61	55.26	42.89	31.39	58.51	62.57	62.82	
1	1955–1960	31.12	59.31	45.0	32.54	61.03	64.58	64.92	
2	1960–1965	33.41	64.85	47.29	34.09	63.18	65.31	67.04	
3	1965–1970	35.58	66.24	49.47	36.04	65.05	65.84	69.18	
4	1970–1975	37.83	67.69	51.48	38.05	66.71	67.28	70.75	
5	1975–1980	40.39	69.7	54.93	40.0	68.18	68.72	70.58	
6	1980–1985	43.56	70.61	61.57	40.89	69.54	70.21	70.9	
7	1985–1990	47.7	71.98	65.85	41.48	70.75	71.06	68.4	
8	1990–1995	51.74	71.73	67.2	42.22	71.88	72.2	68.07	
9	1995–2000	54.17	72.95	69.14	44.73	73.0	73.33	70.21	
10	2000–2005	56.89	74.83	71.5	49.98	74.02	74.39	72.35	
11	2005–2010	60.03	75.65	73.88	55.59	75.01	75.18	72.72	
12	2010–2015	62.25	77.66	75.27	60.19	75.82	76.01	73.98	

```
In [80]: table_transposed.isnull().sum()
```

```
Out[80]: 0
Country or subnational area    0
Afghanistan *                  0
Albania *                      0
Algeria *                      0
Angola *                       0
..
Australia/New Zealand          0
Polynesia                      0
Melanesia                      0
Micronesia                     0
World                          0
Length: 231, dtype: int64
```

```
In [81]: table_transposed.columns
```

```
Out[81]: Index(['Country or subnational area', 'Afghanistan *', 'Albania *',
              'Algeria *', 'Angola *', 'Antigua and Barbuda', 'Argentina *',
              'Armenia *', 'Aruba (Netherlands)', 'Australia *',
              ...,
              'Central Asia', 'Southern Asia', 'Eastern Asia', 'Southeast Asia',
              'OCEANIA', 'Australia/New Zealand', 'Polynesia', 'Melanesia',
              'Micronesia', 'World'],
              dtype='object', name=0, length=231)
```

```
In [82]: # Rename 'Country or subnational area' column
table_transposed.rename(columns = {'Country or subnational area': 'Time Periods'}, inplace=True)
```

```
In [83]: table_transposed.head()
```

```
Out[83]:
```

	Time Periods	Afghanistan*	Albania*	Algeria*	Angola*	Antigua and Barbuda	Argentina*	Armenia*	Arub (Netherland:
0	1950–1955	28.61	55.26	42.89	31.39	58.51	62.57	62.82	60.4
1	1955–1960	31.12	59.31	45.0	32.54	61.03	64.58	64.92	64.3
2	1960–1965	33.41	64.85	47.29	34.09	63.18	65.31	67.04	66.5
3	1965–1970	35.58	66.24	49.47	36.04	65.05	65.84	69.18	68.2
4	1970–1975	37.83	67.69	51.48	38.05	66.71	67.28	70.75	70.0

## Transformation 5 Convert several df columns to floats

```
In [84]: table_transposed.dtypes
```

```
Out[84]: 0
Time Periods      object
Afghanistan *     object
Albania *         object
Algeria *         object
Angola *          object
...
Australia/New Zealand object
Polynesia         object
Melanesia         object
Micronesia        object
World            object
Length: 231, dtype: object
```

```
In [85]: table_transposed = table_transposed.astype(float, errors='ignore')
```

```
In [86]: list(table_transposed)
```



```
Out[86]: ['Time Periods',  
          'Afghanistan\u202f*',  
          'Albania\u202f*',  
          'Algeria\u202f*',  
          'Angola\u202f*',  
          'Antigua and Barbuda',  
          'Argentina\u202f*',  
          'Armenia\u202f*',  
          'Aruba (Netherlands)',  
          'Australia\u202f*',  
          'Austria\u202f*',  
          'Azerbaijan\u202f*',  
          'Bahamas',  
          'Bahrain\u202f*',  
          'Bangladesh\u202f*',  
          'Barbados\u202f*',  
          'Belarus\u202f*',  
          'Belgium\u202f*',  
          'Belize\u202f*',  
          'Benin\u202f*',  
          'Bhutan\u202f*',  
          'Bolivia\u202f*',  
          'Bosnia and Herzegovina\u202f*',  
          'Botswana\u202f*',  
          'Brazil\u202f*',  
          'Brunei\u202f*',  
          'Bulgaria\u202f*',  
          'Burkina Faso\u202f*',  
          'Burundi\u202f*',  
          'Cambodia\u202f*',  
          'Cameroon\u202f*',  
          'Canada\u202f*',  
          'Cape Verde\u202f*',  
          'Central African Republic\u202f*',  
          'Chad\u202f*',  
          'Guernsey and Jersey\u202f* (UK)',  
          'Chile\u202f*',  
          'China\u202f*',  
          'Colombia\u202f*',  
          'Comoros\u202f*',  
          'Costa Rica\u202f*',  
          'Croatia\u202f*',  
          'Cuba\u202f*',  
          'Curaçao\u202f* (Netherlands)',  
          'Cyprus\u202f*',  
          'Czech Republic\u202f*',  
          'DR Congo\u202f*',  
          'Denmark\u202f*',  
          'Djibouti\u202f*',  
          'Dominican Republic\u202f*',  
          'Ecuador\u202f*',  
          'Egypt\u202f*',  
          'El Salvador\u202f*',  
          'Equatorial Guinea\u202f*',  
          'Eritrea\u202f*',  
          'Estonia\u202f*',  
          'Eswatini\u202f*',  
          'Ethiopia\u202f*',  
          'Micronesia\u202f*',  
          'Fiji\u202f*',
```

'Finland\u202f\*',  
'France\u202f\*',  
'French Guiana (France)',  
'French Polynesia (France)',  
'Gabon\u202f\*',  
'Gambia',  
'Georgia\u202f\*',  
'Germany\u202f\*',  
'Ghana\u202f\*',  
'Greece\u202f\*',  
'Grenada\u202f\*',  
'Guadeloupe (France)',  
'Guam\u202f\* (USA)',  
'Guatemala\u202f\*',  
'Guinea\u202f\*',  
'Guinea-Bissau\u202f\*',  
'Guyana\u202f\*',  
'Haiti\u202f\*',  
'Honduras\u202f\*',  
'Hong Kong\u202f\* (UK/China)',  
'Hungary\u202f\*',  
'Iceland\u202f\*',  
'India\u202f\*',  
'Indonesia\u202f\*',  
'Iran\u202f\*',  
'Iraq\u202f\*',  
'Ireland\u202f\*',  
'Israel\u202f\*',  
'Italy\u202f\*',  
'Ivory Coast\u202f\*',  
'Jamaica\u202f\*',  
'Japan\u202f\*',  
'Jordan\u202f\*',  
'Kazakhstan\u202f\*',  
'Kenya\u202f\*',  
'Kiribati\u202f\*',  
'Kuwait\u202f\*',  
'Kyrgyzstan\u202f\*',  
'Laos\u202f\*',  
'Latvia\u202f\*',  
'Lebanon\u202f\*',  
'Lesotho\u202f\*',  
'Liberia\u202f\*',  
'Lithuania\u202f\*',  
'Luxembourg\u202f\*',  
'Libya\u202f\*',  
'Macau\u202f\* (China)',  
'North Macedonia\u202f\*',  
'Madagascar\u202f\*',  
'Malawi\u202f\*',  
'Malaysia\u202f\*',  
'Maldives\u202f\*',  
'Mali\u202f\*',  
'Malta\u202f\*',  
'Martinique (France)',  
'Mauritania\u202f\*',  
'Mauritius\u202f\*',  
'Mayotte (France)',  
'Mexico\u202f\*',  
'Moldova\u202f\*',

'Mongolia\u202f\*',  
'Montenegro\u202f\*',  
'Morocco\u202f\*',  
'Mozambique\u202f\*',  
'Myanmar\u202f\*',  
'Namibia\u202f\*',  
'Nepal\u202f\*',  
'Netherlands\u202f\*',  
'New Caledonia (France)',  
'New Zealand\u202f\*',  
'Nicaragua\u202f\*',  
'Niger\u202f\*',  
'Nigeria\u202f\*',  
'North Korea\u202f\*',  
'Norway\u202f\*',  
'Oman\u202f\*',  
'Pakistan\u202f\*',  
'Palestine\u202f\*',  
'Panama\u202f\*',  
'Papua New Guinea\u202f\*',  
'Paraguay\u202f\*',  
'Peru\u202f\*',  
'Philippines\u202f\*',  
'Poland\u202f\*',  
'Portugal\u202f\*',  
'Puerto Rico (USA)',  
'Qatar\u202f\*',  
'Congo\u202f\*',  
'Romania\u202f\*',  
'Russia\u202f\*',  
'Rwanda\u202f\*',  
'Réunion\u202f\* (France)',  
'Saint Lucia\u202f\*',  
'Saint Vincent and the Grenadines\u202f\*',  
'Samoa\u202f\*',  
'São Tomé and Príncipe\u202f\*',  
'Saudi Arabia\u202f\*',  
'Senegal\u202f\*',  
'Serbia\u202f\*',  
'Seychelles\u202f\*',  
'Sierra Leone\u202f\*',  
'Singapore\u202f\*',  
'Slovakia\u202f\*',  
'Slovenia\u202f\*',  
'Solomon Islands\u202f\*',  
'Somalia\u202f\*',  
'South Africa\u202f\*',  
'South Korea\u202f\*',  
'South Sudan\u202f\*',  
'Spain\u202f\*',  
'Sri Lanka\u202f\*',  
'Sudan\u202f\*',  
'Suriname\u202f\*',  
'Sweden\u202f\*',  
'Switzerland\u202f\*',  
'Syria\u202f\*',  
'Tajikistan\u202f\*',  
'Taiwan\u202f\*',  
'Tanzania\u202f\*',  
'Thailand\u202f\*',

```
'East Timor\u202f*',
'Togo\u202f*',
'Tonga\u202f*',
'Trinidad and Tobago\u202f*',
'Tunisia\u202f*',
'Turkey\u202f*',
'Turkmenistan\u202f*',
'Uganda\u202f*',
'Ukraine\u202f*',
'United Arab Emirates\u202f*',
'United Kingdom\u202f*',
'United States\u202f*',
'U.S. Virgin Islands',
'Uruguay\u202f*',
'Uzbekistan\u202f*',
'Vanuatu\u202f*',
'Venezuela\u202f*',
'Vietnam\u202f*',
'Western Sahara\u202f*',
'Yemen\u202f*',
'Zambia\u202f*',
'Zimbabwe\u202f*',
'NORTH AMERICA',
'LATIN AMERICA',
'Central America',
'Caribbean',
'South America',
'EUROPE',
'Northern Europe',
'Western Europe',
'Southern Europe',
'Eastern Europe',
'AFRICA',
'Northern Africa',
'Sub-Saharan Africa',
'Western Africa',
'Middle Africa',
'Eastern Africa',
'Southern Africa',
'ASIA',
'Western Asia',
'Central Asia',
'Southern Asia',
'Eastern Asia',
'Southeast Asia',
'OCEANIA',
'Australia/New Zealand',
'Polynesia',
'Melanesia',
'Micronesia',
'World']
```

```
In [87]: table_transposed.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 13 entries, 0 to 12
Columns: 231 entries, Time Periods to World
dtypes: object(231)
memory usage: 23.6+ KB
```

```
In [88]: table_transposed['Afghanistan *'] = table_transposed['Afghanistan *'].astype(float)
```

```
In [89]: table_transposed.dtypes
```

```
Out[89]: 0
Time Periods      object
Afghanistan *     float64
Albania *         object
Algeria *         object
Angola *          object
...
Australia/New Zealand  object
Polynesia           object
Melanesia           object
Micronesia          object
World              object
Length: 231, dtype: object
```

```
In [90]: table_transposed['NORTH AMERICA'] = table_transposed['NORTH AMERICA'].astype(float)
```

```
In [91]: table_transposed['NORTH AMERICA'].dtype
```

```
Out[91]: dtype('float64')
```

```
In [92]: avg_lifespan_North_America = table_transposed['NORTH AMERICA'].mean()
avg_lifespan_North_America
```

```
Out[92]: 73.93461538461538
```

```
In [93]: table_transposed['NORTH AMERICA'].describe()
```

```
Out[93]: count      13.000000
mean       73.934615
std        3.524357
min        68.730000
25%        70.510000
50%        74.510000
75%        76.680000
max        79.170000
Name: NORTH AMERICA, dtype: float64
```

```
In [94]: first_time_period = table_transposed['NORTH AMERICA'].iloc[0]
first_time_period
```

```
Out[94]: 68.73
```

```
In [95]: table_transposed['United Kingdom\u202f*'].describe()
```

```
Out[95]: count      13.0
unique     13.0
top        69.4
freq       1.0
Name: United Kingdom *, dtype: float64
```

```
In [96]: table_transposed['United Kingdom\u202f*'] = table_transposed['United Kingdom\u202f*'].
```

```
In [97]: avg_lifespan_UK = table_transposed['United Kingdom\u202f*'].mean()  
avg_lifespan_UK
```

```
Out[97]: 74.60076923076923
```

```
In [98]: table_transposed['France\u202f*'] = table_transposed['France\u202f*'].astype(float)
```

```
In [99]: first_period_France = table_transposed['France\u202f*'].iloc[0]  
first_period_France
```

```
Out[99]: 67.05
```

```
In [100]: avg_lifespan_France = table_transposed['France\u202f*'].mean()  
avg_lifespan_France
```

```
Out[100]: 74.78999999999999
```

```
In [101]: table_transposed['United Kingdom\u202f*'].describe()
```

```
Out[101]: count      13.000000  
mean       74.600769  
std        3.688779  
min        69.400000  
25%        71.710000  
50%        74.200000  
75%        77.180000  
max        80.970000  
Name: United Kingdom *, dtype: float64
```

```
In [102]: first_period_UK = table_transposed['United Kingdom\u202f*'].iloc[0]  
first_period_UK
```

```
Out[102]: 69.4
```

```
In [103]: first_period_US = table_transposed['United States\u202f*'].iloc[0]  
first_period_US
```

```
Out[103]: 68.71
```

```
In [104]: table_transposed['United States\u202f*'].describe()
```

```
Out[104]: count      13.00  
unique     13.00  
top        68.71  
freq       1.00  
Name: United States *, dtype: float64
```

```
In [105]: table_transposed['United States\u202f*'] = table_transposed['United States\u202f*'].as
```

```
In [106]: avg_lifespan_US = table_transposed['United States\u202f*'].mean()  
avg_lifespan_US
```

```
Out[106]: 73.78307692307693
```

```
In [107]: table_transposed['United States\u202f*'].describe()
```

```
Out[107]: count    13.000000
mean      73.783077
std       3.450904
min       68.710000
25%      70.370000
50%      74.380000
75%      76.490000
max       78.880000
Name: United States *, dtype: float64
```

**Ethical Implications...** The table in this study comes from Wikipedia, whose entries are user-generated and potentially user-manipulated. Although studies have shown Wikipedia to be only as mistake-prone and inaccurate as other information sources, it would be appropriate to independently verify the results culled from such a page. Life expectancy entries per five-year time period are estimates of how long a person born during that period would live on average, were mortality rates to remain constant. These are perforce only estimates because mortality rates change over time. Therefore we should not expect that a baby born today will actually live the amount of years suggested by a table. The table does not account for life expectancy differences across genders. It is well documented how females live longer than males, and the reasons are many. We have yet to have a full understanding as to what drives the different mortality rates. We do not have demographics of the laureates and we do not know how the Wikipedia page's table was taken from a sample. Do the laureates

# have better access to healthcare than a sample representative of a country at large?

```
In [108... table_transposed.shape
```

```
Out[108]: (13, 231)
```

```
In [109... table_transposed_df = pd.concat([table_transposed, new_flat_df['knownName']], ignore_i
```

```
In [110... table_transposed_df.shape
```

```
Out[110]: (950, 232)
```

```
In [111... # Create 'avg_lifespan_1950' column from average lifespan in U.S. in 1950-1955  
table_transposed_df['avg_lifespan_1950'] = first_period_US
```

```
In [112... table_transposed_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>  
Int64Index: 950 entries, 0 to 949  
Columns: 233 entries, Time Periods to avg_lifespan_1950  
dtypes: float64(6), object(227)  
memory usage: 1.7+ MB
```

## Project: Milestone 4 Connecting to an API/Pulling in the Data and Cleaning/Formatting

```
In [113... # Use requests library to connect to API and access information  
import pandas as pd  
import requests  
  
url = "http://api.nobelprize.org/v1/laureate.json?gender=All"  
  
headers = {"accept": "application/json"}  
  
response = requests.get(url, headers=headers)  
  
print(response.text)
```



```

{"laureates":[{"id":"1","firstname":"Wilhelm Conrad","surname":"Roentgen","born":"1845-03-27","died":"1923-02-10","bornCountry":"Prussia (now Germany)","bornCountryCode":"DE","bornCity":"Lennep (now Remscheid)","diedCountry":"Germany","diedCountryCode":"DE","diedCity":"Munich","gender":"male","prizes":[{"year":"1901","category":"physics","share":"1","motivation":"\n in recognition of the extraordinary services he has rendered by the discovery of the remarkable rays subsequently named after him\n","affiliations":[{"name":"Munich University","city":"Munich","country":"Germany"}]}]},{id":"2","firstname":"Hendrik A.","surname":"Lorentz","born":"1853-07-18","died":"1928-02-04","bornCountry":"the Netherlands","bornCountryCode":"NL","bornCity":"Arnhem","diedCountry":"the Netherlands","diedCountryCode":"NL","gender":"male","prizes":[{"year":"1902","category":"physics","share":"2","motivation":"\n in recognition of the extraordinary service they rendered by their researches into the influence of magnetism upon radiation phenomena\n","affiliations":[{"name":"Leiden University","city":"Leiden","country":"the Netherlands"}]}]},{id":"3","firstname":"Pieter","surname":"Zeeman","born":"1865-05-25","died":"1943-10-09","bornCountry":"the Netherlands","bornCountryCode":"NL","bornCity":"Zonnemaire","diedCountry":"the Netherlands","diedCountryCode":"NL","diedCity":"Amsterdam","gender":"male","prizes":[{"year":"1902","category":"physics","share":"2","motivation":"\n in recognition of the extraordinary service they rendered by their researches into the influence of magnetism upon radiation phenomena\n","affiliations":[{"name":"Amsterdam University","city":"Amsterdam","country":"the Netherlands"}]}]},{id":"4","firstname":"Henri","surname":"Becquerel","born":"1852-12-15","died":"1908-08-25","bornCountry":"France","bornCountryCode":"FR","bornCity":"Paris","diedCountry":"France","diedCountryCode":"FR","gender":"male","prizes":[{"year":"1903","category":"physics","share":"2","motivation":"\n in recognition of the extraordinary services he has rendered by his discovery of spontaneous radioactivity\n","affiliations":[{"name":"\u00c9cole Polytechnique","city":"Paris","country":"France"}]}]},{id":"5","firstname":"Pierre","surname":"Curie","born":"1859-05-15","died":"1906-04-19","bornCountry":"France","bornCountryCode":"FR","bornCity":"Paris","diedCountry":"France","diedCountryCode":"FR","diedCity":"Paris","gender":"male","prizes":[{"year":"1903","category":"physics","share":"4","motivation":"\n in recognition of the extraordinary services they have rendered by their joint researches on the radiation phenomena discovered by Professor Henri Becquerel\n","affiliations":[{"name":"\u00c9cole municipale de physique et de chimie industrielles (Municipal School of Industrial Physics and Chemistry)","city":"Paris","country":"France"}]}]},{id":"6","firstname":"Marie","surname":"Curie","born":"1867-11-07","died":"1934-07-04","bornCountry":"Russian Empire (now Poland)","bornCountryCode":"PL","bornCity":"Warsaw","diedCountry":"France","diedCountryCode":"FR","diedCity":"Sallanches","gender":"female","prizes":[{"year":"1903","category":"physics","share":"4","motivation":"\n in recognition of the extraordinary services they have rendered by their joint researches on the radiation phenomena discovered by Professor Henri Becquerel\n","affiliations":[[]]},{year":"1911","category":"chemistry","share":"1","motivation":"\n in recognition of her services to the advancement of chemistry by the discovery of the elements radium and polonium, by the isolation of radium and the study of the nature and compounds of this remarkable element\n","affiliations":[{"name":"Sorbonne University","city":"Paris","country":"France"}]}]},{id":"8","firstname":"Lord","surname":"Rayleigh","born":"1842-11-12","died":"1919-06-30","bornCountry":"United Kingdom","bornCountryCode":"GB","bornCity":"Langford Grove, Maldon, Essex","diedCountry":"United Kingdom","diedCountryCode":"GB","gender":"male","prizes":[{"year":"1904","category":"physics","share":"1","motivation":"\n for his investigations of the densities of the most important gases and for his discovery of argon in connection with these studies\n","affiliations":[{"name":"Royal Institution of Great Britain","city":"London","country":"United Kingdom"}]}]},{id":"9","firstname":"Philipp","surname":"Lenard","born":"1862-06-07","died":"1947-05-20","bornCountry":"Hungary (now Slovakia)","bornCountryCode":"SK","bornCity":"Pressburg (now Bratislava)","diedCountry":"Germany","diedCountryCode":"DE","diedCity":"Messelhausen","gender":"male","prizes":[{"year":"1905","category":"physics","share":"1","motivation":"\n for his work on cathode rays\n","affiliations":[{"name":"Kiel University","city":"Kiel","country":"Germany"}]}]},{id":"10","firstname":"J.J.","surname":"Thomson","born":"1856-12-18","died":"1940-08-30","bornCountry":"United Kingdom","bornCountryCode":"GB","bornCity":"Cheetham Hill","diedCountry":"United Kingdom","diedCountryCode":"GB","diedCity":"Cambridge","gender":"male","pr

```

izes":[{"year":"1906","category":"physics","share":"1","motivation":"\n in recognition of the great merits of his theoretical and experimental investigations on the conduct ion of electricity by gases\\", "affiliations":[{"name":"University of Cambridge","cit y":"Cambridge","country":"United Kingdom"}]}],{"id":"11","firstname":"Albert A.,"su rname":"Michelson","born":"1852-12-19","died":"1931-05-09","bornCountry":"Prussia (no w Poland)","bornCountryCode":"PL","bornCity":"Strelno (now Strzelno)","diedCountr y":"USA","diedCountryCode":"US","diedCity":"Pasadena, CA","gender":"male","prizes": [{"year":"1907","category":"physics","share":"1","motivation":"\n for his optical prec ision instruments and the spectroscopic and metrological investigations carried out w ith their aid\\", "affiliations":[{"name":"University of Chicago","city":"Chicago, I L","country":"USA"}]}],{"id":"12","firstname":"Gabriel","surname":"Lippmann","bor n":"1845-08-16","died":"1921-07-13","bornCountry":"Luxembourg","bornCountryCode":"L U","bornCity":"Hollerich","gender":"male","prizes":[{"year":"1908","category":"physic s","share":"1","motivation":"\n for his method of reproducing colours photographically based on the phenomenon of interference\\", "affiliations":[{"name":"Sorbonne Universi ty","city":"Paris","country":"France"}]}],{"id":"13","firstname":"Guglielmo","surnam e":"Marconi","born":"1874-04-25","died":"1937-07-20","bornCountry":"Italy","bornCount ryCode":"IT","bornCity":"Bologna","diedCountry":"Italy","diedCountryCode":"IT","diedC ity":"Rome","gender":"male","prizes":[{"year":"1909","category":"physics","shar e":"2","motivation":"\n in recognition of their contributions to the development of wi reless telegraphy\\", "affiliations":[{"name":"Marconi Wireless Telegraph Co. Ltd.,"c ity":"London","country":"United Kingdom"}]}],{"id":"14","firstname":"Ferdinand","sur name":"Braun","born":"1850-06-06","died":"1918-04-20","bornCountry":"Hesse-Kassel (no w Germany)","bornCountryCode":"DE","bornCity":"Fulda","diedCountry":"USA","diedCountr yCode":"US","diedCity":"Brooklyn, NY","gender":"male","prizes":[{"year":"1909","categ ory":"physics","share":"2","motivation":"\n in recognition of their contributions to t he development of wireless telegraphy\\", "affiliations":[{"name":"Strasbourg Universi ty","city":"Strasbourg","country":"Germany (now France)"}]}],{"id":"15","firstnam e":"Johannes Diderik","surname":"van der Waals","born":"1837-11-23","died":"1923-03-0 8","bornCountry":"the Netherlands","bornCountryCode":"NL","bornCity":"Leiden","diedCo untry":"the Netherlands","diedCountryCode":"NL","diedCity":"Amsterdam","gender":"mal e","prizes":[{"year":"1910","category":"physics","share":"1","motivation":"\n for his work on the equation of state for gases and liquids\\", "affiliations":[{"name":"Amste rdam University","city":"Amsterdam","country":"the Netherlands"}]}],{"id":"16","firs tname":"Wilhelm","surname":"Wien","born":"1864-01-13","died":"1928-08-30","bornCountr y":"Prussia (now Russia)","bornCountryCode":"RU","bornCity":"Gaffken (now Parusnoy e)","diedCountry":"Germany","diedCountryCode":"DE","diedCity":"Munich","gender":"mal e","prizes":[{"year":"1911","category":"physics","share":"1","motivation":"\n for his discoveries regarding the laws governing the radiation of heat\\", "affiliations":[{"n ame":"W\u00fcrzburg University","city":"W\u00fcrzburg","country":"Germany"}]}],{"i d":"17","firstname":"Gustaf","surname":"Dal\u00e9n","born":"1869-11-30","died":"1937- 12-09","bornCountry":"Sweden","bornCountryCode":"SE","bornCity":"Stenstorp","diedCoun try":"Sweden","diedCountryCode":"SE","diedCity":"Stockholm","gender":"male","prizes": [{"year":"1912","category":"physics","share":"1","motivation":"\n for his invention of automatic regulators for use in conjunction with gas accumulators for illuminating li ghthouses and buoys\\", "affiliations":[{"name":"Swedish Gas-Accumulator Co.,"cit y":"Liding\u00f6, Stockholm","country":"Sweden"}]}],{"id":"18","firstname":"Heik e","surname":"Kamerlingh Onnes","born":"1853-09-21","died":"1926-02-21","bornCountr y":"the Netherlands","bornCountryCode":"NL","bornCity":"Groningen","diedCountry":"the Netherlands","diedCountryCode":"NL","diedCity":"Leiden","gender":"male","prizes":[{"y ear":"1913","category":"physics","share":"1","motivation":"\n for his investigations o n the properties of matter at low temperatures which led, inter alia, to the producti on of liquid helium\\", "affiliations":[{"name":"Leiden University","city":"Leiden","c ountry":"the Netherlands"}]}],{"id":"19","firstname":"Max","surname":"von Laue","bor n":"1879-10-09","died":"1960-04-23","bornCountry":"Germany","bornCountryCode":"DE","b ornCity":"Pfaffendorf","diedCountry":"West Germany (now Germany)","diedCountryCod e":"DE","diedCity":"Berlin","gender":"male","prizes":[{"year":"1914","category":"phys ics","share":"1","motivation":"\n for his discovery of the diffraction of X-rays by cr ystals\\", "affiliations":[{"name":"Frankfurt-on-the-Main University","city":"Frankfur t-on-the-Main","country":"Germany"}]}],{"id":"20","firstname":"William","surname":"B

ragg", "born": "1862-07-02", "died": "1942-03-12", "bornCountry": "United Kingdom", "bornCountryCode": "GB", "bornCity": "Wigton", "diedCountry": "United Kingdom", "diedCountryCode": "GB", "diedCity": "London", "gender": "male", "prizes": [{"year": "1915", "category": "physics", "share": "2", "motivation": "\"for their services in the analysis of crystal structure by means of X-rays\"", "affiliations": [{"name": "University College", "city": "London", "country": "United Kingdom"}]}], {"id": "21", "firstname": "Lawrence", "surname": "Bragg", "born": "1890-03-31", "died": "1971-07-01", "bornCountry": "Australia", "bornCountryCode": "AU", "bornCity": "Adelaide", "diedCountry": "United Kingdom", "diedCountryCode": "GB", "diedCity": "Ipswich", "gender": "male", "prizes": [{"year": "1915", "category": "physics", "share": "2", "motivation": "\"for their services in the analysis of crystal structure by means of X-rays\"", "affiliations": [{"name": "Victoria University", "city": "Manchester", 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services he rendered to the advancement of Physics by his discovery of energy quanta\"", "affiliations": [{"name": "Berlin University", "city": "Berlin", "country": "Germany"}]}], {"id": "24", "firstname": "Johannes", "surname": "Stark", "born": "1874-04-15", "died": "1957-06-21", "bornCountry": "Germany", "bornCountryCode": "DE", "bornCity": "Schickenhof", "diedCountry": "West Germany (now Germany)", "diedCountryCode": "DE", "diedCity": "Traunstein", "gender": "male", "prizes": [{"year": "1919", "category": "physics", "share": "1", "motivation": "\"for his discovery of the Doppler effect in canal rays and the splitting of spectral lines in electric fields\"", "affiliations": [{"name": "Greifswald University", "city": "Greifswald", "country": "Germany"}]}], {"id": "25", "firstname": "Charles Edouard", "surname": "Guillaume", "born": "1861-02-15", "died": "1938-06-13", "bornCountry": "Switzerland", "bornCountryCode": "CH", "bornCity": "Fleurier", "diedCountry": "France", 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NJ","country":"USA"}]}]},{id":"207","firstname":"Sir Robert","surname":"Robinson","born":"1886-09-13","died":"1975-02-08","bornCountry":"United Kingdom","bornCountryCode":"GB","bornCity":"Rufford, near Chesterfield","diedCountry":"United Kingdom","diedCountryCode":"GB","diedCity":"Great Missenden","gender":"male","prizes":[{"year":"1947","category":"chemistry","share":"1","motivation":"\nfor his investigations on plant products of biological importance, especially the alkaloids\n","affiliations":[{"name":"University of Oxford","city":"Oxford","country":"United Kingdom"}]}]},{id":"208","firstname":"Arne","surname":"Tiselius","born":"1902-08-10","died":"1971-10-29","bornCountry":"Sweden","bornCountryCode":"SE","bornCity":"Stockholm","diedCountry":"Sweden","diedCountryCode":"SE","diedCity":"Uppsala","gender":"male","prizes":[{"year":"1948","category":"chemistry","share":"1","motivation":"\nfor his research on electrophoresis and adsorption analysis, especially for his discoveries 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her determinations by X-ray techniques of the structures of important biochemical substances\","affiliations":[{"name":"University of Oxford, Royal Society","city":"Oxford","country":"United Kingdom"}]]]],{"id":"231","firstname":"Robert B.","surname":"Woodward","born":"1917-04-10","died":"1979-07-08","bornCountry":"USA","bornCountryCode":"US","bornCity":"Boston, MA","diedCountry":"USA","diedCountryCode":"US","diedCity":"Cambridge, MA","gender":"male","prizes":[{"year":"1965","category":"chemistry","share":"1","motivation":"\nfor his outstanding achievements in the art of organic synthesis\n","affiliations":[{"name":"Harvard University","city":"Cambridge, MA","country":"USA"}]]]],{"id":"232","firstname":"Robert S.","surname":"Mulliken","born":"1896-06-07","died":"1986-10-31","bornCountry":"USA","bornCountryCode":"US","bornCity":"Newburyport, MA","diedCountry":"USA","diedCountryCode":"US","diedCity":"Arlington, 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G.W.","surname":"Norrish","born":"1897-11-09","died":"1978-06-07","bornCountry":"United Kingdom","bornCountryCode":"GB","bornCity":"Cambridge","diedCountry":"United Kingdom","diedCountryCode":"GB","diedCity":"Cambridge","gender":"male","prizes":[{"year":"1967","category":"chemistry","share":"4","motivation":"\nfor their studies of extremely fast chemical reactions, effected by disturbing the equilibrium by means of very short pulses of energy\n","affiliations":[{"name":"Institute of Physical Chemistry","city":"Cambridge","country":"United Kingdom"}]]]],{"id":"235","firstname":"George","surname":"Porter","born":"1920-12-06","died":"2002-08-31","bornCountry":"United Kingdom","bornCountryCode":"GB","bornCity":"Stainforth","diedCountry":"United Kingdom","diedCountryCode":"GB","diedCity":"Canterbury","gender":"male","prizes":[{"year":"1967","category":"chemistry","share":"4","motivation":"\nfor their studies of extremely fast chemical reactions, effected by disturbing the equilibrium by 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TX","gender":"male","prizes":[{"year":"1969","category":"chemistry","share":"2","motivation":"\nfor their contributions to the development of the concept of conformation and its application in chemistry\n","affiliations":[{"name":"Imperial College","city":"London","country":"United Kingdom"}]]]],{"id":"238","firstname":"Odd","surname":"Hassel","born":"1897-05-17","died":"1981-05-11","bornCountry":"Norway","bornCountryCode":"NO","bornCity":"Kristiania (now Oslo)","diedCountry":"Norway","diedCountryCode":"NO","diedCity":"Oslo","gender":"male","prizes":[{"year":"1969","category":"chemistry","share":"2","motivation":"\nfor their contributions to the development of the concept of conformation and its application in chemistry\n","affiliations":[{"name":"University of 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to organize the world rallies of the international peace movement\"", "affiliations": [{}]}], {"id": "478", "firstname": "Tobias", "surname": "Asser", "born": "1838-04-28", "died": "1913-07-29", "bornCountry": "the Netherlands", "bornCountryCode": "NL", "bornCity": "Amsterdam", "diedCountry": "the Netherlands", "diedCountryCode": "NL", "diedCity": "the Hague", "gender": "male", "prizes": [{"year": "1911", "category": "p

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their families","affiliations":[[[]]]}],{"year":"1944","category":"peace","share":"1","motivation":"\nfor the great work it has performed during the war on behalf of humanity","affiliations":[[[]]]}],{"year":"1963","category":"peace","share":"2","motivation":"\nfor promoting the principles of the Geneva Convention and cooperation with the UN","affiliations":[[[]]]}],{"id":"483","firstname":"Woodrow","surname":"Wilson","born":"1856-12-28","died":"1924-02-03","bornCountry":"USA","bornCountryCode":"US","bornCity":"Staunton, VA","diedCountry":"USA","diedCountryCode":"US","diedCity":"Washington, D.C.","gender":"male","prizes":[{"year":"1919","category":"peace","share":"1","motivation":"\nfor his role as founder of the League of 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internationalism","affiliations":[[[]]]}],{"id":"486","firstname":"Christian","surname":"Lange","born":"1869-09-17","died":"1938-12-11","bornCountry":"Norway","bornCountryCode":"NO","bornCity":"Stavanger","diedCountry":"Norway","diedCountryCode":"NO","diedCity":"Oslo","gender":"male","prizes":[{"year":"1921","category":"peace","share":"2","motivation":"\nfor their lifelong contributions to the cause of peace and organized internationalism","affiliations":[[[]]]}],{"id":"487","firstname":"Fridtjof","surname":"Nansen","born":"1861-10-10","died":"1930-05-13","bornCountry":"Norway","bornCountryCode":"NO","bornCity":"Kristiania (now Oslo)","diedCountry":"Norway","diedCountryCode":"NO","diedCity":"Oslo","gender":"male","prizes":[{"year":"1922","category":"peace","share":"1","motivation":"\nfor his leading role in the repatriation of prisoners of war, in international relief work and as the League of Nations' High Commissioner for refugees","affiliations":[[[]]]}],{"id":"488","firstname":"Sir 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1935\n","affiliations":[[[]]]}],{"id":"502","firstname":"Robert","surname":"Cecil","born":"1864-09-14","died":"1958-11-24","bornCountry":"United Kingdom","bornCountryCode":"GB","bornCity":"London","diedCountry":"United Kingdom","diedCountryCode":"GB","diedCity":"Tunbridge Wells","gender":"male","prizes":[{"year":"1937","category":"peace","share":"1","motivation":"\nfor his tireless effort in support of the League of Nations, disarmament and peace\n","affiliations":[[[]]]}],{"id":"503","firstname":"Nansen International Office for Refugees","born":"1921-00-00","died":"0000-00-00","gender":"org","prizes":[{"year":"1938","category":"peace","share":"1","motivation":"\nfor having carried on the work of Fridtjof Nansen to the benefit of refugees across Europe\n","affiliations":[[[]]]}],{"id":"505","firstname":"Cordell","surname":"Hull","born":"1871-10-02","died":"1955-07-23","bornCountry":"USA","bornCountryCode":"US","bornCity":"Olympus, TN","diedCountry":"USA","diedCountryCode":"US","diedCity":"Bethesda, MD","gender":"male","prizes":[{"year":"1945","category":"peace","share":"1","motivation":"\nfor his indefatigable work for international understanding and his pivotal role in establishing the United Nations\n","affiliations":[[[]]]}],{"id":"506","firstname":"Emily Greene","surname":"Balch","born":"1867-01-08","died":"1961-01-09","bornCountry":"USA","bornCountryCode":"US","bornCity":"Jamaica Plain, MA (now Boston, MA)","diedCountry":"USA","diedCountryCode":"US","diedCity":"Cambridge, MA","gender":"female","prizes":[{"year":"1946","category":"peace","share":"2","motivation":"\nfor her lifelong work for the cause of peace\n","affiliations":[[[]]]}],{"id":"507","firstname":"John R.","surname":"Mott","born":"1865-05-25","died":"1955-01-31","bornCountry":"USA","bornCountryCode":"US","bornCity":"Livingston Manor, NY","diedCountry":"USA","diedCountryCode":"US","gender":"male","prizes":[{"year":"1946","category":"peace","share":"2","motivation":"\nfor his contribution to the creation of a peace-promoting religious brotherhood across national boundaries\n","affiliations":[[[]]]}],{"id":"508","firstname":"Friends Service Council","born":"1647-00-00","died":"0000-00-00","gender":"org","prizes":[{"year":"1947","category":"peace","share":"2","motivation":"\nfor their pioneering work in the international peace movement and compassionate effort to relieve human suffering, thereby promoting the fraternity between nations\n","affiliations":[[[]]]}],{"id":"509","firstname":"American Friends Service Committee","born":"1917-00-00","died":"0000-00-00","gender":"org","prizes":[{"year":"1947","category":"peace","share":"2","motivation":"\nfor their pioneering work in the international peace movement and compassionate effort to relieve human suffering, thereby promoting the fraternity between 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MA","country":"USA"}]}],{"id":"512","firstname":"L\u00e9on","surname":"Jouhaux","born":"1879-07-01","died":"1954-04-28","bornCountry":"France","bornCountryCode":"FR","bornCity":"Paris","diedCountry":"France","diedCountryCode":"FR","diedCity":"Paris","gender":"male","prizes":[{"year":"1951","category":"peace","share":"1","motivation":"\nfor having devoted his life

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to the fight against war through the promotion of social justice and brotherhood among men and nations\","affiliations":[[[]]]},{id:"513","firstname":"Albert","surname":"Schweitzer","born":"1875-01-14","died":"1965-09-04","bornCountry":"Germany (now France)","bornCountryCode":"FR","bornCity":"Kaysersberg","diedCountry":"Gabon","diedCountryCode":"GA","diedCity":"Lambar\u00e9n\u00e9","gender":"male","prizes":[{"year":"1952","category":"peace","share":"1","motivation":"\nfor his altruism, reverence for life, and tireless humanitarian work which has helped making the idea of brotherhood between men and nations a living one\","affiliations":[[[]]]},{id:"514","firstname":"George C.","surname":"Marshall","born":"1880-12-31","died":"1959-10-16","bornCountry":"USA","bornCountryCode":"US","bornCity":"Uniontown, PA","diedCountry":"USA","diedCountryCode":"US","diedCity":"Washington, D.C.","gender":"male","prizes":[{"year":"1953","category":"peace","share":"1","motivation":"\nfor proposing and supervising the plan for the economic recovery of Europe\","affiliations":[[[]]]},{id:"515","firstname":"Office of the United Nations High Commissioner for Refugees","born":"1950-12-14","died":"0000-00-00","gender":"org","prizes":[{"year":"1954","category":"peace","share":"1","motivation":"\nfor its efforts to heal the wounds of war by providing help and protection to refugees all over the world\","affiliations":[[[]]]},{year:"1981","category":"peace","share":"1","motivation":"\nfor promoting the fundamental rights of refugees\","affiliations":[[[]]]},{id:"516","firstname":"Lester Bowles","surname":"Pearson","born":"1897-04-23","died":"1972-12-27","bornCountry":"Canada","bornCountryCode":"CA","bornCity":"Toronto","diedCountry":"Canada","diedCountryCode":"CA","diedCity":"Ottawa","gender":"male","prizes":[{"year":"1957","category":"peace","share":"1","motivation":"\nfor his crucial contribution to the deployment of a United Nations Emergency Force in the wake of the Suez Crisis\","affiliations":[[[]]]},{id:"517","firstname":"Georges","surname":"Pire","born":"1910-02-10","died":"1969-01-30","bornCountry":"Belgium","bornCountryCode":"BE","bornCity":"Dinant","diedCountry":"Belgium","diedCountryCode":"BE","diedCity":"Leuven","gender":"male","prizes":[{"year":"1958","category":"peace","share":"1","motivation":"\nfor his efforts to help refugees to leave their camps and return to a life of freedom and dignity\","affiliations":[[[]]]},{id:"518","firstname":"Philip","surname":"Noel-Baker","born":"1889-11-01","died":"1982-10-08","bornCountry":"United Kingdom","bornCountryCode":"GB","bornCity":"London","diedCountry":"United Kingdom","diedCountryCode":"GB","diedCity":"London","gender":"male","prizes":[{"year":"1959","category":"peace","share":"1","motivation":"\nfor his longstanding contribution to the cause of disarmament and peace\","affiliations":[[[]]]},{id:"519","firstname":"Albert","surname":"Lutuli","born":"1898-00-00","died":"1967-07-21","bornCountry":"Southern Rhodesia (now Zimbabwe)","bornCountryCode":"ZW","bornCity":"Bulawayo","diedCountry":"South Africa","diedCountryCode":"ZA","diedCity":"Stanger","gender":"male","prizes":[{"year":"1960","category":"peace","share":"1","motivation":"\nfor his non-violent struggle against apartheid\","affiliations":[[[]]]},{id:"520","firstname":"Dag","surname":"Hammarskj\u00f6ld","born":"1905-07-29","died":"1961-09-18","bornCountry":"Sweden","bornCountryCode":"SE","bornCity":"J\u00f6nk\u00f6ping","diedCountry":"Northern Rhodesia (now Zambia)","diedCountryCode":"ZM","diedCity":"Ndola","gender":"male","prizes":[{"year":"1961","category":"peace","share":"1","motivation":"\nfor developing the UN into an effective and constructive international organization, capable of giving life to the principles and aims expressed in the UN Charter\","affiliations":[[[]]]},{id:"523","firstname":"League of Red Cross Societies","born":"1919-00-00","died":"0000-00-00","gender":"org","prizes":[{"year":"1963","category":"peace","share":"2","motivation":"\nfor promoting the principles of the Geneva Convention and cooperation with the UN\","affiliations":[[[]]]},{id:"524","firstname":"Martin Luther","surname":"King Jr.","born":"1929-01-15","died":"1968-04-04","bornCountry":"USA","bornCountryCode":"US","bornCity":"Atlanta, GA","diedCountry":"USA","diedCountryCode":"US","diedCity":"Memphis, TN","gender":"male","prizes":[{"year":"1964","category":"peace","share":"1","motivation":"\nfor his non-violent struggle for civil rights for the Afro-American population\","affiliations":[[[]]]},{id:"525","firstname":"United Nations Children's Fund","born":"1946-00-00","died":"0000-00-00","gender":"org","prizes":[{"year":"1965","category":"peace","share":"1","motivation":"\nfor its effort to enhance solidarity between nations and reduce the difference between rich and poor states\","affiliations":[[[]]]},{id:"526","firstname":"Ren\u00e9","surname":"Cassin","born":"1887-10-05","died":"1976-02-20","bornCountry":"France","bornCountryCode":"FR","bornCity":"Bayonne","diedCountry":

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y":"USA","bornCountryCode":"US","bornCity":"Cresco, IA","diedCountry":"USA","diedCoun
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ory":"peace","share":"1","motivation":"\for having given a well-founded hope - the g
reen revolution\","affiliations":[[[]]]},{
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tryCode":"DE","bornCity":"L\u00fcbbeck","diedCountry":"Germany","diedCountryCode":"D
E","diedCity":"Unkel","gender":"male","prizes":[{"year":"1971","category":"peace","sh
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d West\","affiliations":[[[]]]},{
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Vietnam in 1973\","affiliations":[[[]]]},{
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dCountry":"Japan","diedCountryCode":"JP","diedCity":"Tokyo","gender":"male","prizes":
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o stabilize conditions in the Pacific rim area and for signing the Nuclear Non-Prolif
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e":"Sakharov","born":"1921-05-21","died":"1989-12-14","bornCountry":"Russia","bornCou
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e","share":"1","motivation":"\for his struggle for human rights in the Soviet Union,
for disarmament and cooperation between all nations\","affiliations":[[[]]]},{
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edCountry":"Northern Ireland","diedCountryCode":"GB","diedCity":"Belfast","gender":"f
emale","prizes":[{"year":"1976","category":"peace","share":"2","motivation":"\for th
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id":"536","firstname":"Mairead","surnam
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West relations\","", "affiliations": [[]]}, {"id": "553", "firstname": "Aung San Suu Kyi", "born": "1945-06-19", "died": "0000-00-00", "bornCountry": "Burma (now Myanmar)", "bornCountryCode": "MM", "bornCity": "Rangoon (now Yangon)", "gender": "female", "prizes": [{"year": "1991", "category": "peace", "share": "1", "motivation": "\"for her non-violent struggle for democracy and human rights\"", "affiliations": [[]]}]}, {"id": "554", "firstname": "Rigoberta", "surname": "Mench\u00fa Tum", "born": "1959-01-09", "died": "0000-00-00", "bornCountry": "Guatemala", "bornCountryCode": "GT", "bornCity": "Aldea Chimal", "gender": "female", "prizes": [{"year": "1992", "category": "peace", "share": "1", "motivation": "\"for her struggle for social justice and ethno-cultural reconciliation based on respect for the rights of indigenous peoples\"", "affiliations": [[]]}]}, {"id": "555", "firstname": "Nelson", "surname": "Mandela", "born": "1918-07-18", "died": "2013-12-05", "bornCountry": "South 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in new forms for the novel and drama - in the destitution of modern man acquires its elevation\"", "affiliations": [{}]}, {"id": "644", "firstname": "Alexandr", "surname": "Solzhenitsyn", "born": "1918-12-11", "died": "2008-08-03", "bornCountry": "Russia", "bornCountryCode": "RU", "bornCity": "Kislovodsk", "diedCountry": "Russia", "diedCountryCode": "RU", "diedCity": "Troitse-Lykovo", "gender": "male", "prizes": [{"year": "1970", "category": "literature", "share": "1", "motivation": "\"for the ethical force with which he has pursued the indispensable traditions of Russian literature\"", "affiliations": [{}]}, {"id": "645", "firstname": "Pablo", "surname": "Neruda", "born": "1904-07-12", "died": "1973-09-23", "bornCountry": "Chile", "bornCountryCode": "CL", "bornCity": "Parral", "diedCountry": "Chile", "diedCountryCode": "CL", "diedCity": "Santiago", "gender": "male", "prizes": [{"year": "1971", "category": "literature", "share": "1", "motivation": "\"for a poetry that with the action of an elemental force brings alive a continent's destiny and dreams\"", "affiliations": [{}]}, {"id": "647", "firstname": "Heinrich", "surname": "B\u00f6ll", "born": "1917-12-21", "died": "1985-07-16", "bornCountry": "Germany", "bornCountryCode": "DE", "bornCity": "Cologne", "diedCountry": "West Germany (now Germany)", "diedCountryCode": "DE", "diedCity": "Bornheim-Merten", "gender": "male", "prizes": [{"year": "1972", "category": "literature", "share": "1", "motivation": "\"for his writing which through its combination of a broad perspective on his time and a sensitive skill in characterization has contributed to a renewal of German literature\"", "affiliations": [{}]}, {"id": "648", "firstname": "Patrick", "surname": "White", "born": "1912-05-28", "died": "1990-09-30", "bornCountry": "United Kingdom", "bornCountryCode": "GB", "bornCity": "London", "diedCountry": "Australia", "diedCountryCode": "AU", "diedCity": "Sydney", "gender": "male", "prizes": [{"year": "1973", "category": "literature", "share": "1", "motivation": "\"for an epic and psychological narrative art which has introduced a new continent into literature\"", "affiliations": [{}]}, {"id": "649", "firstname": "Eyvind", "surname": "Johnson", "born": "1900-07-29", "died": "1976-08-25", "bornCountry": "Sweden", "bornCountryCode": "SE", "bornCity": "Svartbj\u00f6rnaby", "diedCountry": "Sweden", "diedCountryCode": "SE", "diedCity": "Stockholm", "gender": "male", "prizes": [{"year": "1974", "category": "literature", "share": "2", "motivation": "\"for a narrative art, fa

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Bashevis", "surname": "Singer", "born": "1904-07-14", "died": "1991-07-24", "bornCountry": "Russian Empire (now Poland)", "bornCountryCode": "PL", "bornCity": "Leoncin", "diedCountry": "USA", "diedCountryCode": "US", "diedCity": "Surfside, FL", "gender": "male", "prizes": [{"year": "1978", "category": "literature", "share": "1", "motivation": "\"for his impassioned narrative art which, with roots in a Polish-Jewish cultural tradition, brings universal human conditions to life\""}, {"id": "655", "firstname": "Odysseus", "surname": "Elytis", "born": "1911-11-02", "died": "1996-03-18", "bornCountry": "Crete (now Greece)", "bornCountryCode": "GR", "bornCity": "Ir\u00e1klion", "diedCountry": "Greece", "diedCountryCode": "GR", "diedCity": "Athens", "gender": "male", "prizes": [{"year": "1979", "category": "literature", "share": "1", "motivation": "\"for his poetry, which, against the background of Greek tradition, depicts with sensuous strength and intellectual clear-sightedness modern man's 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1", "firstname": "Jaroslav", "surname": "Seifert", "born": "1901-09-23", "died": "1986-01-10", "bornCountry": "Austria-Hungary (now Czech Republic)", "bornCountryCode": "CZ", "bornCity": "Prague", "diedCountry": "Czechoslovakia (now Czech Republic)", "diedCountryCode": "CZ", "diedCity": "Prague", "gender": "male", "prizes": [{"year": "1984", "category": "literature", "share": "1", "motivation": "\"for his poetry which endowed with freshness, sensuality and rich inventiveness provides a liberating image of the indomitable spirit and versatility of man\"", "affiliations": "[[]]"}], {"id": "662", "firstname": "Claude", "surname": "Simon", "born": "1913-10-10", "died": "2005-07-06", "bornCountry": "Madagascar", "bornCountryCode": "MG", "bornCity": "Tananarive (now Antananarivo)", "diedCountry": "France", "diedCountryCode": "FR", "diedCity": "Paris", "gender": "male", "prizes": [{"year": "1985", "category": "literature", "share": "1", "motivation": "\"who in his novel combines the poet's and the painter's creativeness with a deepened awareness of time in the depiction of the human condition\"", "affiliations": "[[]]"}], {"id": "663", "firstname": "Wole", "surname": "Soyinka", "born": "1934-07-13", "died": "0000-00-00", "bornCountry": "Nigeria", "bornCountryCode": "NG", "bornCity": "Abeokuta", "gender": "male", "prizes": [{"year": "1986", "category": "literature", "share": "1", "motivation": "\"who in a wide cultural perspective and with poetic overtones fashions the drama of existence\"", "affiliations": "[[]]"}], {"id": "664", "firstname": "Joseph", "surname": "Brodsky", "born": "1940-05-24", "died": "1996-01-28", "bornCountry": "USSR (now Russia)", "bornCountryCode": "RU", "bornCity": "Leningrad (now St. Petersburg)", "diedCountry": "USA", "diedCountryCode": "US", "diedCity": "New York, NY", "gender": "male", "prizes": [{"year": "1987", "category": "literature", "share": "1", "motivation": "\"for an all-embracing authorship, imbued with clarity of thought and poetic intensity\"", "affiliations": "[[]]"}], {"id": "665", "firstname": "Naguib", "surname": "Mahfouz", "born": "1911-12-11", "died": "2006-08-30", "bornCountry": "Egypt", "bornCountryCode": "EG", "bornCity": "Cairo", "diedCountry": "Egypt", "diedCountryCode": "EG", "diedCity": "Cairo", "gender": "male", "prizes": [{"year": "1988", "category": "literature", "share": "1", "motivation": "\"who, through works rich in nuance - 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light in fragments of human reality\","affiliations":[[[]]]},{id:"674","firstname":"Dario","surname":"Fo","born":"1926-03-24","died":"2016-10-13","bornCountry":"Italy","bornCountryCode":"IT","bornCity":"Leggiano-Sangiano","diedCountry":"Italy","diedCountryCode":"IT","diedCity":"Milan","gender":"male","prizes":[{"year":"1997","category":"literature","share":"1","motivation":"\nwho emulates the jesters of the Middle Ages in scourging authority and upholding the dignity of the downtrodden\","affiliations":[[[]]]},{id:"675","firstname":"Jos\u00e9","surname":"Saramago","born":"1922-11-16","died":"2010-06-18","bornCountry":"Portugal","bornCountryCode":"PT","bornCity":"Azinhaga","diedCountry":"Spain","diedCountryCode":"ES","diedCity":"Lanzarote","gender":"male","prizes":[{"year":"1998","category":"literature","share":"1","motivation":"\nwho with parables sustained by imagination, compassion and irony continually enables us once again to apprehend an elusory 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Oslo","city":"Oslo","country":"Norway"}]}]},{id:"678","firstname":"Jan","surname":"Tinbergen","born":"1903-04-12","died":"1994-06-09","bornCountry":"the Netherlands","bornCountryCode":"NL","bornCity":"the Hague","diedCountry":"the Netherlands","diedCountryCode":"NL","diedCity":"the Hague","gender":"male","prizes":[{"year":"1969","category":"economics","share":"2","motivation":"\nfor having developed and applied dynamic models for the analysis of economic processes\","affiliations":[{"name":"The Netherlands School of Economics","city":"Rotterdam","country":"the Netherlands"}]}]},{id:"679","firstname":"Paul A.","surname":"Samuelson","born":"1915-05-15","died":"2009-12-13","bornCountry":"USA","bornCountryCode":"US","bornCity":"Gary, IN","diedCountry":"USA","diedCountryCode":"US","diedCity":"Belmont, MA","gender":"male","prizes":[{"year":"1970","category":"economics","share":"1","motivation":"\nfor the scientific work through which he has developed static and dynamic economic theory and actively contributed to raising the level of analysis in economic science\","affiliations":[{"name":"Massachusetts Institute of Technology (MIT)","city":"Cambridge, MA","country":"USA"}]}]},{id:"680","firstname":"Simon","surname":"Kuznets","born":"1901-04-30","died":"1985-07-08","bornCountry":"Russian Empire (now Belarus)","bornCountryCode":"BY","bornCity":"Pinsk","diedCountry":"USA","diedCountryCode":"US","diedCity":"Cambridge, MA","gender":"male","prizes":[{"year":"1971","category":"economics","share":"1","motivation":"\nfor his empirically founded interpretation of economic growth which has led to new and deepened insight into the economic and social structure and process of development\","affiliations":[{"name":"Harvard University","city":"Cambridge, MA","country":"USA"}]}]},{id:"681","firstname":"John R.","surname":"Hicks","born":"1904-04-08","died":"1989-05-20","bornCountry":"United Kingdom","bornCountryCode":"GB","bornCity":"Warwick","diedCountry":"United Kingdom","diedCountryCode":"GB","diedCity":"Blockley","gender":"male","prizes":[{"year":"1972","category":"economics","share":"2","motivation"}]}

n": "\"for their pioneering contributions to general economic equilibrium theory and welfare theory\", \"affiliations\": [{\"name\": \"All Souls College\", \"city\": \"Oxford\", \"country\": \"United Kingdom\"}]}], {\"id\": \"682\", \"firstname\": \"Kenneth J.\", \"surname\": \"Arrow\", \"born\": \"1921-08-23\", \"died\": \"2017-02-21\", \"bornCountry\": \"USA\", \"bornCountryCode\": \"US\", \"bornCity\": \"New York, NY\", \"diedCountry\": \"USA\", \"diedCountryCode\": \"US\", \"diedCity\": \"Palo Alto, CA\", \"gender\": \"male\", \"prizes\": [{\"year\": \"1972\", \"category\": \"economics\", \"share\": \"2\", \"motivation\": \"\"for their pioneering contributions to general economic equilibrium theory and welfare theory\", \"affiliations\": [{\"name\": \"Harvard University\", \"city\": \"Cambridge, MA\", \"country\": \"USA\"}]}], {\"id\": \"683\", \"firstname\": \"Wassily\", \"surname\": \"Leontief\", \"born\": \"1906-08-05\", \"died\": \"1999-02-05\", \"bornCountry\": \"Russia\", 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penetrating analysis of the interdependence of economic, social and institutional phenomena\", \"affiliations\": [{}]}], {\"id\": \"685\", \"firstname\": \"Friedrich\", \"surname\": \"von Hayek\", \"born\": \"1899-05-08\", \"died\": \"1992-03-23\", \"bornCountry\": \"Austria\", \"bornCountryCode\": \"AT\", \"bornCity\": \"Vienna\", \"diedCountry\": \"Germany\", \"diedCountryCode\": \"DE\", \"diedCity\": \"Freiburg\", \"gender\": \"male\", \"prizes\": [{\"year\": \"1974\", \"category\": \"economics\", \"share\": \"2\", \"motivation\": \"\"for their pioneering work in the theory of money and economic fluctuations and for their penetrating analysis of the interdependence of economic, social and institutional phenomena\", \"affiliations\": [{}]}], {\"id\": \"686\", \"firstname\": \"Leonid Vitaliyevich\", \"surname\": \"Kantorovich\", \"born\": \"1912-01-19\", \"died\": \"1986-04-07\", \"bornCountry\": \"Russian Empire (now Russia)\", \"bornCountryCode\": \"RU\", \"bornCity\": \"St. 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chnology","city":"Okinawa","country":"Japan"}]}]}},{id":"1012","firstname":"Alain","s
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```

e":"J.F. Clauser & Assoc.", "city": "Walnut Creek, CA", "country": "USA"}]]]]}, {"id": "1014", "firstname": "Anton", "surname": "Zeilinger", "born": "1945-05-20", "died": "0000-00-00", "bornCountry": "Austria", "bornCountryCode": "AT", "bornCity": "Ried im Innkreis", "gender": "male", "prizes": [{"year": "2022", "category": "physics", "share": "3", "motivation": "\"for experiments with entangled photons, establishing the violation of Bell inequalities and pioneering quantum information science\"", "affiliations": [{"name": "University of Vienna", "city": "Vienna", "country": "Austria"}, {"name": "Institute for Quantum Optics and Quantum Information, Austrian Academy of Sciences", "city": "Vienna", "country": "Austria"}]]]]}, {"id": "1015", "firstname": "Carolyn", "surname": "Bertozzi", "born": "1966-10-10", "died": "0000-00-00", "bornCountry": "USA", "bornCountryCode": "US", "bornCity": "Boston, MA", "gender": "female", "prizes": [{"year": "2022", "category": "chemistry", "share": "3", "motivation": "\"for the development of click chemistry and bioorthogonal chemistry\"", "affiliations": [{"name": "Stanford University", "city": "Stanford, CA", "country": "USA"}, {"name": "Howard Hughes Medical Institute", "country": "USA"}]]]]}, {"id": "1016", "firstname": "Morten", "surname": "Meldal", "born": "1954-00-00", "died": "0000-00-00", "bornCountry": "Denmark", "bornCountryCode": "DK", "bornCity": "Copenhagen", "gender": "male", "prizes": [{"year": "2022", "category": "chemistry", "share": "3", "motivation": "\"for the development of click chemistry and bioorthogonal chemistry\"", "affiliations": [{"name": "University of Copenhagen", "city": "Copenhagen", "country": "Denmark"}]]]]}, {"id": "1017", "firstname": "Annie", "surname": "Ernaux", "born": "1940-09-01", "died": "0000-00-00", "bornCountry": "France", "bornCountryCode": "FR", "bornCity": "Lillebonne", "gender": "female", "prizes": [{"year": "2022", "category": "literature", "share": "1", "motivation": "\"for the courage and clinical acuity with which she uncovers the roots, estrangements and collective restraints of personal memory\"", "affiliations": []]]]]}, {"id": "1018", "firstname": "Ales", "surname": "Bialiatski", "born": "1962-09-25", "died": "0000-00-00", "bornCountry": "Russia", "bornCountryCode": "RU", "bornCity": "Vyartsilya, Karelia", "gender": "male", "prizes": [{"year": "2022", "category": "peace", "share": "3", "motivation": "\"The Peace Prize laureates represent civil society in their home countries. They have for many years promoted the right to criticise power and protect the fundamental rights of citizens. They have made an outstanding effort to document war crimes, human right abuses and the abuse of power. Together they demonstrate the significance of civil society for peace and democracy.\""}]]]]}, {"id": "1019", "firstname": "Memoria", "surname": "1", "born": "1987-00-00", "died": "0000-00-00", "gender": "org", "prizes": [{"year": "2022", "category": "peace", "share": "3", "motivation": "\"The Peace Prize laureates represent civil society in their home countries. They have for many years promoted the right to criticise power and protect the fundamental rights of citizens. They have made an outstanding effort to document war crimes, human right abuses and the abuse of power. Together they demonstrate the significance of civil society for peace and democracy.\""}]]]]}, {"id": "1020", "firstname": "Center for Civil Liberties", "born": "2007-00-00", "died": "0000-00-00", "gender": "org", "prizes": [{"year": "2022", "category": "peace", "share": "3", "motivation": "\"The Peace Prize laureates represent civil society in their home countries. They have for many years promoted the right to criticise power and protect the fundamental rights of citizens. They have made an outstanding effort to document war crimes, human right abuses and the abuse of power. Together they demonstrate the significance of civil society for peace and democracy.\""}]]]]}, {"id": "1021", "firstname": "Ben", "surname": "Bernanke", "born": "1953-12-13", "died": "0000-00-00", "bornCountry": "USA", "bornCountryCode": "US", "bornCity": "Augusta, GA", "gender": "male", "prizes": [{"year": "2022", "category": "economics", "share": "3", "motivation": "\"for research on banks and financial crises\"", "affiliations": [{"name": "The Brookings Institution", "city": "Washington, D.C.", "country": "USA"}]]]]}, {"id": "1022", "firstname": "Douglas", "surname": "Diamond", "born": "1953-10-25", "died": "0000-00-00", "bornCountry": "USA", "bornCountryCode": "US", "bornCity": "Chicago, IL", "gender": "male", "prizes": [{"year": "2022", "category": "economics", "share": "3", "motivation": "\"for research on banks and financial crises\"", "affiliations": [{"name": "University of Chicago", "city": "Chicago, IL", "country": "USA"}]]]]}, {"id": "1023", "firstname": "Philip", "surname": "Dybvig", "born": "1955-05-22", "died": "0000-00-00", "bornCountry": "USA", "bornCountryCode": "US", "bornCity": "Gainesville, FL", "gender": "male", "prizes": [{"year": "2022", "category": "economics", "share": "3", "motivation": "\"for research on banks and financial crises\""}]]]]}

```



```
s\","", "affiliations": [{"name": "Washington University", "city": "St. Louis, MO", "country": "USA"}] ] ] ] }
```

```
In [114... # Type of data accessed  
type(response)
```

```
Out[114]: requests.models.Response
```

```
In [115... # Create dict to hold data  
jsondata = response.json()
```

```
In [116... len(jsondata), type(jsondata)
```

```
Out[116]: (1, dict)
```

```
In [117... type(jsondata['laureates'][0])
```

```
Out[117]: dict
```

```
In [118... api_nobel_df = pd.DataFrame(jsondata['laureates'])
```

```
In [119... api_nobel_df.tail(10)
```

Out[119]:

	id	firstname	surname	born	died	bornCountry	bornCountryCode	bornCity	diedCountry
971	1014	Anton	Zeilinger	1945-05-20	0000-00-00	Austria	AT	Ried im Innkreis	N
972	1015	Carolyn	Bertozzi	1966-10-10	0000-00-00	USA	US	Boston, MA	N
973	1016	Morten	Meldal	1954-00-00	0000-00-00	Denmark	DK	Copenhagen	N
974	1017	Annie	Ernaux	1940-09-01	0000-00-00	France	FR	Lillebonne	N
975	1018	Ales	Bialiatski	1962-09-25	0000-00-00	Russia	RU	Vyartsilya, Karelia	N
976	1019	Memorial	NaN	1987-00-00	0000-00-00	NaN	NaN	NaN	N
977	1020	Center for Civil Liberties	NaN	2007-00-00	0000-00-00	NaN	NaN	NaN	N
978	1021	Ben	Bernanke	1953-12-13	0000-00-00	USA	US	Augusta, GA	N
979	1022	Douglas	Diamond	1953-10-25	0000-00-00	USA	US	Chicago, IL	N
980	1023	Philip	Dybvig	1955-05-22	0000-00-00	USA	US	Gainesville, FL	N

```
In [120...] api_nobel_df.shape
```

```
Out[120]: (981, 13)
```

```
In [121...] api_nobel_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 981 entries, 0 to 980
Data columns (total 13 columns):
#   Column                Non-Null Count  Dtype
---  -
0   id                    981 non-null    object
1   firstname             980 non-null    object
2   surname               951 non-null    object
3   born                  980 non-null    object
4   died                  981 non-null    object
5   bornCountry           953 non-null    object
6   bornCountryCode       953 non-null    object
7   bornCity              951 non-null    object
8   diedCountry           641 non-null    object
9   diedCountryCode       641 non-null    object
10  diedCity              635 non-null    object
11  gender                981 non-null    object
12  prizes                981 non-null    object
dtypes: object(13)
memory usage: 99.8+ KB
```

```
In [122...] api_nobel_df['gender'].value_counts()
```

```
Out[122]: male      894
female    60
org        27
Name: gender, dtype: int64
```

```
In [123...] api_nobel_df['gender'].unique()
```

```
Out[123]: array(['male', 'female', 'org'], dtype=object)
```

```
In [124...] org_df = api_nobel_df[api_nobel_df['gender'] == 'org']
```

```
In [125...] org_df.shape
```

```
Out[125]: (27, 13)
```

**Transformation 1: Create new column 'name' to hold entire name. Execute this by concatenating 'firstname' and 'surname'.**

```
In [126...] api_nobel_df['knownName'] = api_nobel_df['firstname'].str.cat(api_nobel_df['surname'],
api_nobel_df['knownName'])
```

```
Out[126]: 0      Wilhelm Conrad Röntgen
          1      Hendrik A. Lorentz
          2      Pieter Zeeman
          3      Henri Becquerel
          4      Pierre Curie
          ...
          976      NaN
          977      NaN
          978      Ben Bernanke
          979      Douglas Diamond
          980      Philip Dybvig
          Name: knownName, Length: 981, dtype: object
```

```
In [127... api_nobel_df['knownName'].info()

<class 'pandas.core.series.Series'>
RangeIndex: 981 entries, 0 to 980
Series name: knownName
Non-Null Count  Dtype
-----
951 non-null    object
dtypes: object(1)
memory usage: 7.8+ KB
```

```
In [128... api_nobel_df['knownName'].isnull().sum()
```

```
Out[128]: 30
```

## Transformation 2: Create smaller df of female laureates.

```
In [129... female_df = api_nobel_df.groupby('gender')
female_df = female_df.get_group(('female'))
female_df.head()
```

Out[129]:

	id	firstname	surname	born	died	bornCountry	bornCountryCode	bornCity	diedCountry
--	----	-----------	---------	------	------	-------------	-----------------	----------	-------------

5	6	Marie	Curie	1867-11-07	1934-07-04	Russian Empire (now Poland)	PL	Warsaw	France
77	79	Maria	Goeppert Mayer	1906-06-28	1972-02-20	Germany (now Poland)	PL	Kattowitz (now Katowice)	USA
189	194	Irène	Joliot-Curie	1897-09-12	1956-03-17	France	FR	Paris	France
225	230	Dorothy Crowfoot	Hodgkin	1910-05-12	1994-07-29	Egypt	EG	Cairo	United Kingdom
338	344	Gerty	Cori	1896-08-15	1957-10-26	Austria-Hungary (now Czech Republic)	CZ	Prague	USA

In [130... female\_df.isnull().sum()

Out[130]:

id	0
firstname	0
surname	1
born	0
died	0
bornCountry	0
bornCountryCode	0
bornCity	0
diedCountry	33
diedCountryCode	33
diedCity	33
gender	0
prizes	0
knownName	1

dtype: int64

In [131... female\_df.shape

Out[131]: (60, 14)

In [132... female\_df.info()

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 60 entries, 5 to 974
Data columns (total 14 columns):
#   Column              Non-Null Count  Dtype
---  -
0   id                  60 non-null    object
1   firstname           60 non-null    object
2   surname             59 non-null    object
3   born                60 non-null    object
4   died                60 non-null    object
5   bornCountry         60 non-null    object
6   bornCountryCode     60 non-null    object
7   bornCity            60 non-null    object
8   diedCountry         27 non-null    object
9   diedCountryCode     27 non-null    object
10  diedCity            27 non-null    object
11  gender              60 non-null    object
12  prizes              60 non-null    object
13  knownName           59 non-null    object
dtypes: object(14)
memory usage: 7.0+ KB
```

```
In [133]: female_df.bornCountry.value_counts()
```

```
Out[133]:
USA                  16
France               5
Poland               2
Canada              2
Italy               2
Germany             2
Northern Ireland    2
Liberia             2
Sweden              2
Australia           1
British Mandate of Palestine (now Israel) 1
Romania             1
Yemen              1
Pakistan            1
Norway              1
Kenya              1
China              1
Ukraine            1
Iraq               1
Persia (now Iran)   1
Russian Empire (now Poland) 1
Austria            1
Iran               1
Germany (now Poland) 1
South Africa       1
Chile              1
Denmark            1
Guatemala          1
Burma (now Myanmar) 1
Ottoman Empire (now North Macedonia) 1
Austrian Empire (now Czech Republic) 1
Austria-Hungary (now Czech Republic) 1
Egypt              1
Philippines        1
Name: bornCountry, dtype: int64
```

```
In [134... female_df.diedCountry.value_counts()
```

```
Out[134]:
```

USA	11
Sweden	3
France	2
United Kingdom	2
Italy	2
Austria	1
Northern Ireland	1
India	1
Norway	1
South Africa	1
Poland	1
Kenya	1

Name: diedCountry, dtype: int64

## Transformation 3: Extract award year from 'prizes' column.

```
In [135... api_nobel_df.prizes.dtype
```

```
Out[135]: dtype('O')
```

```
In [136... api_nobel_df['award_year'] = api_nobel_df['prizes'].astype('str').str.extractall('(\d+
```

```
In [137... move_decimal = api_nobel_df['award_year']/10
```

```
In [138... api_nobel_df['award_year'] = move_decimal.astype(int)
```

```
In [139... api_nobel_df['award_year']
```

```
Out[139]:
```

0	1901
1	1902
2	1902
3	1903
4	1903
...	
976	2022
977	2022
978	2022
979	2022
980	2022

Name: award\_year, Length: 981, dtype: int32

## Transformation 4: Determine age at time of prize win.

```
In [140... female_df.prizes.head()
```

```
Out[140]: 5      [{'year': '1903', 'category': 'physics', 'shar...
77      [{'year': '1963', 'category': 'physics', 'shar...
189     [{'year': '1935', 'category': 'chemistry', 'sh...
225     [{'year': '1964', 'category': 'chemistry', 'sh...
338     [{'year': '1947', 'category': 'medicine', 'sha...
Name: prizes, dtype: object
```

```
In [141... female_df['award_year'] = female_df['prizes'].astype('str').str.extractall('(\d+)').ur
```

C:\Users\Admin\AppData\Local\Temp\ipykernel\_14880\2650851957.py:1: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame.  
Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)

```
female_df['award_year'] = female_df['prizes'].astype('str').str.extractall('(\d+)').unstack().fillna('').sum(axis=1).astype(int)
```

```
In [142... female_df[['born', 'award_year']]
```



Out[142]:

	born	award_year
5	1867-11-07	1903419111
77	1906-06-28	19634
189	1897-09-12	19352
225	1910-05-12	19641
338	1896-08-15	19474
407	1921-07-19	19772
422	1902-06-16	19831
429	1909-04-22	19862
432	1918-01-23	19883
447	1942-10-20	19953
462	1843-06-09	19051
489	1860-09-06	19312
498	1867-01-08	19462
525	1943-05-22	19762
526	1944-01-27	19762
530	1910-08-26	19791
532	1902-01-31	19822
542	1945-06-19	19911
543	1959-01-09	19921
554	1950-10-09	19972
567	1858-11-20	19091
583	1871-09-27	19261
585	1882-05-20	19281
594	1892-06-26	19381
597	1889-04-07	19451
619	1891-12-10	19662
645	1923-11-20	19911
647	1931-02-18	19931
650	1923-07-02	19961
750	1947-06-21	20031
752	1947-01-29	20042
759	1946-10-20	20041
760	1940-04-01	20041
791	1919-10-22	20071

	born	award_year
<b>798</b>	1947-07-30	20084
<b>809</b>	1948-11-26	20093
<b>810</b>	1961-04-15	20093
<b>817</b>	1939-06-22	20093
<b>818</b>	1953-08-17	20091
<b>820</b>	1933-08-07	20092
<b>841</b>	1938-10-29	20113
<b>842</b>	1972-02-01	20113
<b>843</b>	1979-02-07	20113
<b>864</b>	1931-07-10	20131
<b>870</b>	1963-01-04	20144
<b>880</b>	1997-07-12	20142
<b>884</b>	1930-12-30	20152
<b>890</b>	1948-05-31	20151
<b>920</b>	1959-05-27	20184
<b>921</b>	1956-07-25	20182
<b>925</b>	1993-00-00	20182
<b>937</b>	1962-01-29	20181
<b>941</b>	1972-10-25	20193
<b>948</b>	1965-06-16	20204
<b>949</b>	1968-12-11	20202
<b>950</b>	1964-02-19	20202
<b>951</b>	1943-04-22	20201
<b>963</b>	1963-10-02	20212
<b>972</b>	1966-10-10	20223
<b>974</b>	1940-09-01	20221

In [143...

```
# Glean Marie Curie's award_year year
female_df['award_year'].replace(190341911, '1903')
```

```
Out[143]: 5      1903419111
          77      19634
          189     19352
          225     19641
          338     19474
          407     19772
          422     19831
          429     19862
          432     19883
          447     19953
          462     19051
          489     19312
          498     19462
          525     19762
          526     19762
          530     19791
          532     19822
          542     19911
          543     19921
          554     19972
          567     19091
          583     19261
          585     19281
          594     19381
          597     19451
          619     19662
          645     19911
          647     19931
          650     19961
          750     20031
          752     20042
          759     20041
          760     20041
          791     20071
          798     20084
          809     20093
          810     20093
          817     20093
          818     20091
          820     20092
          841     20113
          842     20113
          843     20113
          864     20131
          870     20144
          880     20142
          884     20152
          890     20151
          920     20184
          921     20182
          925     20182
          937     20181
          941     20193
          948     20204
          949     20202
          950     20202
          951     20201
          963     20212
          972     20223
```

```
974          20221
Name: award_year, dtype: int32
```

```
In [144... female_df['born'] = pd.to_datetime(female_df['born'], format='%Y-%m-%d', errors='coerc
```

C:\Users\Admin\AppData\Local\Temp\ipykernel\_14880\739920948.py:1: SettingWithCopyWarning:  
 ing:  
 A value is trying to be set on a copy of a slice from a DataFrame.  
 Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)

```
female_df['born'] = pd.to_datetime(female_df['born'], format='%Y-%m-%d', errors='coerce')
```

```
In [145... female_df['born'].dtype
```

```
Out[145]: dtype('<M8[ns]')
```

```
In [146... female_df['award_year'] = pd.to_datetime(female_df['award_year'], format='%Y', errors=
```

C:\Users\Admin\AppData\Local\Temp\ipykernel\_14880\1495774267.py:1: SettingWithCopyWarning:  
 ing:  
 A value is trying to be set on a copy of a slice from a DataFrame.  
 Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)

```
female_df['award_year'] = pd.to_datetime(female_df['award_year'], format='%Y', errors='coerce')
```

```
In [147... female_df['award_year'].dtype
```

```
Out[147]: dtype('<M8[ns]')
```

```
In [148... # Create new column 'age_at_award' which displays Laureate's age at time of award.
# Convert days to years and remove decimals
import numpy as np
female_df['age_at_award'] = ((female_df['award_year'] - female_df['born']) / np.time
```

C:\Users\Admin\AppData\Local\Temp\ipykernel\_14880\855340606.py:4: SettingWithCopyWarning:  
 ing:  
 A value is trying to be set on a copy of a slice from a DataFrame.  
 Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)

```
female_df['age_at_award'] = ((female_df['award_year'] - female_df['born']) / np.timedelta64(1, 'Y')).apply(np.floor)
```

```
In [149... female_df['age_at_award'].mean()
```

```
Out[149]: nan
```

```
In [150... female_df['died'] = pd.to_datetime(female_df['died'], format='%Y-%m-%d', errors='coerc
```

```
C:\Users\Admin\AppData\Local\Temp\ipykernel_14880\187489917.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
female_df['died'] = pd.to_datetime(female_df['died'], format='%Y-%m-%d', errors='coerce')
```

```
In [151... female_df['lifespan'] = ((female_df['died'] - female_df['born']) / np.timedelta64(1,
```

```
C:\Users\Admin\AppData\Local\Temp\ipykernel_14880\2165558311.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
female_df['lifespan'] = ((female_df['died'] - female_df['born']) / np.timedelta64(1, 'Y')).apply(np.floor)
```

```
In [152... female_df['lifespan'].mean()
```

```
Out[152]: 78.85185185185185
```

## Create 'age\_at\_award' column for api df

```
In [153... api_nobel_df['born'] = pd.to_datetime(api_nobel_df['born'], format='%Y-%m-%d', errors='coerce')
```

```
In [154... api_nobel_df['award_year'] = pd.to_datetime(api_nobel_df['award_year'], format='%Y', errors='coerce')
```

```
In [155... # Create new column 'age_at_award' which displays Laureate's age at time of award.
# Convert days to years and remove decimals
import numpy as np
api_nobel_df['age_at_award'] = ((api_nobel_df['award_year'] - api_nobel_df['born']) /
```

```
In [156... api_nobel_df['age_at_award'].mean()
```

```
Out[156]: 59.27056277056277
```

```
In [157... api_nobel_df['died'] = pd.to_datetime(api_nobel_df['died'], format='%Y-%m-%d', errors='coerce')
```

```
In [158... api_nobel_df['lifespan'] = ((api_nobel_df['died'] - api_nobel_df['born']) / np.timedelta64(1, 'Y')).apply(np.floor)
```

```
In [159... api_nobel_df['lifespan'].mean()
```

```
Out[159]: 80.21779141104294
```

```
In [160... api_nobel_df.head()
```

Out[160]:

	id	firstname	surname	born	died	bornCountry	bornCountryCode	bornCity	diedCountry
0	1	Wilhelm Conrad	Röntgen	1845- 03-27	1923- 02-10	Prussia (now Germany)	DE	Lennepe (now Remscheid)	Germany
1	2	Hendrik A.	Lorentz	1853- 07-18	1928- 02-04	the Netherlands	NL	Arnhem	the Netherlands
2	3	Pieter	Zeeman	1865- 05-25	1943- 10-09	the Netherlands	NL	Zonnemaire	the Netherlands
3	4	Henri	Becquerel	1852- 12-15	1908- 08-25	France	FR	Paris	France
4	5	Pierre	Curie	1859- 05-15	1906- 04-19	France	FR	Paris	France

Transformation 5. Create df with only necessary columns...the columns that will be merged upon and the columns with useful data.

```
In [161... api_nobel = api_nobel_df[['gender', 'knownName', 'age_at_award', 'lifespan']]
```

```
In [162... api_nobel.head(10)
```

Out[162]:

	gender	knownName	age_at_award	lifespan
0	male	Wilhelm Conrad Röntgen	55.0	77.0
1	male	Hendrik A. Lorentz	48.0	74.0
2	male	Pieter Zeeman	36.0	78.0
3	male	Henri Becquerel	50.0	55.0
4	male	Pierre Curie	43.0	46.0
5	female	Marie Curie	NaN	66.0
6	male	Lord Rayleigh	61.0	76.0
7	male	Philipp Lenard	42.0	84.0
8	male	J.J. Thomson	49.0	83.0
9	male	Albert A. Michelson	54.0	78.0

## Milestone 4 Ethical Issues

The most critical ethical issue in the data is the small sample size of female Laureates- 60 observations. One can unequivocally state that males have won Nobel prizes at a disproportional rate relative to females. One must take special care when studying the demographics of female Laureates and generalizing to the female population at large. This is especially true when one looks through a granular prism at subsets of female Laureates by country and by category of prize. After USA(16) and France(5), no 'bornCountry' has more than two female winners. Another important issue when grouping Laureates by country is that many of the United States winners were immigrants. Immigrants have won a much greater percentage of prizes than their percentage in the population at large would

suggest. We do not have data in these datasets that inform us what effect birth country has on lifespan relative to the country where one lives. For example, a new study states that black women have double the maternal mortality rates as white women(<https://news.vanderbilt.edu/2022/04/1/study-black-women-face-higher-maternal-mortality-rates-than-previously-determined/>). This is after controlling for other factors. The data shows that a wealthy black woman is still so disadvantaged. Our data does not trace race, ethnicity, or even social class, which are most certainly drivers of lifespan. Another concern with the API dataset is the great number of 0 values in the 'died' column. I chose not to impute any values because every option would skew the true data. Any skew would have a detrimental effect on the analysis. I anticipate merging the datasets and gleaning true values for the missing ones in the API file.

In [ ]:

In [ ]:

In [ ]:

## Project Milestone 5 Merging and Storing the Data



## Load flat file into SQLite3 db and create db

```
In [163... import sqlite3
conn = sqlite3.connect('term_project_db.sqlite')
flat_file_df.to_sql('nobel_flat', conn, if_exists='replace', index=False)
conn.close()
```

```
In [164... # Check if flat table in db
conn = sqlite3.connect('term_project_db.sqlite')
wiki_df = pd.read_sql_query('SELECT * FROM nobel_flat', conn)
conn.close()
wiki_df.head()
```

```
Out[164]:
```

	awardYear	category	portion	prizeAmountAdjusted	knownName	gender	years_lived
0	2001	Economic Sciences	1/3	12295082	A. Michael Spence	male	NaN
1	1975	Physics	1/3	3404179	Aage N. Bohr	male	87.0
2	2004	Chemistry	1/3	11762861	Aaron Ciechanover	male	NaN
3	1982	Chemistry	1	3102518	Aaron Klug	male	92.0
4	1979	Physics	1/3	2988048	Abdus Salam	male	70.0

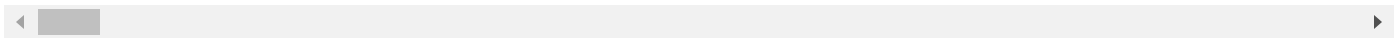
## Load webpage file into db

```
In [165... conn = sqlite3.connect('term_project_db.sqlite')
table_transposed_df.to_sql('nobel_wiki', conn, if_exists='replace', index=False)
conn.close()
```

```
In [166... # Check if wiki table in db
conn = sqlite3.connect('term_project_db.sqlite')
wiki_df = pd.read_sql_query('SELECT * FROM nobel_wiki', conn)
conn.close()
wiki_df.head()
```

Out[166]:

	Time Periods	Afghanistan *	Albania *	Algeria *	Angola *	Antigua and Barbuda	Argentina *	Armenia *	Arub (Netherland:
0	1950– 1955	28.61	55.26	42.89	31.39	58.51	62.57	62.82	60.4
1	1955– 1960	31.12	59.31	45.00	32.54	61.03	64.58	64.92	64.3
2	1960– 1965	33.41	64.85	47.29	34.09	63.18	65.31	67.04	66.5
3	1965– 1970	35.58	66.24	49.47	36.04	65.05	65.84	69.18	68.2
4	1970– 1975	37.83	67.69	51.48	38.05	66.71	67.28	70.75	70.0



## Load API File into db

In [167...

```
conn = sqlite3.connect('term_project_db.sqlite')
api_nobel.to_sql('nobel_api', conn, if_exists='replace',index=False)
conn.close()
```

In [168...

```
# Check if api table in db
conn = sqlite3.connect('term_project_db.sqlite')
api_df = pd.read_sql_query('SELECT * FROM nobel_api', conn)
conn.close()
api_df.head()
```

Out[168]:

	gender	knownName	age_at_award	lifespan
0	male	Wilhelm Conrad Röntgen	55.0	77.0
1	male	Hendrik A. Lorentz	48.0	74.0
2	male	Pieter Zeeman	36.0	78.0
3	male	Henri Becquerel	50.0	55.0
4	male	Pierre Curie	43.0	46.0

In [169...

```
import sqlite3
conn = sqlite3.connect('term_project_db.sqlite')
cursor = conn.cursor()
sql = '''Select *
FROM nobel_flat
LEFT JOIN nobel_wiki
ON nobel_flat.knownName = nobel_wiki.knownName
LEFT JOIN nobel_api
ON nobel_wiki.knownName = nobel_api.knownName
LIMIT 4;'''
cursor.execute(sql)
result = cursor.fetchall()
```

```
for row in result:  
    print(row)  
  
# Closing the connection  
conn.close()
```

(2001, 'Economic Sciences', '1/3', 12295082, 'A. Michael Spence', 'male', None, '1950-1955', 28.61, 55.26, 42.89, 31.39, 58.51, 62.57, 62.82, 60.44, 69.37, 66.54, 58.43, 60.02, 42.98, 40.67, 57.22, 60.71, 67.81, 55.92, 33.72, 32.26, 40.02, 53.67, 47.67, 50.83, 58.28, 62.33, 30.94, 39.03, 40.32, 38.54, 69.05, 48.06, 33.44, 36.06, 69.22, 54.64, 43.83, 50.67, 38.72, 56.0, 61.26, 59.44, 60.65, 66.73, 66.86, 39.06, 71.06, 41.04, 45.97, 48.65, 41.14, 44.25, 34.48, 34.08, 61.77, 41.44, 34.08, 54.58, 52.21, 66.4, 67.05, 53.33, 48.94, 37.0, 30.24, 60.65, 67.52, 42.17, 65.75, 56.34, 53.32, 57.2, 42.92, 33.07, 35.88, 58.83, 37.48, 41.8, 63.1, 64.01, 72.23, 36.62, 43.49, 40.58, 37.93, 66.9, 68.88, 66.52, 32.14, 58.61, 62.8, 46.51, 55.06, 42.3, 46.38, 53.55, 52.83, 40.93, 62.4, 60.46, 42.15, 33.13, 60.83, 65.96, 36.67, 61.0, 54.9, 36.32, 36.26, 54.8, 34.47, 26.96, 66.11, 55.59, 38.59, 50.19, 47.2, 50.72, 59.04, 43.18, 59.77, 45.67, 31.29, 44.2, 41.75, 34.01, 71.93, 50.74, 69.76, 42.3, 34.5, 33.81, 37.6, 72.8, 36.05, 37.04, 46.59, 56.8, 38.31, 62.76, 43.93, 55.43, 61.44, 60.3, 63.54, 55.19, 43.15, 61.15, 58.51, 40.02, 47.84, 52.42, 51.08, 45.93, 46.4, 41.94, 35.47, 59.12, 57.96, 28.82, 60.17, 64.43, 65.6, 45.38, 33.99, 48.52, 47.92, 27.92, 64.6, 54.51, 44.54, 55.99, 71.86, 69.34, 47.6, 53.05, 58.16, 41.25, 50.81, 29.97, 35.3, 58.63, 57.89, 38.81, 41.01, 51.28, 40.0, 61.83, 43.86, 69.4, 68.71, 62.88, 66.14, 56.07, 41.94, 54.84, 53.5, 35.48, 34.7, 42.07, 48.54, 68.73, 51.27, 49.1, 52.05, 51.94, 63.68, 68.87, 67.74, 63.75, 60.36, 37.46, 42.27, 36.33, 33.55, 36.91, 37.0, 47.81, 42.33, 43.76, 54.67, 37.02, 45.6, 46.48, 61.58, 69.44, 50.39, 40.5, 53.5, 46.98, 'A. Michael Spence', 68.71, 'male', 'A. Michael Spence', None, None)

(1975, 'Physics', '1/3', 3404179, 'Aage N. Bohr', 'male', 87.0, '1955-1960', 31.12, 59.31, 45.0, 32.54, 61.03, 64.58, 64.92, 64.36, 70.42, 68.02, 60.4, 61.97, 48.46, 44.22, 59.84, 66.32, 69.46, 58.64, 36.13, 33.78, 41.39, 58.46, 49.71, 52.99, 61.02, 66.78, 33.29, 40.52, 41.05, 40.45, 70.31, 48.77, 35.5, 37.36, 70.46, 56.38, 44.47, 55.2, 40.47, 58.76, 63.64, 62.39, 64.35, 68.72, 69.59, 40.55, 72.07, 42.95, 49.92, 51.59, 46.35, 48.12, 35.99, 36.68, 66.92, 43.47, 36.68, 56.58, 54.7, 68.19, 69.2, 56.16, 54.86, 39.0, 31.52, 62.65, 68.91, 44.66, 67.15, 58.91, 57.15, 59.72, 45.46, 34.33, 37.19, 59.8, 40.62, 44.6, 65.85, 66.91, 73.22, 39.65, 47.0, 43.5, 44.92, 69.16, 70.04, 68.44, 35.09, 62.73, 66.41, 50.66, 57.31, 44.73, 47.99, 58.26, 55.08, 42.43, 67.57, 62.43, 45.08, 34.19, 66.88, 67.55, 38.99, 63.58, 58.96, 38.75, 37.21, 57.94, 36.09, 27.98, 67.83, 58.87, 41.72, 55.74, 52.77, 55.3, 61.07, 46.1, 62.11, 47.45, 33.79, 49.62, 45.27, 34.56, 72.94, 54.6, 70.68, 45.45, 34.81, 35.8, 49.88, 73.48, 40.54, 42.73, 48.23, 59.5, 40.93, 63.33, 46.3, 57.09, 65.89, 62.37, 67.92, 59.16, 46.83, 63.29, 64.79, 41.51, 53.41, 55.25, 55.14, 48.47, 48.89, 44.42, 37.49, 61.6, 59.41, 29.87, 63.95, 68.64, 67.88, 47.91, 35.99, 51.27, 51.23, 30.59, 67.75, 58.29, 47.08, 58.69, 72.9, 70.71, 50.52, 55.1, 62.92, 43.03, 53.3, 32.48, 38.66, 60.47, 60.82, 40.73, 43.69, 53.41, 42.6, 67.11, 49.59, 70.6, 69.67, 65.49, 67.15, 57.9, 44.94, 57.77, 57.26, 37.4, 34.7, 44.13, 50.59, 69.7, 54.17, 53.25, 55.27, 54.36, 67.12, 70.49, 69.35, 66.26, 65.52, 39.95, 45.82, 38.51, 35.5, 38.45, 39.45, 50.58, 44.54, 46.93, 56.73, 40.26, 46.64, 49.97, 63.37, 70.46, 53.9, 43.27, 55.43, 49.33, 'Aage N. Bohr', 68.71, 'male', 'Aage N. Bohr', 52.0, 87.0)

(2004, 'Chemistry', '1/3', 11762861, 'Aaron Ciechanover', 'male', None, '1960-1965', 33.41, 64.85, 47.29, 34.09, 63.18, 65.31, 67.04, 66.58, 70.87, 69.66, 61.53, 63.69, 55.25, 47.19, 62.17, 69.11, 70.3, 61.34, 38.42, 35.47, 42.95, 61.93, 51.61, 55.54, 63.82, 70.28, 35.59, 42.03, 41.39, 42.68, 71.34, 49.45, 37.57, 38.7, 70.92, 58.32, 44.55, 57.98, 42.47, 62.37, 65.72, 65.39, 66.5, 70.43, 70.35, 41.63, 72.4, 45.18, 53.61, 54.75, 49.3, 51.57, 37.49, 40.08, 69.38, 45.05, 40.08, 58.58, 56.92, 69.07, 70.66, 59.5, 57.1, 40.5, 32.79, 64.65, 69.97, 46.9, 69.25, 61.12, 60.57, 62.25, 48.01, 35.38, 38.63, 60.69, 43.53, 48.03, 68.83, 68.79, 73.5, 42.73, 50.2, 46.38, 50.88, 70.14, 70.98, 69.68, 38.64, 65.72, 69.16, 54.6, 59.5, 48.02, 50.63, 62.02, 57.35, 43.98, 70.07, 64.01, 47.8, 35.39, 69.88, 69.12, 46.88, 66.0, 62.12, 41.17, 38.42, 60.88, 38.98, 28.61, 69.34, 61.86, 45.19, 61.23, 57.03, 58.5, 62.87, 50.73, 65.61, 49.52, 36.18, 51.88, 48.43, 36.2, 73.46, 58.03, 71.18, 48.68, 35.29, 38.13, 51.63, 73.47, 44.71, 47.49, 50.75, 62.15, 43.04, 64.5, 49.14, 58.62, 68.31, 64.46, 69.12, 62.89, 50.16, 67.78, 67.88, 43.02, 57.7, 59.36, 60.77, 50.99, 51.86, 46.98, 38.62, 64.26, 62.84, 30.99, 66.44, 70.63, 69.15, 50.43, 37.97, 53.02, 54.83, 32.72, 69.91, 60.26, 49.22, 60.52, 73.5, 71.58, 53.49, 57.19, 65.0, 44.31, 56.05, 34.98, 41.89, 62.3, 64.09, 43.74, 47.22, 55.51, 45.39, 69.69, 54.7, 71.03, 70.1, 66.82, 68.38, 59.75, 47.94, 60.68, 60.49, 39.29, 34.71, 46.08, 52.48, 70.2, 56.78, 56.47, 58.35, 56.69, 69.21, 71.18, 70.49, 68.2

```
4, 68.4, 42.32, 48.6, 40.73, 37.61, 40.01, 42.06, 52.43, 46.5, 50.14, 58.77, 43.43, 4
6.97, 52.84, 64.4, 70.92, 56.08, 45.54, 57.69, 51.17, 'Aaron Ciechanover', 68.71, 'ma
le', 'Aaron Ciechanover', 56.0, None)
(1982, 'Chemistry', '1', 3102518, 'Aaron Klug', 'male', 92.0, '1965-1970', 35.58, 66.
24, 49.47, 36.04, 65.05, 65.84, 69.18, 68.22, 70.83, 70.14, 62.62, 65.22, 61.09, 49.3
2, 64.59, 70.37, 70.71, 64.26, 40.87, 38.2, 44.72, 64.73, 53.37, 57.99, 65.95, 70.91,
38.04, 43.53, 41.97, 44.85, 72.15, 52.43, 40.16, 40.14, 71.6, 60.83, 55.47, 60.11, 4
4.48, 65.18, 67.46, 68.53, 68.17, 71.9, 69.99, 42.99, 72.93, 47.35, 56.95, 56.78, 51.
58, 53.92, 38.99, 42.15, 70.31, 46.69, 42.14, 60.58, 58.93, 69.72, 71.33, 64.4, 59.2
6, 44.65, 35.78, 66.65, 70.66, 48.62, 70.1, 63.0, 63.59, 64.59, 50.93, 36.14, 40.6, 6
1.55, 46.22, 51.07, 70.85, 69.45, 73.65, 46.02, 53.09, 49.18, 56.36, 70.76, 71.77, 7
0.93, 41.64, 67.61, 71.41, 58.38, 61.66, 50.75, 53.03, 64.88, 59.57, 45.48, 70.46, 6
5.36, 48.52, 37.92, 71.28, 69.78, 53.31, 68.09, 65.02, 43.54, 39.5, 63.34, 42.42, 30.
79, 70.73, 64.63, 47.93, 62.96, 60.69, 60.32, 64.64, 53.87, 68.35, 51.64, 38.14, 53.9
8, 51.2, 39.08, 73.64, 61.05, 71.26, 51.99, 35.62, 39.97, 57.24, 73.92, 48.55, 51.25,
54.09, 64.36, 46.87, 65.08, 51.52, 60.08, 69.79, 66.37, 70.72, 66.6, 52.49, 67.34, 6
8.47, 44.13, 61.41, 61.57, 63.94, 53.49, 54.42, 50.23, 38.41, 66.72, 64.39, 32.63, 6
7.2, 70.32, 69.17, 52.97, 39.99, 54.84, 58.78, 34.88, 71.37, 62.92, 51.24, 62.42, 74.
12, 72.57, 56.85, 59.26, 66.91, 45.83, 58.19, 37.49, 45.02, 64.01, 64.77, 48.33, 50.7
8, 57.61, 48.12, 70.66, 59.6, 71.71, 70.37, 68.3, 68.6, 61.6, 50.86, 63.27, 62.33, 4
1.23, 39.14, 47.83, 54.13, 70.51, 58.93, 58.62, 61.01, 58.78, 70.04, 71.85, 71.11, 6
9.79, 69.03, 44.42, 51.12, 42.7, 39.5, 41.82, 44.13, 54.23, 52.81, 53.78, 60.74, 46.6
4, 57.03, 55.52, 65.41, 70.92, 58.31, 49.14, 59.79, 55.48, 'Aaron Klug', 68.71, 'mal
e', 'Aaron Klug', 55.0, 92.0)
```

## Merge dfs to create visualizations

In [170...] `flat_file_df['avg_lifespan_1950'] = first_period_US`

C:\Users\Admin\AppData\Local\Temp\ipykernel\_14880\2527495610.py:1: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame.  
Try using `.loc[row_indexer,col_indexer] = value` instead

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)

```
flat_file_df['avg_lifespan_1950'] = first_period_US
```

In [171...] `flat_file_df.head()`

Out[171]:

	awardYear	category	portion	prizeAmountAdjusted	knownName	gender	years_lived	avg_lifespan
0	2001	Economic Sciences	1/3	12295082	A. Michael Spence	male	NaN	
1	1975	Physics	1/3	3404179	Aage N. Bohr	male	87.0	
2	2004	Chemistry	1/3	11762861	Aaron Ciechanover	male	NaN	
3	1982	Chemistry	1	3102518	Aaron Klug	male	92.0	
4	1979	Physics	1/3	2988048	Abdus Salam	male	70.0	

In [172...] `merged_dfs = pd.merge(flat_file_df, api_df, on=['knownName', 'gender'])`

In [173... merged\_dfs.head()

Out[173]:

	awardYear	category	portion	prizeAmountAdjusted	knownName	gender	years_lived	avg_lifespan
0	2001	Economic Sciences	1/3	12295082	A. Michael Spence	male	NaN	
1	1975	Physics	1/3	3404179	Aage N. Bohr	male	87.0	
2	2004	Chemistry	1/3	11762861	Aaron Ciechanover	male	NaN	
3	1982	Chemistry	1	3102518	Aaron Klug	male	92.0	
4	1979	Physics	1/3	2988048	Abdus Salam	male	70.0	

In [174... merged\_dfs.category.value\_counts()

Out[174]:

Physiology or Medicine	214
Physics	212
Chemistry	183
Literature	115
Peace	98
Economic Sciences	84

Name: category, dtype: int64

In [175... merged\_dfs.portion.value\_counts()

Out[175]:

1	324
1/2	304
1/3	211
1/4	67

Name: portion, dtype: int64

In [176... merged\_dfs.info()

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 906 entries, 0 to 905
Data columns (total 10 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   awardYear                            906 non-null    int64
1   category                             906 non-null    object
2   portion                              906 non-null    object
3   prizeAmountAdjusted                  906 non-null    int64
4   knownName                           906 non-null    object
5   gender                              906 non-null    object
6   years_lived                          623 non-null    float64
7   avg_lifespan_1950                    906 non-null    float64
8   age_at_award                         880 non-null    float64
9   lifespan                             650 non-null    float64
dtypes: float64(4), int64(2), object(4)
memory usage: 77.9+ KB
```

In [177... merged\_dfs.isnull().sum()

```
Out[177]: awardYear      0
category      0
portion       0
prizeAmountAdjusted  0
knownName     0
gender        0
years_lived   283
avg_lifespan_1950  0
age_at_award  26
lifespan      256
dtype: int64
```

```
In [178... merged_dfs.describe()
```

```
Out[178]:
```

	awardYear	prizeAmountAdjusted	years_lived	avg_lifespan_1950	age_at_award	lifespan
<b>count</b>	906.000000	9.060000e+02	623.000000	9.060000e+02	880.000000	650.000000
<b>mean</b>	1970.693157	6.124010e+06	79.860353	6.871000e+01	58.860227	80.226154
<b>std</b>	33.600524	3.274569e+06	10.776512	7.535913e-13	12.562010	10.780894
<b>min</b>	1901.000000	2.377268e+06	39.000000	6.871000e+01	16.000000	39.000000
<b>25%</b>	1947.000000	3.052326e+06	73.000000	6.871000e+01	49.750000	74.000000
<b>50%</b>	1976.000000	4.913422e+06	81.000000	6.871000e+01	59.000000	82.000000
<b>75%</b>	1999.750000	9.044276e+06	88.000000	6.871000e+01	68.000000	88.000000
<b>max</b>	2019.000000	1.229508e+07	103.000000	6.871000e+01	95.000000	103.000000

```
In [179... nobel_male = merged_dfs[merged_dfs['gender'] == 'male']
```

```
In [180... nobel_male.head()
```

```
Out[180]:
```

	awardYear	category	portion	prizeAmountAdjusted	knownName	gender	years_lived	avg_lifespan
<b>0</b>	2001	Economic Sciences	1/3	12295082	A. Michael Spence	male	NaN	
<b>1</b>	1975	Physics	1/3	3404179	Aage N. Bohr	male	87.0	
<b>2</b>	2004	Chemistry	1/3	11762861	Aaron Ciechanover	male	NaN	
<b>3</b>	1982	Chemistry	1	3102518	Aaron Klug	male	92.0	
<b>4</b>	1979	Physics	1/3	2988048	Abdus Salam	male	70.0	

```
In [181... nobel_female = merged_dfs[merged_dfs['gender'] == 'female']
```

```
In [182... nobel_female.head()
```

Out[182]:

	awardYear	category	portion	prizeAmountAdjusted	knownName	gender	years_lived	avg_lifes
7	2009	Chemistry	1/3	10958504	Ada E. Yonath	female	NaN	
39	2013	Literature	1	8365867	Alice Munro	female	NaN	
43	1982	Peace	1/2	3102518	Alva Myrdal	female	84.0	
78	1983	Physiology or Medicine	1	3715324	Barbara McClintock	female	90.0	
90	1905	Peace	1	7615202	Bertha von Suttner	female	71.0	

In [183... nobel\_male.describe()

Out[183]:

	awardYear	prizeAmountAdjusted	years_lived	avg_lifespan_1950	age_at_award	lifespan
count	855.000000	8.550000e+02	596.000000	8.550000e+02	832.000000	623.000000
mean	1969.992982	6.040718e+06	79.941275	6.871000e+01	58.965144	80.319422
std	33.406866	3.262114e+06	10.737740	7.393970e-13	12.389293	10.740990
min	1901.000000	2.377268e+06	39.000000	6.871000e+01	24.000000	39.000000
25%	1946.000000	3.050198e+06	74.000000	6.871000e+01	49.750000	74.000000
50%	1975.000000	4.907955e+06	82.000000	6.871000e+01	59.000000	82.000000
75%	1998.000000	9.044276e+06	88.000000	6.871000e+01	68.000000	88.000000
max	2019.000000	1.229508e+07	102.000000	6.871000e+01	95.000000	102.000000

In [184... nobel\_female.describe()

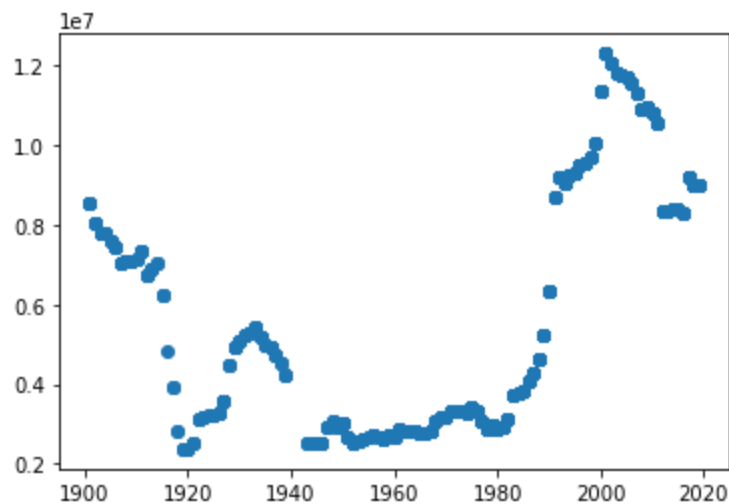
Out[184]:

	awardYear	prizeAmountAdjusted	years_lived	avg_lifespan_1950	age_at_award	lifespan
count	51.000000	5.100000e+01	27.000000	5.100000e+01	48.000000	27.000000
mean	1982.431373	7.520388e+06	78.074074	6.871000e+01	57.041667	78.074074
std	34.989858	3.196923e+06	11.671550	2.870452e-14	15.290045	11.671550
min	1903.000000	2.499993e+06	58.000000	6.871000e+01	16.000000	58.000000
25%	1963.500000	4.278428e+06	67.000000	6.871000e+01	49.250000	67.000000
50%	1995.000000	8.384572e+06	78.000000	6.871000e+01	56.000000	78.000000
75%	2009.000000	1.054556e+07	88.000000	6.871000e+01	69.000000	88.000000
max	2019.000000	1.180730e+07	103.000000	6.871000e+01	87.000000	103.000000

In [185...  
import matplotlib.pyplot as plt  
x = merged\_dfs['awardYear']  
y = merged\_dfs['prizeAmountAdjusted']



```
plt.scatter(x, y)
plt.show()
```



## Visualization 1: Compare adjusted price amount to year, by gender

In [ ]:

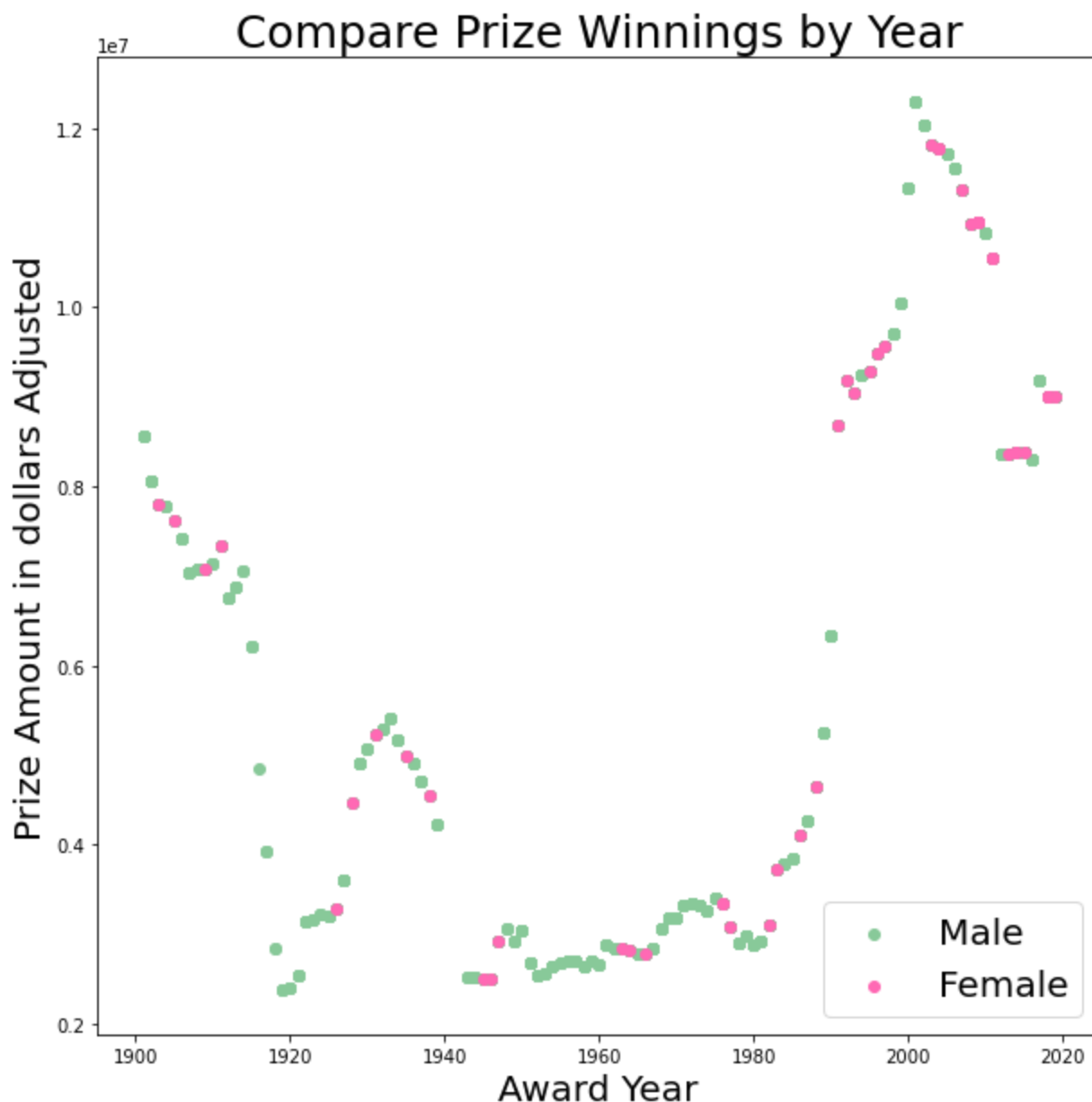
In [186...

```
fig = plt.figure()

fig.set_size_inches(10, 10)
x = nobel_male['awardYear']
y = nobel_male['prizeAmountAdjusted']
plt.scatter(x, y, color = '#88c999')

x = nobel_female['awardYear']
y = nobel_female['prizeAmountAdjusted']
plt.scatter(x, y, color = 'hotpink')
plt.xlabel('Award Year', fontsize=20)
plt.ylabel('Prize Amount in dollars Adjusted', fontsize=20)
plt.title('Compare Prize Winnings by Year', fontsize=25)
plt.legend(["Male", "Female"], fontsize=20, loc = "lower right")

plt.show()
```



## Visualization 2: Compare Laureates' Lifespan to Population at Large

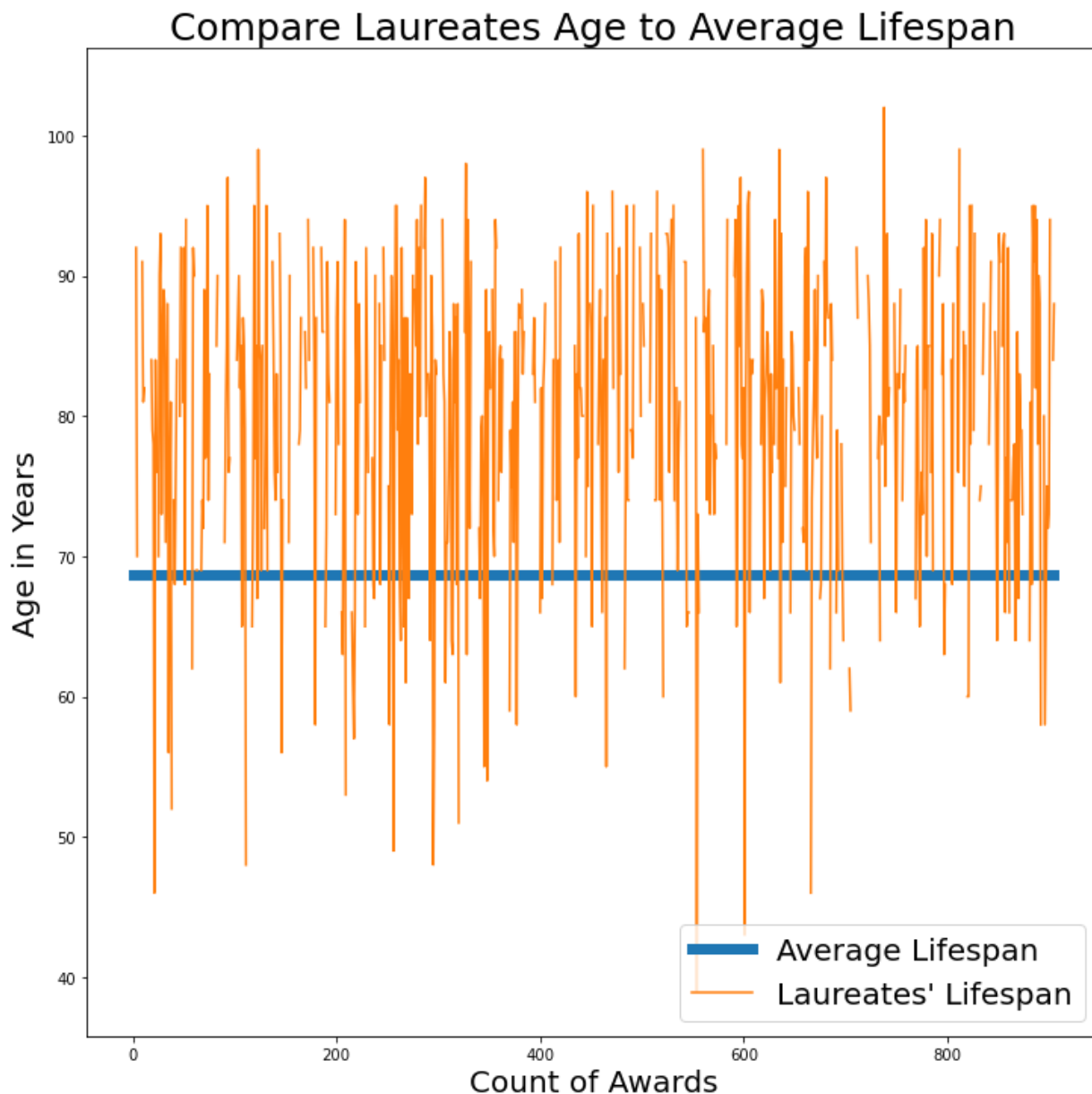
In [187...

```
fig = plt.figure()

fig.set_size_inches(12, 12)
x = np.arange(906)
y = merged_dfs.avg_lifespan_1950
plt.plot(x,y, linewidth=7)

x = np.arange(906)
y = merged_dfs.years_lived
plt.plot(x,y)
plt.xlabel('Count of Awards', fontsize=20)
plt.ylabel('Age in Years', fontsize=20)
```

```
plt.title('Compare Laureates Age to Average Lifespan', fontsize=25)
plt.legend(["Average Lifespan", "Laureates' Lifespan"], fontsize=20, loc="lower right")
plt.show()
```



## Laureates Outlived Average Person

## Visualization 3: Count of Laureates who shared award

```
In [188...] merged_dfs.portion.value_counts()
```

```
Out[188]:
```

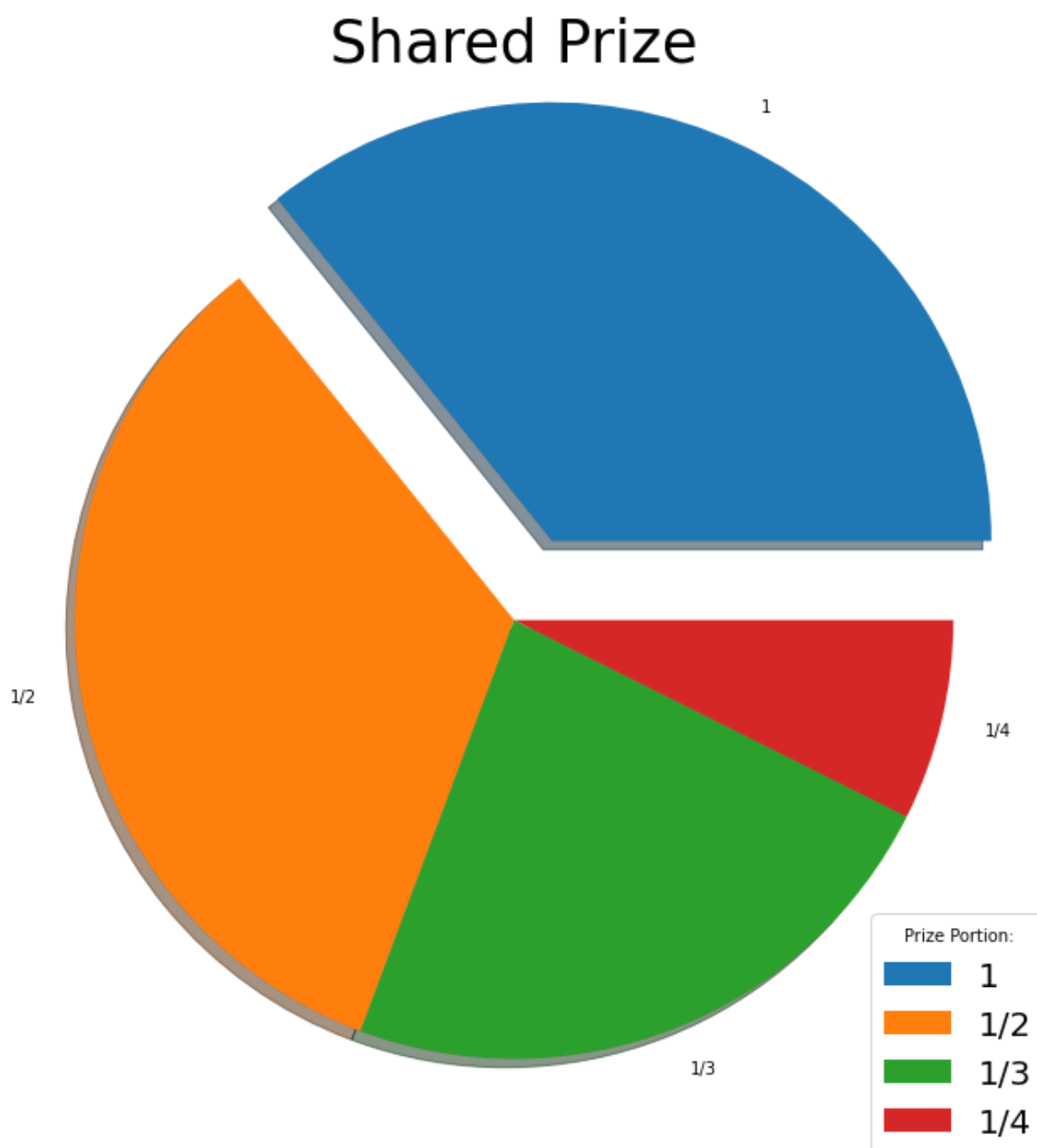
1	324
1/2	304
1/3	211
1/4	67

Name: portion, dtype: int64

In [189...

```
fig = plt.figure()

fig.set_size_inches(12, 12)
y = np.array([324, 304, 211, 67])
mylabels = ["1", "1/2", "1/3", "1/4"]
myexplode = [0.2, 0, 0, 0]
plt.pie(y, labels = mylabels, explode = myexplode, shadow = True)
plt.title('Shared Prize', fontsize=35)
plt.legend(title = "Prize Portion:", fontsize=20, loc = "lower right")
plt.show()
```



## Visualization 4

In [190...

```
fig = plt.figure()

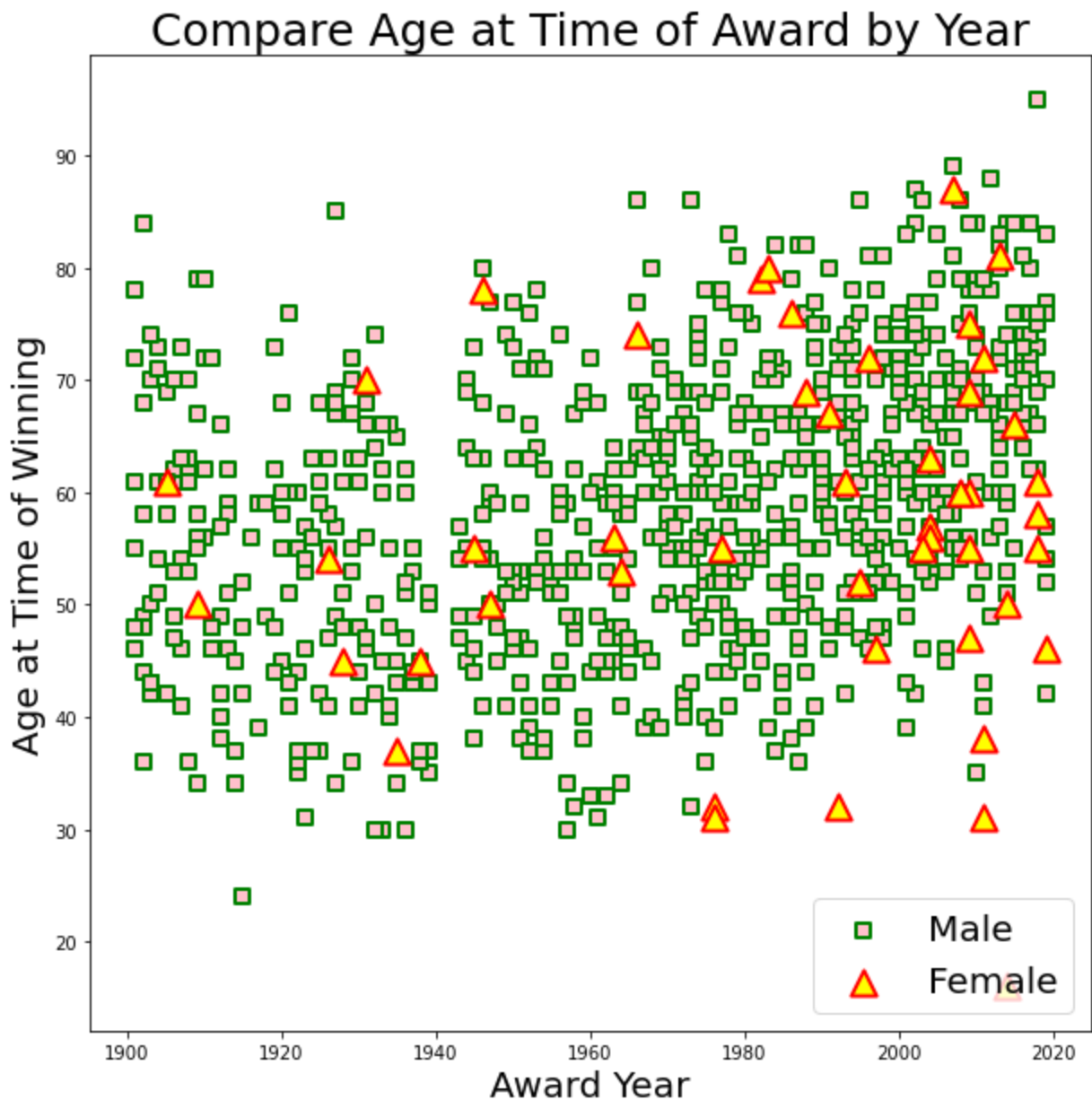
fig.set_size_inches(10, 10)
```

```
x = nobel_male['awardYear']
y = nobel_male['age_at_award']
plt.scatter(x, y, c="pink",
            linewidths = 2,
            marker = "s",
            edgecolor = "green",
            s = 50)

x = nobel_female['awardYear']
y = nobel_female['age_at_award']
plt.scatter(x, y, c="yellow",
            linewidths = 2,
            marker = "^",
            edgecolor = "red",
            s = 200)

plt.xlabel('Award Year', fontsize=20)
plt.ylabel('Age at Time of Winning', fontsize=20)
plt.title('Compare Age at Time of Award by Year', fontsize=25)
plt.legend(["Male", "Female"], fontsize=20, loc = "lower right")

plt.show()
```



There exists a slight upward trend where one would have expected a strong upward trend in age at time of winning, relative to the strong upward trend in life expectancy from the late 1800s through 2020.

## Visualization 5:

```
In [191]: '''albg = new_flat_df[['categoryFullName', 'gender', 'years_lived']]
albg.groupby('categoryFullName').mean().plot(kind='bar')'''

Out[191]: "albg = new_flat_df[['categoryFullName', 'gender', 'years_lived']]
nalbg.groupby('categoryFullName').mean().plot(kind='bar')"
```

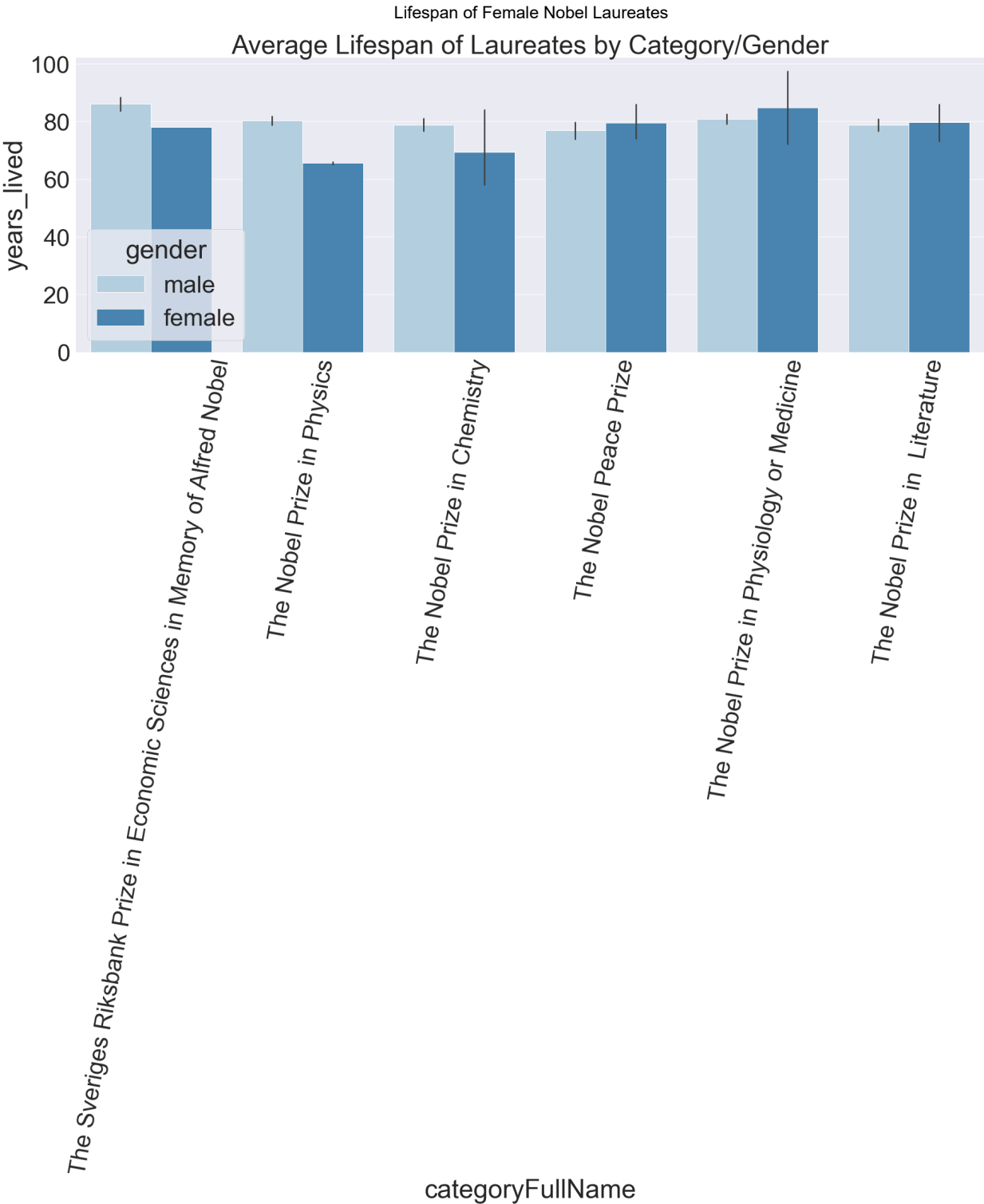
```
In [192]: '''gendercount_by_category.plot(kind='bar')
plt.xlabel('Number of Laureates')
plt.show()'''
```

```
Out[192]: "gendercount_by_category.plot(kind='bar')\nplt.xlabel('Number of Laureates')\nplt.show()"
```

## Visualization 5 Graph average lifespans of Laureates by category/gender

```
In [193]: fig = plt.figure()
sns.set(font_scale=4)

fig.set_size_inches(30, 10)
sns.barplot(x='categoryFullName', y='years_lived', hue='gender', data=new_flat_df, palette=
plt.title('Average Lifespan of Laureates by Category/Gender')
plt.xticks(rotation=80)
plt.show()
```



## Milestone 5

## Female Nobel Laureates

There is a plethora of data about Nobel Laureates, easily and freely accessible in csv file, webpage, and API formats. The data is not cleaned and some wrangling must be performed in order to make it usable. There is a significant number of null values throughout the data. Therefore, discounting the nulls is not an option for doing so would skew true results. The best



plan to deal with the null values is to complement the datasets with each other. I used this same strategy to deal with differences in string names. Fuzzy Matching was a boon in comparing name columns both within a df and between dfs.

The most impressive piece of data is the Laureate discrepancy between genders...869 to 54. Females comprise only slightly more than six percent of Laureates. Females performed best in the 'liberal arts' prizes of Peace and Literature, where they garnered 17 out of 107 and 15 out of 116 prizes respectively. Even in Physiology and Medicine where women have been better presented in the world at large, females have fared poorly, winning only 12 out of 219 awards. In Chemistry women have won 5 out of 184 times, in Physics 3 out of 213, and in Economics 2 out of 84 times. These discrepancies are glaring and clearly statistically significant. This trend holds true through all categories. There exists too great of a difference between males and females to entertain a possibility that these results are due to chance.

Less apparent are any age correlations with Nobel awards. It is a veritable impossibility to get an accurate baseline for mean lifespan. Statistics show an average expected lifetime for a person born during a specific year. One must note that this average lifespan for a human born during a certain year assumes a flat line of average lifespans throughout the expected decades of his life. Needless to say, lifespan averages change over time. For instance, until the Covid-19 pandemic lifespans had been growing in the United States of America. In addition it is an open ethical question if appropriate to compare female U.S. Laureates to the average U.S. lifespan. There is a disproportionate number of Nobel Laureates for the U.S. who hail from other countries and who are immigrants. Should they be qualified as belonging to the country which they were born in, won the award in, lived longest in, or died in? One must include U.S.A. female laureates in any study because no other country boasted more than five female winners. No country after U.S.A. and France boasts more than 2 female Laureates. The statistics show no great differences between male and female Laureates, and no great difference between female Laureates and the population at large. There does not exist a large enough sample of female Laureates of any category, whether it be country, year, or award category to extrapolate to the population at large. The data shows nothing about the demographics of the winners like social caste or wealth. It would therefore be ethically inappropriate to extrapolate anything about lifespans of academically and intellectually successful women from this paltry data sample.

This EDA is in accordance with the European General Data Protection Regulation, including its most recent regulations(<https://gdpr-info.eu/art-5-gdpr/>). Ethical accountability belongs to me. I am responsible for ensuring that all ethical implications are considered. The data used is public and there are no privacy issues to contend with presently, and no privacy issues for downstream users of the data. If one were to strive to ensure anonymity, he could anonymize the data. The names are not necessary for any results or conclusions. Names were used to merge the data correctly. All of the data sources were open. Careful attention was paid to any biases in modeling and I attempted all reasonable modeling. There is transparency in the EDA which ensures reproducibility and proof of an objective point of view in assessing the data. I strived to represent the data conclusions precisely and clearly to protect against someone misconstruing it.

In [ ]: